

Altivar Process ATV6100

Variable Speed Drives

Programming Manual

BRU16021.04

07/2025



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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Qualification Of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended Use

This product is a drive for three-phase synchronous, asynchronous motors and intended for industrial use according to this manual.

The product may only be used in compliance with all applicable safety standard and local regulations and directives, the specified requirements and the technical data. The product must be installed outside the hazardous ATEX zone. Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented. Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design). Any use other than the use explicitly permitted is prohibited and can result in hazards.

Product Related Information

Read and understand these instructions before performing any procedure with this drive.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Before performing work on the drive system:

- Follow the instructions given in the section "Complete drive system power Off procedure" of the installation manual.

Before applying voltage to the drive system:

- Verify that the work has been completed and that the entire installation cannot cause hazards.
- Remove the ground and the short circuits on the mains input terminals and the motor output terminals.
- Verify proper grounding of all equipment.
- Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

Failure to follow these instructions will result in death or serious injury.

⚠ ⚠ DANGER**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

- Only appropriately trained persons who are familiar with and fully understand the contents of the present manual and all other pertinent product documentation and who have received all necessary training to recognize and avoid hazards involved are authorized to work on and with this drive system.
- Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Prior to performing any type of work on the drive system, block the motor shaft to prevent rotation.
- Insulate both ends of unused conductors of the motor cable
- Do not create short circuits across the DC bus terminals or the DC bus capacitors.

Failure to follow these instructions will result in death or serious injury.

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

⚠ ⚠ DANGER**ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION**

Do not use damaged products or accessories.

Failure to follow these instructions will result in death or serious injury.

Contact your local Schneider Electric sales office if you detect any damage whatsoever.

⚠ WARNING**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines (1).
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.

NOTICE**DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE**

Before switching on and configuring the product, verify that it is approved for the mains voltage.

Failure to follow these instructions can result in equipment damage.

⚠ WARNING**HOT SURFACES**

- Ensure that any contact with hot surfaces is avoided.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the product has sufficiently cooled down before handling it.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

About the Book

Document Scope

The purpose of this document is to:

- help you to set up the drive,
- show you how to program the drive,
- show you the different menus, modes, and parameters,
- help you in maintenance and diagnostics.

Validity Note

NOTE: The products listed in the document are not all available at the time of publication of this document online. The data, illustrations and product specifications listed in the guide will be completed and updated as the product availabilities evolve. Updates to the guide will be available for download once products are released on the market.

This documentation is valid for the Altivar Process ATV6100 Medium Voltage Drives.

The technical characteristics of the devices described in this document also appear online. To access this information online:

Step	Action
1	Go to the Schneider Electric home page www.se.com .
2	In the Search box type the reference of the product or the name of a product range. <ul style="list-style-type: none"> • Do not include blank spaces in the reference or product range. • To get information on grouping similar modules, use asterisks (*).
3	If you entered a reference, go to the Product Datasheets search results and click on the reference that interests you. If you entered the name of a product range, go to the Product Ranges search results and click on the product range that interests you.
4	If more than one reference appears in the Products search results, click on the reference that interests you.
5	Depending on the size of your screen, you may need to scroll down to see the data sheet.
6	To save or print a data sheet as a .pdf file, click Download XXX product datasheet .

The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Related Documents

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.se.com.

The internet site provides the information you need for products and solutions:

- The whole catalog for detailed characteristics and selection guides,
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation,

Title of Documentation	Reference number
ATV6100 Handbook	BRU16010 (English)
ATV6100 Installation Manual	BRU15995 (English)
ATV6100 Programming manual	BRU16021 (English)
Recommended Cybersecurity Best Practices	CS-Best-Practices-2019-340 (English)

You can download these technical publications and other technical information from our website at www.se.com/ww/en/download.

Terminology

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

In the area of drive systems this includes, but is not limited to, terms such as **error**, **error message**, **failure**, **fault**, **fault reset**, **protection**, **safe state**, **safety function**, **warning**, **warning message**, and so on.

Among others, these standards include:

- IEC 61800 series: Adjustable speed electrical power drive systems
- IEC 61508 Ed.2 series: Functional safety of electrical/electronic/programmable electronic safety-related
- EN 954-1 Safety of machinery - Safety related parts of control systems
- ISO 13849-1 & 2 Safety of machinery - Safety related parts of control systems
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC 61784 series: Industrial communication networks - Profiles
- IEC 60204-1: Safety of machinery - Electrical equipment of machines – Part 1: General requirements

In addition, the term **zone of operation** is used in conjunction with the description of specific hazards, and is defined as it is for a **hazard zone** or **danger zone** in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Contact Us

Select your country on:

www.se.com/contact

Schneider Electric Industries SAS

Head Office

35, rue Joseph Monier

92500 Rueil-Malmaison

France

Cyber Security

Overview

Introduction

The objective of Cyber Security is to help provide increased levels of protection for information and physical assets from theft, corruption, misuse, or accidents while maintaining access for their intended users.

No single Cyber Security approach is adequate. Schneider Electric recommends a defense-in-depth approach. Conceived by the **National Security Agency (NSA)**, this approach layers the network with security features, appliances, and processes.

The basic components of this approach are:

- Risk assessment
- A security plan built on the results of the risk assessment
- A multi-phase training campaign
- Physical separation of the industrial networks from enterprise networks using a demilitarized zone (DMZ) and the use of firewalls and routing to establish other security zones
- System access control
- Device hardening
- Network monitoring and maintenance

This chapter defines the elements that help you configure a system that is less susceptible to cyber attacks.

Network administrators, system integrators and personnel that commission, maintain or dispose of a device should:

- Apply and maintain the device's security capabilities. See Device Security Capabilities sub-chapter for details
- Review assumptions about protected environments. See Protected Environment Assumptions sub-chapter for details
- Address potential risks and mitigation strategies. See Product Defense-in-Depth sub-chapter for details.
- Follow recommendations to optimize cyber security.

For detailed information on the system defense-in-depth approach, refer to the TVDA: STN - How can I reduce vulnerability to cyberattacks v3 Feb2019 on se.com.

To submit a Cybersecurity question, report security issues, or get the latest news from Schneider Electric, visit the [Schneider Electric website](#).

▲ WARNING
POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY
<ul style="list-style-type: none">• Change default password to help prevent unauthorized access to device settings and information.• Disable unused ports/services and default accounts, where possible, to minimize pathways for malicious attacks.• Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).• Use cybersecurity best practices (for example: least rights, separation of duties) to help prevent unauthorized exposure, loss or modification of data and logs, interruption of services, or unintended operation.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Protected Environment Assumptions

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

▲ WARNING
UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS
<ul style="list-style-type: none">• In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cyber security concept.• Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering IT security and cyber security (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security Forum - Standard of Good Practice for Information Security, SE recommended Cybersecurity Best Practices*).• Verify the effectiveness of your IT security and cyber security systems using appropriate, proven methods.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

(*) : SE Recommended Cybersecurity Best Practices can be downloaded on [SE.com](#).

Before considering cybersecurity practices on the device, please pay attention to following points:

- Cybersecurity governance – available and up-to-date guidance on governing the use of information and technology assets in your company.
- Perimeter security – installed devices, and devices that are not in service, are in an access-controlled or monitored location.

- Emergency power – the control system provides the capability to switch to and from an emergency power supply without affecting the existing security state or a documented degraded mode.
- Firmware upgrades – the ATV6100 upgrades are implemented consistently to the current version of firmware available on request from Schneider Electric Customer Care Center.
- Controls against malware – detection, prevention, and recovery controls to help protect against malware are implemented and combined with appropriate user awareness.
- Physical network segmentation – the control system provides the capability to:
 - Physically segment control system networks from non-control system networks.
 - Physically segment critical control system networks from non-critical control system networks.
- Logical isolation of critical networks – the control system provides the capability to logically and physically isolate critical control system networks from non-critical control system networks. For example, using VLANs.
- Independence from non-control system networks – the control system provides network services to control system networks, critical or non-critical, without a connection to non-control system networks.
- Encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution.
- Zone boundary protection – the control system provides the capability to:
 - Manage connections through managed interfaces consisting of appropriate boundary protection devices, such as: proxies, gateways, routers, firewalls, and encrypted tunnels.
 - Use an effective architecture, for example, firewalls protecting application gateways residing in a DMZ.
 - Control system boundary protections at any designated alternate processing sites should provide the same levels of protection as that of the primary site, for example, data centers.
- No public internet connectivity – access from the control system to the internet is not recommended. If a remote site connection is needed, for example, encrypt protocol transmissions.
- Resource availability and redundancy – ability to break the connections between different network segments or use duplicate devices in response to an incident.
- Manage communication loads – the control system provides the capability to manage communication loads to mitigate the effects of information flooding types of DoS (Denial of Service) events.
- Control system backup – available and up-to-date backups for recovery from a control system failure

Security Policy

▲ WARNING
ACCESSIBILITY LOSS <ul style="list-style-type: none">• Setup a security policy to your device and backup the device image with security administrator user account.• Define and regularly review the password policy.• Periodic change of the passwords, Schneider Electric recommends a modification of the password each 90 days. Failure to follow these instructions can result in death, serious injury, or equipment damage.

Cybersecurity helps to provide:

- Confidentiality (to help prevent unauthorized access)
- Integrity (to help prevent unauthorized modification)
- Availability/authentication (preventing the denial of service and assuring authorized access)
- Non-repudiation (preventing the denial of an action that took place)
- Traceability/detection (logging and monitoring)

For an efficient security, the instructions and procedures should structure the roles and responsibilities in terms of security within the organization; in other words, who is authorized to perform what and when. These should be known by the users.

The anti-intrusion and anti-physical access to any sensitive installation should be set up.

All the security rules implemented in the ATV6100 are in complement of the points above.

The device does not have the capability to transmit data encrypted using the following protocols: HTTP, Modbus slave over serial, Modbus slave over Ethernet. If other users gained access to your network, transmitted information can be disclosed or subject to tampering.

▲ WARNING
CYBERSECURITY HAZARD <ul style="list-style-type: none">• For transmitting data over an internal network, physically or logically segment the network, the access to the internal network needs to be restricted by using standard controls such as firewalls.• For transmitting data over an external network, encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution. Failure to follow these instructions can result in death, serious injury, or equipment damage.

The access through the digital inputs is not controlled.

The ATV6100 have the capability to export its settings and files manually. It is recommended to archive any settings and files (device backup images, device configuration, device security policies) in a secure area.

Product Defense-in-Depth

Use a layered network approach with multiple security and defense controls in your IT and control system to minimize data protection gaps, reduce single-points of failure and create a strong cybersecurity posture. The more layers of security in your network, the harder it is to breach defenses, take digital assets or cause disruption.

Device Security Capabilities

The ATV6100 offers the following security features:

Threats	Desired security property on Embedded Device	security features
Information disclosure	Confidentiality	Password encrypted in a non-reversible way
		User access control
Denial of Service	Availability	Device backup/restore
		Achilles Level 1
Spoofing/Elevation of privilege	User Authenticity / Authorization	Strong password policy

Confidentiality

Information confidentiality capacity prevents unauthorized access to the device and information disclosure.

- The user access control helps on managing users that are authorized to access the device. Protect user credential at usage.
- The user's passwords are encrypted in non-reversible way at rest

Information affecting the security policy of the device is encrypted in transit.

Device Integrity Protection

The device integrity protection prevents unauthorized modification of the device with tampered or spoofed information.

This security capability helps protect the authenticity and integrity of the firmware running on the ATV6100 HMI and facilitates protected file transfer: digitally signed firmware is used to help protect the authenticity of the firmware running on the ATV6100 and only allows firmware generated and signed by Schneider Electric.

- Cryptographic signature of the firmware package executed at the firmware update

User Authenticity and Authorization

The user authentication helps prevent the repudiation issue by managing user identification and prevents information disclosure and device integrity issues by unauthorized users.

These security capabilities help enforce authorizations assigned to users, segregation of duties and least rights:

- User authentication is used to identify and authenticate software processes and devices managing accounts
- Authorization managed according to channels

In line with user authentication and authorization, the device has access control cryptographic features to check user credential before access is granted to the system.

In the ATV6100, the control of accessibility to the settings, parameters, configuration, and logging database is done with a user authentication after "Log in", with a name and password.

Potential Risks and Compensating Controls

Address potential risks using these compensating controls:

Area	Issue	Risk	Compensating controls
User accounts.	Default account settings are often the source of unauthorized access by malicious users.	If you do not change default password or disable the user access control, unauthorized access can occur.	Ensure User access control is enabled on all the communication ports and change the default passwords to help reduce unauthorized access to your device.
Secure protocols.	Modbus serial, Modbus TCP protocols are insecure. The device does not have the capability to transmit data encrypted using these protocols.	If a malicious user gained access to your network, they could intercept communication.	For transmitting data over internal network, physically or logically segment your network. For transmitting data over external network, encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution. See Protected Environment Assumptions, page 15.

Data Flow Restriction

A firewall device is required to secure the access to the device and limit the data flow.

For detailed information, refer to the TVDA: STN - How can I reduce vulnerability to cyberattacks v3 Feb2019 on the Schneider Electric website.

Password

Changing Password

For the first-time login of Manager and Master level accounts, users are enforced to change the default password to a new password following the password policy.

The user password can be changed from the HMI configuration screen, User Manage, page 216.

Password Policy

By default, the password policy of the ATV6100 complies with IEEE 1686–2013 as following:


- 8 characters minimum with ASCII [32 to 122] characters
- At least one digit (0-9)
- At least one special character (for example @, \$)

Password Failure Attempt

Users are allowed to make 5 attempts to enter the password. After 5 incorrect entries, the account will be locked for 10 minutes.

After an incorrect entry, the prompt will display the remaining retry attempts.


Login Incorrect password. Attempts remaining: 4

 Username:

Password:

After 5 incorrect entries, the prompt will display the remaining lock time.

Login Please try again in 9 minutes and 42 seconds.

 Username:

Password:

User Log-out Function

In System state of Diagnostic Menu, the user can manually log out by clicking the Logout button. After logging out, the user will be switched to the home menu. Refer to Logout, page 44.

Access Level Control on HMI

Overview

Operator, manager and master are allowed to use HMI panel and related functions.

For more details regarding access level and password management, refer to [User Manage] Menu, page 216 .

NOTE: Only the Commissioning Engineers certified by Schneider Electric are allowed to perform commissioning action.

NOTE: After logging into the Manager or Master account, if there is no user operation for 5 minutes, the user will be logged out.

Operator Level Access

The operator has Read-only access to the tabs and drive-functionalities, predefined for the operator.

Manager Level Access

The manager access to change parameters related to speed setting and export of event recorder and parameter report.

Only a user, certified by Schneider Electric or a Support Engineer are provided Manager Level access.

Master Level Access

The Master has the access to all parameters.

Service Engineer, commissioning Engineer responsible to commission, configure and set the drive regarding user requirements.

Access Levels for the HMI panel

User profile	Home	Display	Diagnostics	Parameter report	Settings
Operator	√	√	√	-	-
Manager	√	√	√	√	R
Master	√	√	√	√	√

√ : Full access

R : Limited access

- : No access

Master Controller

What's in This Part

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Master Controller Interface Introduction

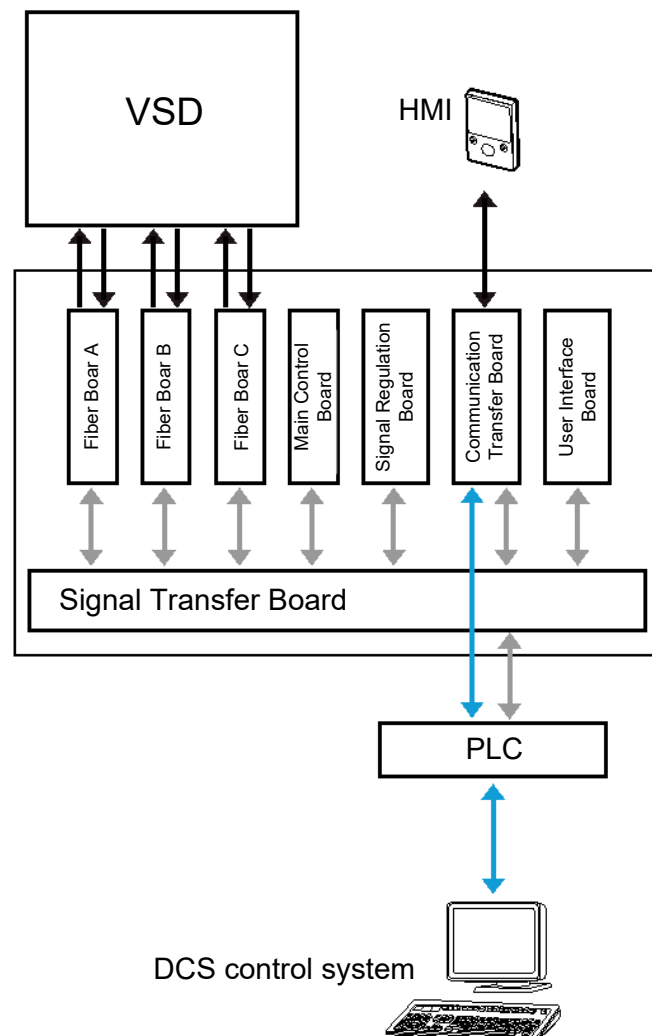
Introduction

Master controller system of Schneider Electric series AC VSD products is under coordinate control of multiple high performance microprocesses, enabling monitoring and control of real-time status of VSD system comprised of drive and motor. Hardware of its control system consists of the following components: DSP master control unit, embedded integrated human machine interface (HMI) and PLC.

Master control unit takes high performance Digital Signal Processor chip as its control core, accompanied by massive field-programmable gate arrays (FPGAs) and Complex Programmable Logic Devices (CPLDs), building a hardware platform to control power unit series MV large-size AC motor. On the basis of such platform, a number of high performance motor control programs including speed sensorless vector control of asynchronous and synchronous motor have been achieved.

Based on Linux software platform of high performance ARM processor chip, embedded integrated HMI has enabled interface-friendly human machine control interface with multiple languages and rich functions, and provided detailed historical records of system state monitoring and operation.

The electrical logic control of the VSD system uses PLC to provide logic synthesis for the status of user site and VSD itself, providing effective logic judgment and real-time protection. The interconnection relation between each component of VSD control system is as shown in Figure below.



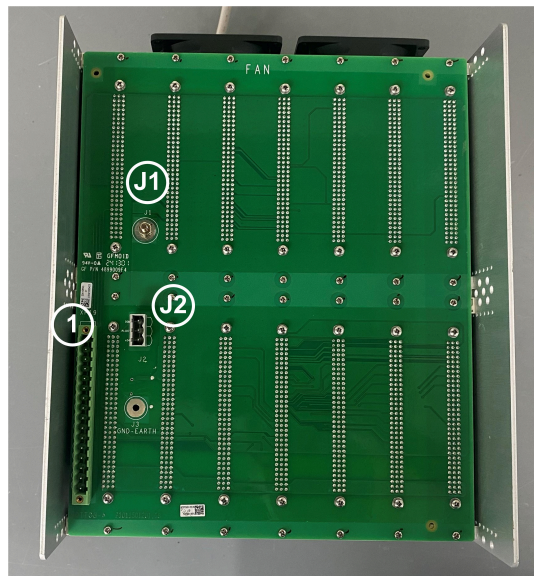
Master Controller view

Master Controller Front view



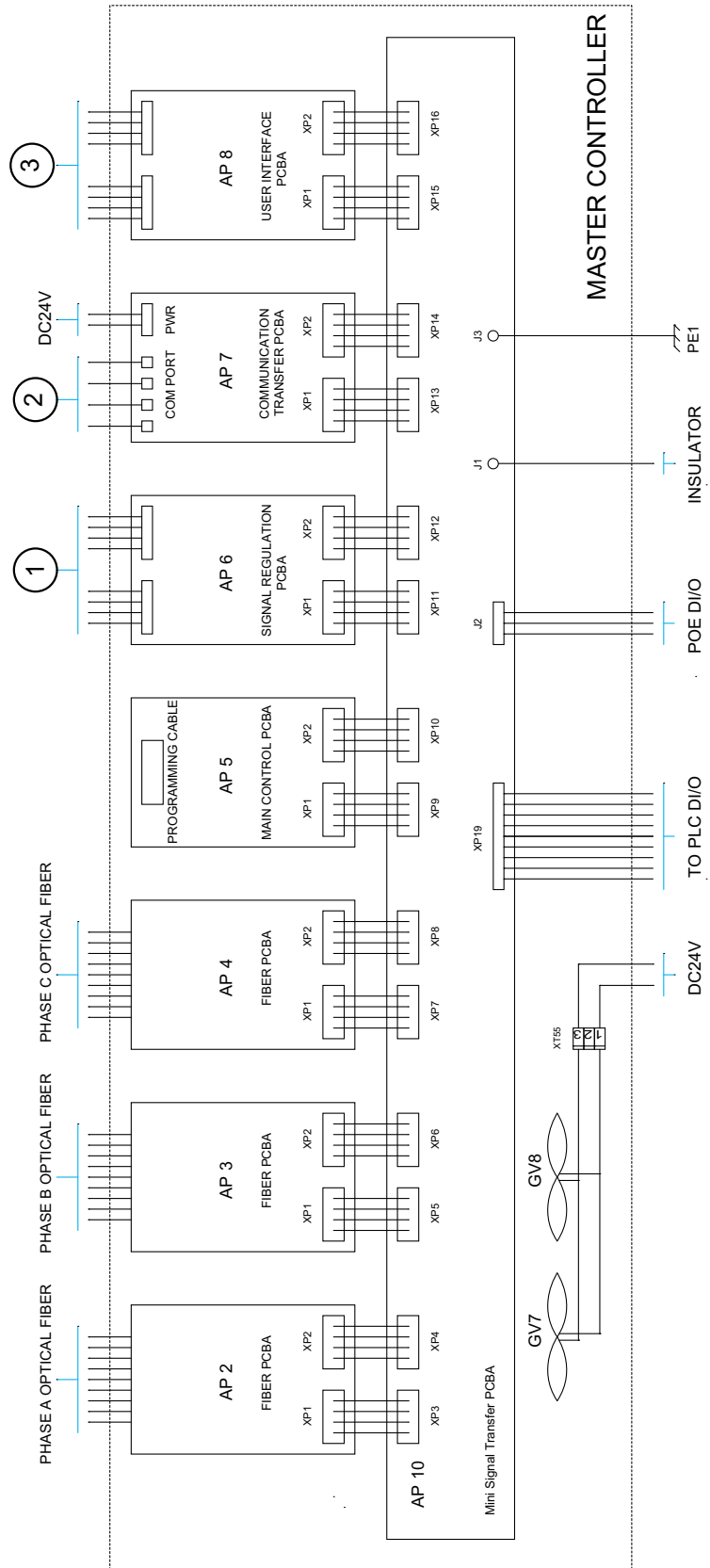
- 1 FIBER
- 2 CONTROL
- 3 SIGNAL
- 4 COM IN
- 5 INTERFACE

Master Controller Rear view



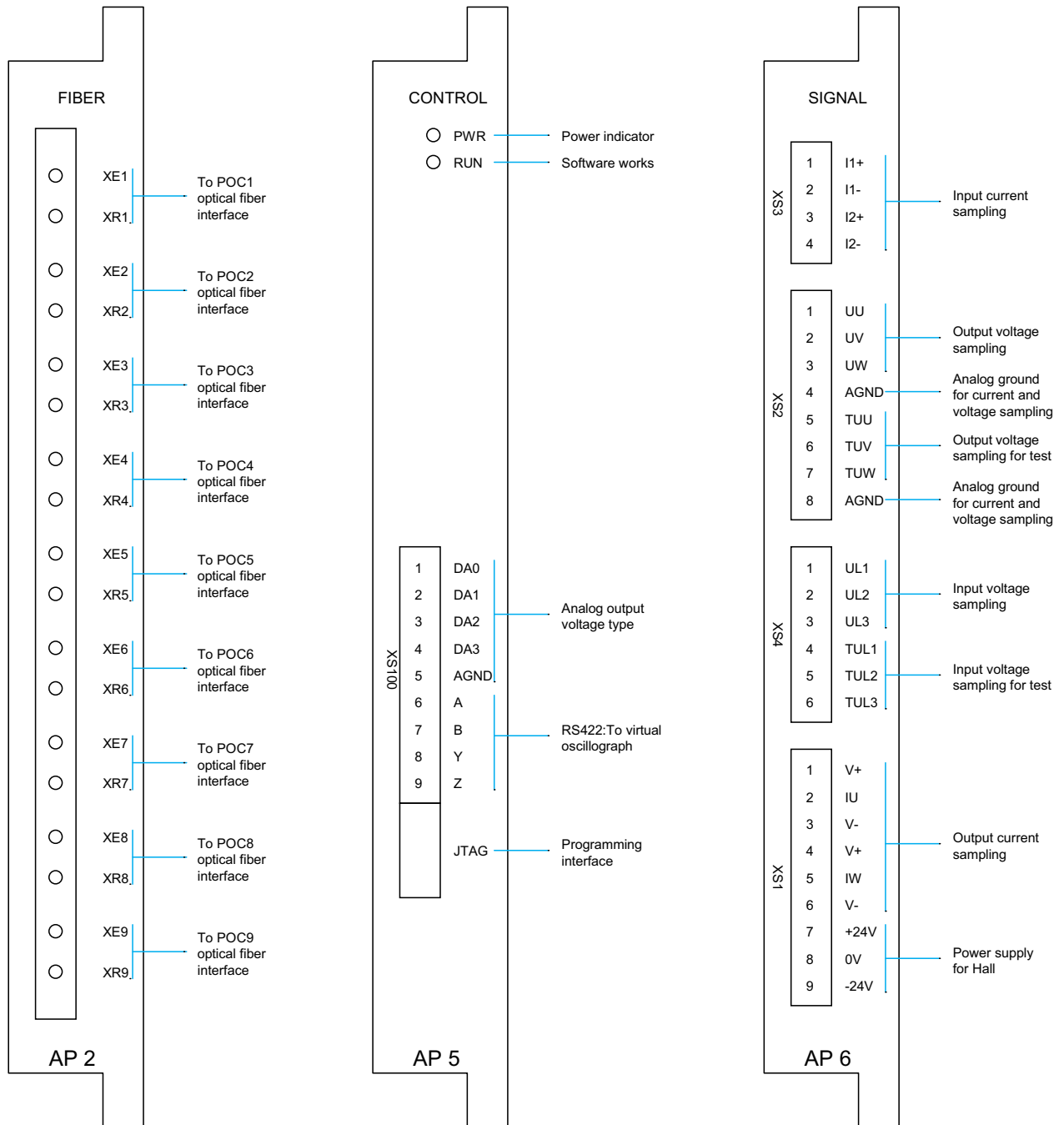
1, J1, J2 See on the **Signal Transfer Board Interface** below

Overview Master Controller and the Board Interface

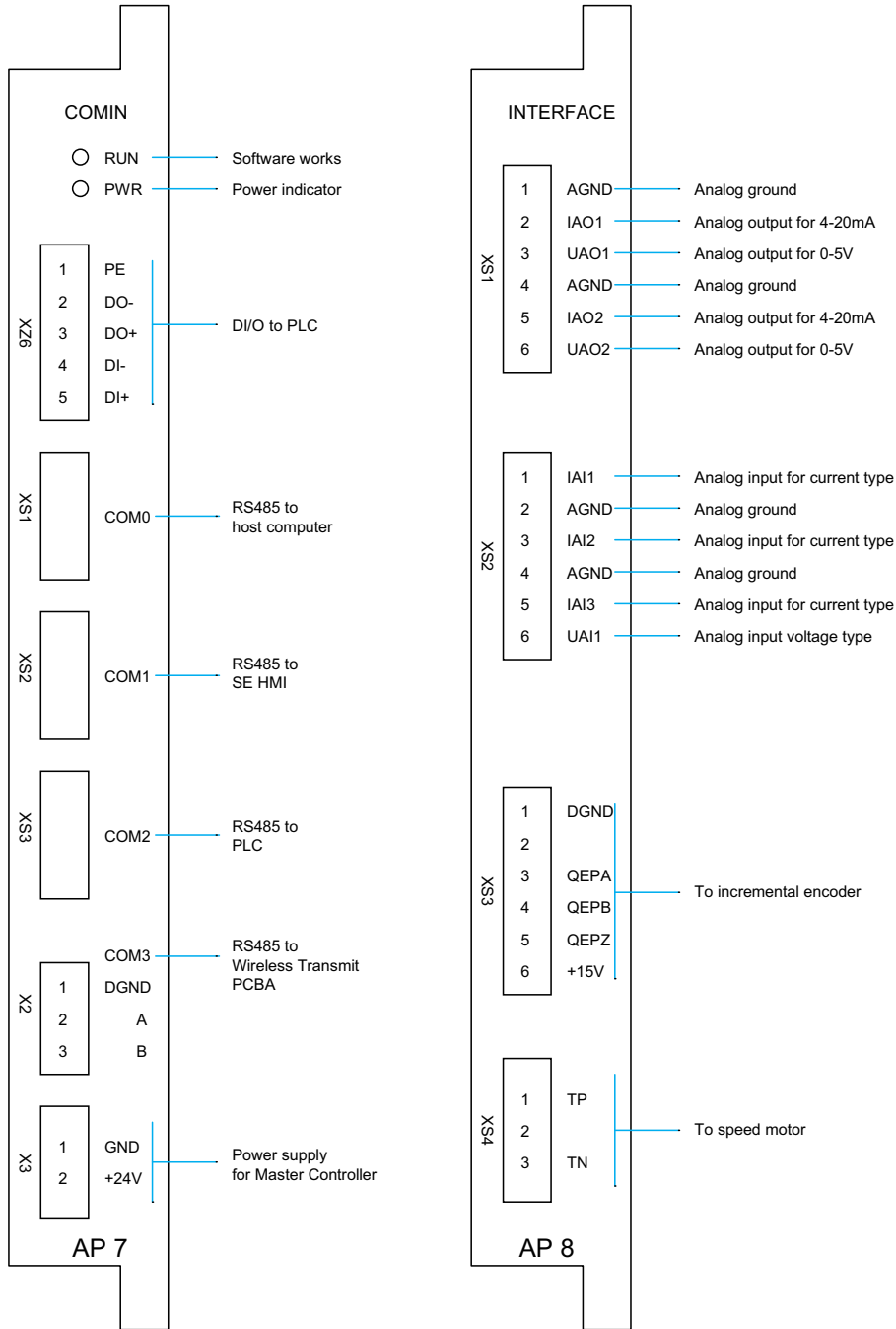


Items	Description
①	Linked to AP6: Signal board interface.
②	Linked to AP7: COMIN board interface.
③	Linked to AP8: Interface board interface, page 29.

Description of Board Interface



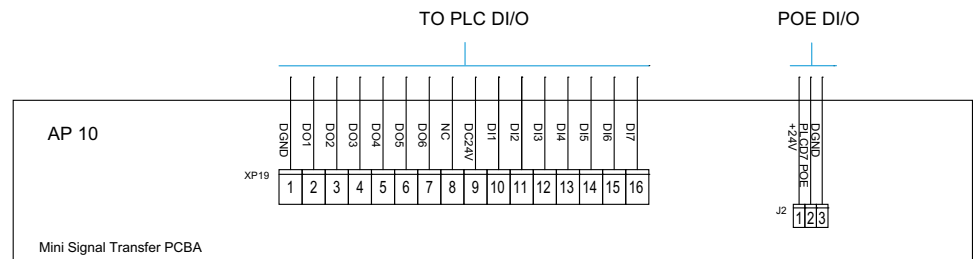
Description of master controller panel interface AP2, AP5, AP6.



Description of master controller panel interface AP7, AP8.

Signal Transfer Board Interface

The pin terminal definitions (including 16 pin terminal and 3 pin terminal) are shown as follows:



Special 3P terminal **J2**⁽¹⁾ of POE function is designed in new master controller's signal transfer board. If the POE function is not used, the PIN2 and PIN3 have to be connected, otherwise the master controller will not operate normally.

By default, J1 is not grounded. However, there may be special cases where it is grounded.

(1) : See "Master Controller rear view" above.

Communication transfer board

The top terminal (DO-, DO+, DI-, DI+) are not used in current version of new master controller.

The top terminal (PE) is used to connect DB25 cable's shield with Ground (Earth, by default is not connected to Ground).

User Interface board

Two 4-20 mA analog outputs (AGND, IAO1, IAO2) which are used for field application; two 0-5 V analog outputs (UAO1, UAO2) which are not used in current version of new master controller.

Three 4-20 mA analog inputs (AGND, IAI1, IAI2, IAI3) which are used for field application; One 0-10 V analog input (UAI1) which is not used in current version of new master controller.

Human Machine Interface (HMI)

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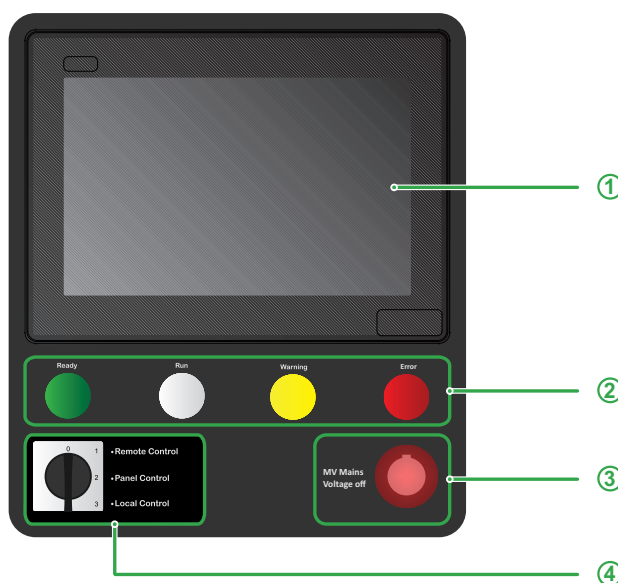
Interface

Introduction

Functions and parameters described in this document are based on the ATV6100 HMI.

HMI Panel

The HMI Panel is a local control unit which is mounted on the front door of the product. The HMI Panel embeds a real time clock used for the time stamping of logged data and all other functions which require time information.



The HMI Panel is divided into 4 zones

Number	Description
①	Interface display: 10" Touch advanced display
②	Drive status pilots light: <ul style="list-style-type: none"> • Ready: Indicates that the drive is not running, ready to start. • Run: Indicates that the drive is running. • Warning: Indicates a drive detected warning. • Error: Indicates a drive detected error.
③	MV Mains Voltage Off: Pushing the button will disable the output and open the user's MV switch.
④	Front HMI options Local/Remote/Panel Switch: Used to switch between local, remote and panel control of the drive. Refer to the Cabinet Switch Selection, page 32.

NOTE: In this manual, the terms HMI Panel and Graphic display terminal can be used interchangeably when referring to the HMI Magelis terminal.

Cabinet Switch Selection

⚠ WARNING

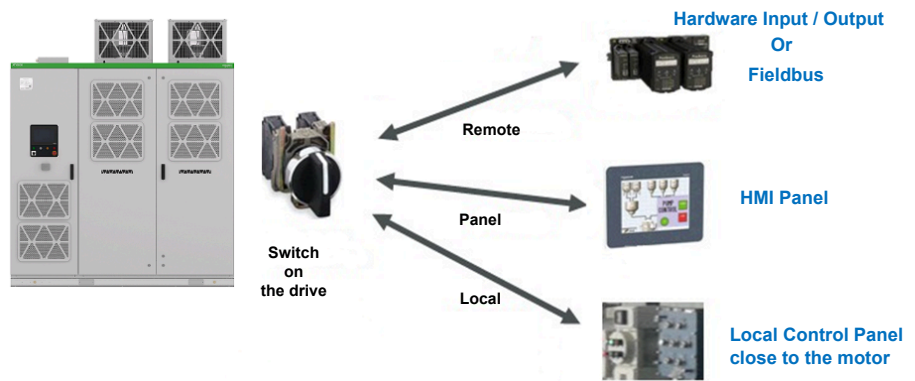
UNANTICIPATED EQUIPMENT

Verify that the motor is at a standstill before modifying the position of the selector switch for the control mode at the drive.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

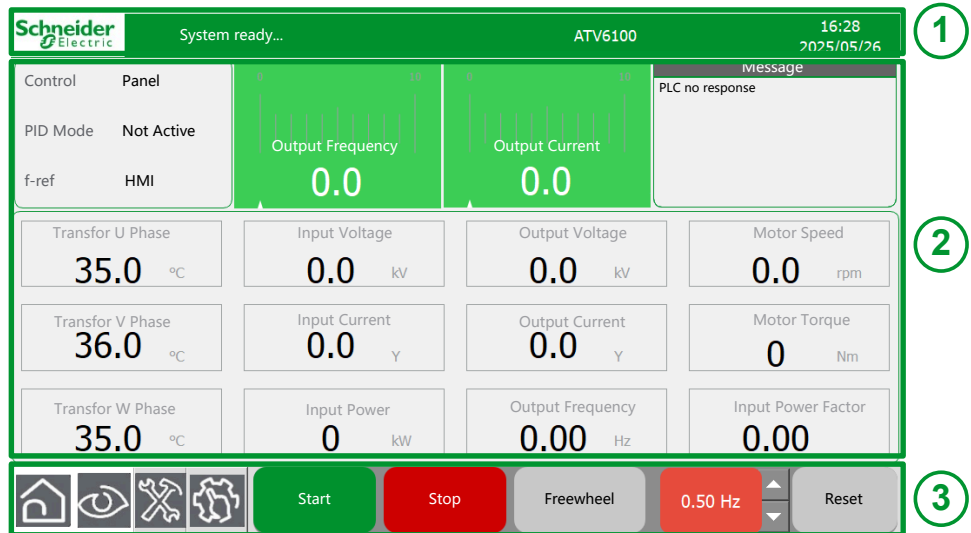
The stop commands (DI STOP in 3 wires control, NST) set for each of the channel command "remote/local/panel" will continue to be taken into account whatever the active channel command.

To select the different control mode, this switch can have up to 3 positions in the enclosure door:



Type of Control	Description
Remote Control	Control system drive receives start/stop inputs via IO or fieldbus.
Panel Control	Control system drive receives inputs via HMI Panel.
Motor Local Control	Control system drive receives via start/stop IO or push button on your equipment.

Working Space Description



The main works area is divided into 3 main zones:

Items	Description
①	A Status bar at the top For details, refer to Status Bar Description, page 34.
②	Screens area For details, refer to: <ul style="list-style-type: none"> • Home Menu Panel, page 37 • Display Menu Panel, page 38 • Diagnostic Menu Panel, page 41 • Settings Menu panel, page 49
③	A Toolbar at the bottom of the working area. For details, refer to Toolbar Description, page 34.

Toolbar and Status Bar

Status Bar Description



The status bar, located at the top of the working area, is divided in 4 zones:

Items	Description
①	Displays Schneider Electric logo.
②	Indicates drive status.
③	Indicates your drive part number.
④	Indicates date and time. You can change the date and time by clicking on it.

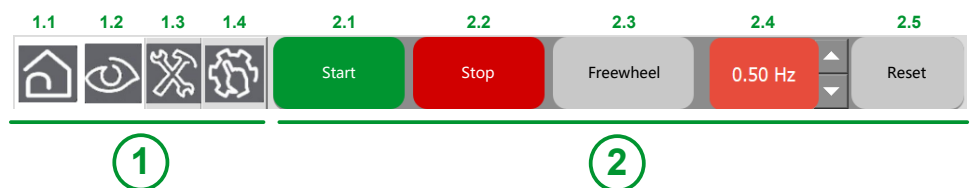
Color of Status Bar

Displays color bar during operating by customer.

State	Description
No error detected	A green banner is displayed to indicate that the product is ready or running.
Error detected	A red banner is displayed to indicate a detected error.
Communication interruption (HMI communication with MC)	An orange banner is displayed over the header to indicate an internal communication interruption between HMI and Master Controller (Modbus SL Internal / Ethernet Internal).
Warning	A blue banner is displayed to indicate a detected warning.

Toolbar Description

This first bar, located at the bottom of the working area, can be used to access the device-specific Menu and functions. This bar is divided in 2 zones:



①

Navigation area: Allow the user to navigate among the main pages.

Items	Description
1.1	Home: used to access directly the home page. For details, refer to Home , page 37.
1.2	Display: used to access directly the display page. For details, refer to Display , page 38.
1.3	Diagnostics: used to access directly the diagnostics page. For details, refer to Diagnostics , page 41.
1.4	Settings: used to access directly the settings page. For details, refer to Settings , page 49.

②

Control/Command Panel: Allows the user to control/command the motor.

Items	Description
2.1	Send start command to the ATV6100. If the Remote/Local Control switch on the cabinet door is turned to Remote Control mode , this button has no effect. In Local Control mode , if the ATV6100 is in running state, this button is in Grey and disabled state. When the ATV6100 is in course of deceleration or in Standby state, this button is enabled, and can be used to start the ATV6100.
2.2	Send stop command to the ATV6100. If the Remote/Local Control switch on the cabinet door is turned to Remote Control mode , this button is disabled. In Local Control mode , after the user uses this button, the ATV6100 will decelerate to standstill according to the deceleration time that has been set. When the ATV6100 is in Stopping or System Ready state, this button appears grey and is in disabled state.
2.3	Send Freewheel stop command to the ATV6100. After the user uses this button, the ATV6100 will block its output. The load motor will decelerate in freewheel stop until standstill according to its own inertia and the actual field situation. When the ATV6100 is in Standby state, this button is in grey and disabled state. This Freewheel stop command is not available if the Remote/Local Control switch on the cabinet door is turned to Remote Control mode .
2.4	Buttons ▲/▼ are used to set the Frequency Reference .
2.5	Reset: apply a Fault Reset. NOTE: Fault Reset mode is always active regardless of which Command channel has been selected.
NOTE: Depending on operating condition and settings, some buttons can be unavailable.	

The button Reset available on the HMI Panel applied a Fault Reset on the drive whatever the active control mode selected with the Local/Remote/Panel switch or with the Panel/Remote button available on the HMI panel. Depending on the wiring and the configuration of the drive, this may result in immediate and unanticipated operation.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

Verify that using the button Reset cannot result in unsafe conditions.

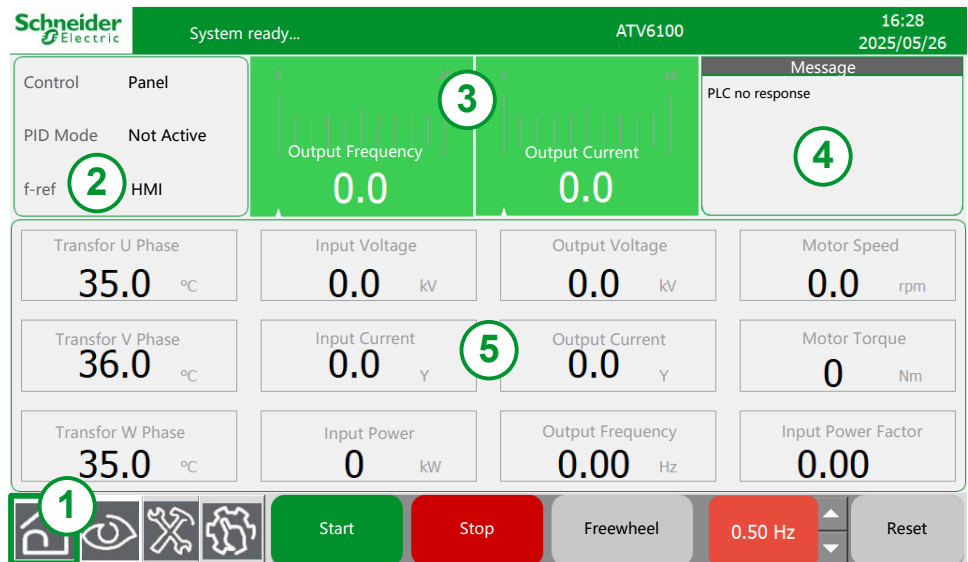
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Home Menu Panel

What's in This Chapter

Home Menu37

Home Menu



The Home page area is divided into 5 zones:

Items	Description
①	Actual position
②	Displays the real-time value of the drive status related parameters
③	Displays two real-time value of parameters.
④	Displays all active warnings error codes.
⑤	Displays the real-time value of : <ul style="list-style-type: none"> • The temperature of the transformer's three phases (U, V and W) in °C. • The motor-related parameters. • The drive-related parameters. • The supply-related parameters.

NOTE: These parameters are fixed and cannot be customized.

Display Menu Panel

What's in This Chapter

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PLC

Access

Display → PLC → PLC Digital

PLC Digital

This menu can display the meaning of each register bit of PLC and corresponding treatment methods.

If the PLC register VB4.6 indicates **Stop due to error**, and its treatment method is to give indication when the state is 1, then when its state bit is 1, the monitoring interface will indicate **Stop due to error**. The definition of each relative register bit of PLC is set to the menu PLC DI Define, page 212.

PLC >> PLC Digital

Meaning: PLC Register:

Action

- No Message
- Message when state=1
- Message when state=0

Oscilloscope

Access

Display → Oscilloscope → Oscilloscope

About This Menu





There are two lists in the **Oscilloscope** display screen (Signal ① and Signal ②) described in the following table.

Name	Description
Iu - output current	Waveform display of phase U output current of the ATV6100
Iv - output current	Waveform display of phase V output current of the ATV6100
Iw - output current	Waveform display of phase W output current of the ATV6100
Vu - output voltage	Waveform display of phase U output voltage of the ATV6100
Vv - output voltage	Waveform display of phase V output voltage of the ATV6100
Vw - output voltage	Waveform display of phase W output voltage of the ATV6100
L1 - input current	Waveform display of phase L1 input current of the ATV6100 from the network
L2 - input current	Waveform display of phase L2 input current of the ATV6100 from the network
L3 - input current	Waveform display of phase L3 input current of the ATV6100 from the network
L1 - input voltage	Waveform display of phase L1 input voltage of the ATV6100 from the network
L2 - input voltage	Waveform display of phase L2 input voltage of the ATV6100 from the network
L3 - input voltage	Waveform display of phase L3 input voltage of the ATV6100 from the network
[Input Active Power]	Active power of the network side
[Input Reactive Power]	Reactive power of the network side
[Output Active Power]	Active power of the motor side
[Output Reactive Power]	Reactive power of the motor side
[Input Power Factor]	Power factor of the network side
[Output Power factor]	Power factor of the motor side
[Rotor Flux Magnitude]	Magnitude of the rotor flux
[Rotor Flux Reference Value]	Reference value of the rotor flux
ISD	Stator excitation current
ISQ	Stator torque current

Name	Description
ISA	α -axis component of the stator current in the α - β two-phase static coordinate
ISB	β -axis component of the stator current in the α - β two-phase static coordinate
ual	α -axis component of the stator voltage in the α - β two-phase static coordinate
ube	β -axis component of the stator voltage in the α - β two-phase static coordinate
ualc	Calculated value of the α -axis component of the stator voltage in the α - β two-phase static coordinate
ubec	Calculated value of the β -axis component of the stator voltage in the α - β two-phase static coordinate
VSAL_REF	α -axis component of the stator reference voltage in the α - β two-phase static coordinate
VSBE_REF	β -axis component of the stator reference voltage in the α - β two-phase static coordinate
W_mes	Speed measured by encoder
W_cal_fit	Speed estimated by DSP
PSRA	α -axis component of the rotor flux in the α - β two phase static coordinate
PSRB	β -axis component of the rotor flux in the α - β two phase static coordinate
ES_AL	α -axis component of the stator EMF in the α - β two phase static coordinate
ES_BE	β -axis component of the stator EMF in the α - β two phase static coordinate

Using the buttons on the waveform screen, waveforms can be adjusted, for


example: pressing  can make the waveform move up along Y-axis. Similarly,

pressing the button  can make it move down along Y-axis. The button



can compress the waveform along X-axis, while the



button  can expand the waveform along X-axis. Through the button **Sampling**, the waveform can be hold, so as not to disturb waveform observation in dynamic display.

Diagnostic Menu Panel

What's in This Chapter

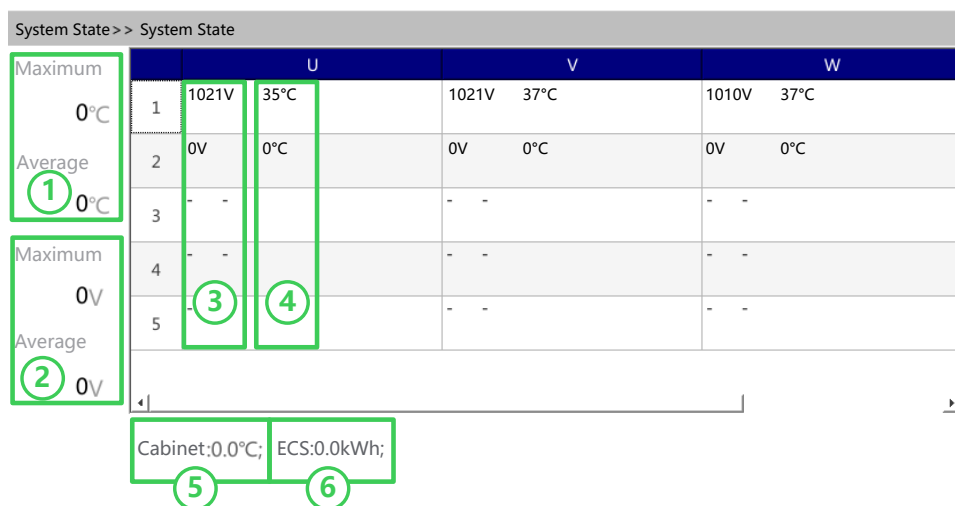
System State41
 Recorder45
 Error History47

System State

Access

Diagnostic → System State → System State

About This Menu



U, V and W are the three-phase branches of the drive.

The lines from 1 to 5 show the number of power cells in each branch.

Items	Description
①	Power Cell Temperature Maximum: Indicate the maximum temperature of corresponding power cell. Average: Indicate the average temperature of corresponding power cell.
②	Busbar voltage Maximum: Indicate the maximum voltage value of corresponding power cell. Average: Indicate the average voltage value of corresponding power cell.
③	Busbar voltage (Values at instant t)
④	Power Cell Temperature (Values at instant t)

Items	Description
⑤	Power unit cabinet temperature
⑥	<p>Power consumption accumulated.</p> <p>It refers to the accumulated power consumption from load when drive in running mode. The record will be reset to 0 if "Total operation time" is reset to 0.</p> <p>Measured in kilowatt-hours (kWh). When 9999kwh is reached, the unit changed to megawatt-hours (MWh).</p>

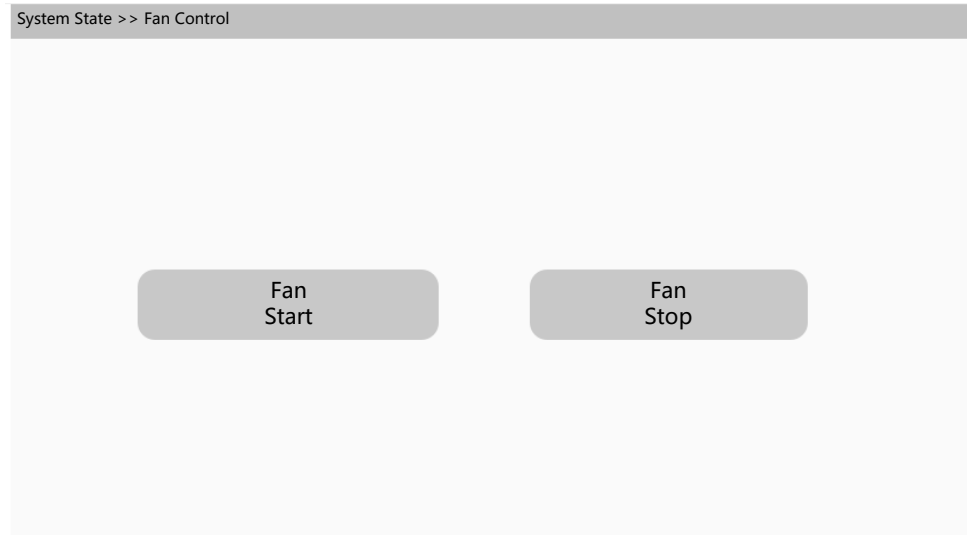
Fan Control

Access

Diagnostic → System State → Fan Control

About This Menu

This menu allows the user to command the fan.



- **Fan Start:** Send Fan Start command to the ATV6100.
- **Fan Stop:** Fan Stop command to the ATV6100.

NOTE: Fan Start and Fan Stop button are only enable when the following criteria are met:

- Remote/Local/Panel control switch on the cabinet door is turned to **Panel Control** mode. Refer to the [Cabinet Switch Selection](#), page 32.
- The **Bypass PLC** is unchecked. Refer to the [Config Tool](#) menu, page 201.
- Medium voltage is not ready.
- Input voltage is $\leq 1\text{kV}$.

NOTE: The fan will be stopped immediately is case of an error is detected to avoid further damage to the system.

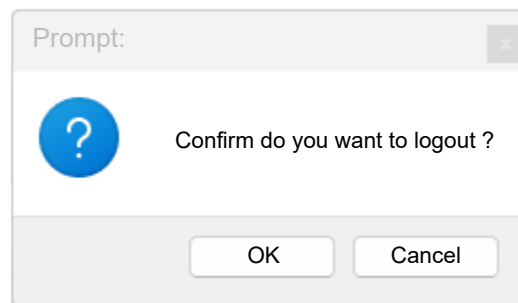
Logout

Access

Diagnostic → System State → Logout

About This Menu

The user can manually log out by clicking the Logout button. After logging out, the user will be switched to the home menu.



Step	Action
1	Click Logout in the left-vecical menu.
2	A pop-up window will appear. Click " OK ". The HMI is now logged out.

Recorder

Access

Diagnostic → Recorder → Recorder

About This Menu

The ATV6100 have a function of automatically record operation parameters. Every action and states on the ATV6100 will be recorded, as shown below.

Recorder >> Recorder

Select date : Export

Timer	Reference	Output freq	Output Curr	Input Curr	Input Volt	Output Volt	Value	Remarks
13:30:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
13:00:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
12:30:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
12:00:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
11:30:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
11:00:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
10:30:00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
10:22:15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	PLC no response...
10:22:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Master Controller...
10:22:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Enter system...

The parameters are recorded automatically when the ATV6100 running includes:

- Record Time
- Reference Value
- Output Frequency
- Input Current
- Output Current
- Input Voltage
- Output Voltage
- Actual Controlled State
- Remark

The operation parameters recorded are stored in text file format into the hard disk of HMI everyday, the file named by its date (**2024.07.10.txt** stands for the operation record in the day of July 10, 2024). These text files are stored in the Log folder of the program’s directory.

Export :

The **Export** button in the panel is used to export the operation record to USB disk.

After this operation record, you can choose to **Export Recorder or Copy recorder**. In the Export recorder mode, when the operation record is being copied to the USB disk, the operation records stored in the HMI will be deleted at the same time; while in the Copy recorder mode, when being copied to the USB disk, the operation records stored in the HMI will not be deleted.

NOTE: When there is no USB disk inserted, the interface will prompt: **Please insert USB Flash disk !**. After the USB disk inserted, the program will automatically set the record exporting path to: **/media/log** (this path cannot be modified). Then, click the **OK** to begin exporting operation records. After records

exported, a Prompt dialog box will pop up automatically, indicating the success of exporting operation.

NOTE: If the record of a date cannot be copied, the corresponding indication will be displayed.

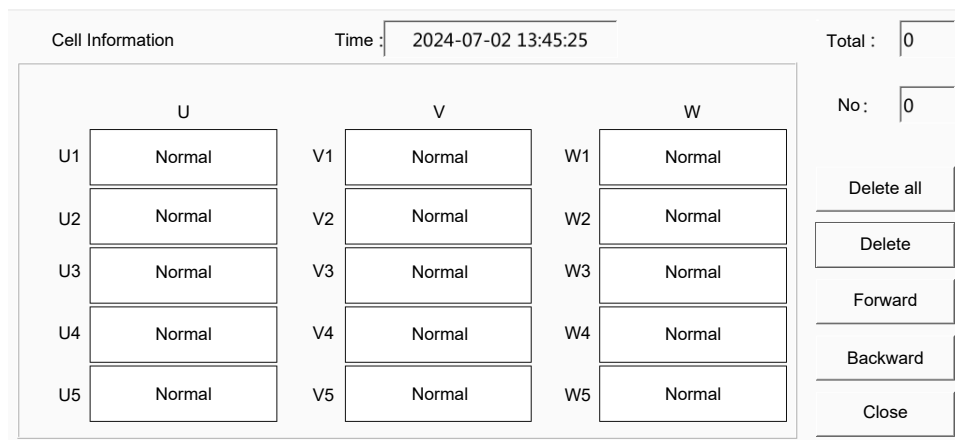
Error History

Access

Diagnostic → Error History → Error History

About This Menu

The ATV6100 has accurate abnormal localization and query functions. In any case, the user can use the status window to know timely the current states of the system and each abnormal status that happened before, including the time, cause, and position. The status window (as shown below) will pop up automatically when the system has a **Detected error**, with the current flashing. The user can use the **Forward** button or **Backward** button to check the history of abnormal conditions.



U1 - U5 stand for the states of five power units of phase U.

V1 - V5 stand for those states of phase V.

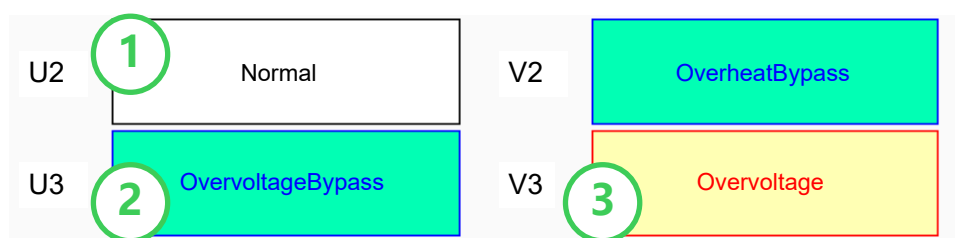
W1 - W5 stand for those states of phase W.

When there is an **Alarming** on the cabinet door, UPS, motor, transformer, fan, and so on, that will not influence system operation, the alarming will be displayed in the main screen. When the alarming disappears, the display will disappear too.

For the ATV6100 series which has no more than twelve units phase, the number of units will increase or decrease automatically. The **Delete** button can delete the current page of records. When the **Delete all** button is clicked, the confirmation dialog box will pop up. Click **OK** button in this box will clear all the records.

NOTE: Error history data can be exported in a .dat file format, see Parameter Report menu, page 213.

Power Cell Status



The table below shows the different states of the Power Cells:

Items	Color	Description
①	White	The Power Cell is ready and there is no error: <ul style="list-style-type: none"> • Normal
②	Green	Power Cell Error Information with bypass function : <ul style="list-style-type: none"> • UndervoltageBypass, • Loss of PhaseBypass, • OverheatBypass, • IGBT OvercurrentBypass, • OvervoltageBypass, • Fiber Suspend(XE)Bypass, • Fiber Suspend(XR)Bypass,
③	Yellow	Power Cell Error Information without bypass function <ul style="list-style-type: none"> • Undervoltage, • Loss of Phase, • Overheat, • IGBT Overcurrent, • Overvoltage, • Fiber Suspend(XE), • Fiber Suspend(XR),

For more details, refer to **Troubleshooting and Maintenance**, page 261 chapter.

The **Cell Information** block at the top left displays the error codes detected by the DSP controller, as well as the date and time of the error detected in the **Time** block.

You can view the list of error codes in the same **Cell Information** block:

- Cell Information
- External Error
- VSD Overcurrent
- Master Controller Self-Inspection Error.
- Overload
- Internal Communication malfunction
- Overcurrent
- Input-voltage-down
- Input OverVoltage
- Input Overcurrent
- Pulses Block Unsuccessful
- Output Grounding Error
- Output loss of U phase
- Output loss of V phase
- Output loss of W phase
- Master Power error
- Low Voltage Ride Through Timeout
- Input OverVoltage Error

Settings Menu Panel

What's in This Chapter

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Advanced Settings	78
Auto Tuning	144
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System Tool	200

▲ WARNING

UNEXPECTED EQUIPMENT OPERATION

The HMI is only for the controlling and monitoring of the ATV6100.

- Never install or operate any other software.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

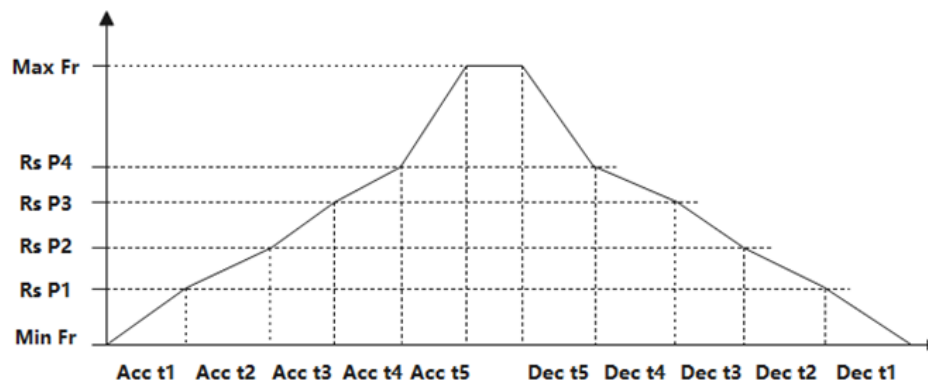
Speed Parameter

Access

Settings → Speed parameter

Overview

The ATV6100 can perform staged speed regulation, which is related to the following parameters.



Max FR	[Maximum Frequency]	Min FR	[Minimum Frequency]
RS P1	[Ramp Switching Point 1]	RS P2	[Ramp Switching Point 2]
RS P3	[Ramp Switching Point 3]	RS P4	[Ramp Switching Point 4]
ACC t1	[Acceleration time 1]	DEC t1	[Deceleration time 1]
ACC t2	[Acceleration time 2]	DEC t2	[Deceleration time 2]
ACC t3	[Acceleration time 3]	DEC t3	[Deceleration time 3]
ACC t4	[Acceleration time 4]	DEC t4	[Deceleration time 4]
ACC t5	[Acceleration time 5]	DEC t5	[Deceleration time 5]

During the acceleration and deceleration phase of the ATV6100, the motor can run in different frequency ranges with different acceleration/deceleration times:

- The acceleration time means the time for the motor to accelerate from the minimum frequency to the maximum frequency.
- The deceleration time means the time for the motor to decelerate from the maximum frequency to the minimum frequency.
- The **[Minimum Frequency]**, **[Ramp Switching Point 1]**, **[Ramp Switching Point 2]**, **[Ramp Switching Point 3]**, **[Ramp Switching Point 4]** and **[Maximum Frequency]** are used to set acceleration / deceleration frequency ranges of the ATV6100.
- In the frequency range set by **[Minimum Frequency]** and **[Ramp Switching Point 1]**, the system accelerates and decelerates with an **[Acceleration time 1]** and a **[Deceleration time 1]**.
- In the frequency range set by **[Ramp Switching Point 1]** and **[Ramp Switching Point 2]**, the system accelerates and decelerates with an **[Acceleration time 2]** and a **[Deceleration time 2]**.
- In the frequency range set by **[Ramp Switching Point 2]** and **[Ramp Switching Point 3]**, the system accelerates and decelerates with an **[Acceleration time 3]** and a **[Deceleration time 3]**.
- In the frequency range set by **[Ramp Switching Point 3]** and **[Ramp Switching Point 4]**, the system accelerates and decelerates with an **[Acceleration time 4]** and a **[Deceleration time 4]**.

- In the frequency range set by **[Ramp Switching Point 4]** and **[Maximum Frequency]**, the system accelerates and decelerates with an **[Acceleration time 5]** and a **[Deceleration time 5]**.

▲ WARNING

UNINTENDED EQUIPMENT OPERATION

These parameters can cause unintended movements

- Verify that the setting of these parameters does not cause unintended movements.
- Verify that the setting of these parameters does not result in unsafe conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The **[Minimum Frequency]** and **[Maximum Frequency]** is set according to the frequency ranges that have been used during long periods of time in a specific situation. The purpose of these parameters is primarily to overcome static torque when the ATV6100 starts from standstill.

The **[Starting frequency]** and **[Torque Boost [%] of Unom]** will determine the starting point for the motor's operation, the two skip frequency points are set according to the actual running requirements such as fan and pump systems, which tend to produce mechanical resonance and fan vibration at certain frequency points. When these types of circumstances arise, it is possible (by setting these parameters to skip the frequency points where resonance and vibration occur), to ensure that the system can run smoothly in the set frequency ranges. When the frequency reference falls into any of the above-described skip-frequency ranges, the drive will automatically output the upper or lower limits of the skip-frequency ranges until clear of frequencies where distortions may occur.

NOTE: This list of parameters is usually set by the engineering and debugging personnel of the drive system provider according to the user's specific operation situation. Once in formal operation, these parameters should not be subjected to casual modification.

Basic Parameter

Access

Settings → Speed parameter → Basic Parameter

[Starting Frequency]

Setting	Description
0.0...50.0 Hz	Setting range The starting frequency of the drive. Factory setting: 0.5 Hz
NOTE: Parameter available if [U/f - Start Mode] is set to [Normal] and [Motor Control Law] is set to [U/F Control].	

[Minimum Frequency]

Setting	Description
0.0...50.0 Hz	Setting range The minimum frequency output of the drive. When the frequency reference is lower than this value, the drive will output this frequency. During the stopping phase, when the set frequency is lower than this value, the output will be stopped, and the stopping phase will be finished. Factory setting: 0.5 Hz

[Maximum Frequency]

Setting	Description
0.1...120.0 Hz	Setting range The maximum frequency output of the drive. When the frequency reference is higher than this value, the drive will output this frequency. Factory setting: 50.0 Hz

[U/f - Reference Voltage]

Setting	Description
1.0...15000.0 V	Setting range The output voltage value when the motor is running at the nominal frequency, commonly set to the rated voltage of the motor. This parameter is writable, requiring at least the Operator access permission to write. When the output frequency of the drive is higher than the Frequency Reference, its output voltage will remain at the reference voltage. Factory setting: 6000 V

[U/f - Reference Frequency]

Setting	Description
1.0...120.0 Hz	<p>Setting range</p> <p>The output frequency value when the drive output is at the nominal voltage, commonly set to the rated frequency of the motor.</p> <p>Factory setting: 50.0 Hz</p>

[Torque Boost [%] of U_{nom}]

Setting	Description
0...100 (5‰)	<p>Setting range</p> <p>This parameter is used to boost the motor torque when running in low speed. At 0 setting there is no boost. This is used only in the U/f control mode.</p> <p>Factory setting: 0 (5‰)</p>

[Skip Frequency 1 Lower Limit]

Setting	Description
0.0...120.0 Hz	<p>Setting range</p> <p>The lower limit of the first skip-frequency point.</p> <p>Factory setting: 0 Hz</p>

[Skip Frequency 1 Upper Limit]

Setting	Description
0.0...120.0 Hz	<p>Setting range</p> <p>The upper limit of the first skip-frequency point.</p> <p>Factory setting: 0 Hz</p>

[Skip Frequency 2 Lower Limit]

Setting	Description
0.0...120.0 Hz	<p>Setting range</p> <p>The lower limit of the second skip-frequency point.</p> <p>Factory setting: 0 Hz</p>

[Skip Frequency 2 Upper Limit]

Setting	Description
0.0...120.0 Hz	<p>Setting range</p> <p>The upper limit of the second skip-frequency point.</p> <p>Factory setting: 0 Hz</p>

Speed Ramp Setup

Access

Settings → Speed parameter → Speed Ramp Setup

[Ramp Switching Point 1]

Setting	Description
0.0...120.0 Hz	Setting range The parameter for staged speed regulation of the ATV6100. This parameter is writable, requiring at least Manager level access. Factory setting: 50 Hz

[Ramp Switching Point 2]

Setting	Description
0.0...120.0 Hz	Setting range The parameter for staged speed regulation of the ATV6100. This parameter is writable, requiring at least Manager level access. Factory setting: 50 Hz

[Ramp Switching Point 3]

Setting	Description
0.0...120.0 Hz	Setting range The parameter for staged speed regulation of the ATV6100. This parameter is writable, requiring at least Manager level access. Factory setting: 50 Hz

[Ramp Switching Point 4]

Setting	Description
0.0...120.0 Hz	Setting range The parameter for staged speed regulation of the ATV6100. This parameter is writable, requiring at least Manager level access. Factory setting: 50 Hz

[Acceleration time 1]

Setting	Description
0.1...3000 s	Setting range The acceleration time of the ATV6100's frequency from [Starting frequency] to [Ramp Switching Point 1] . Factory setting: 100 s

[Deceleration time 1]

Setting	Description
0.1...3000 s	Setting range The deceleration time of the ATV6100's frequency from [Ramp Switching Point 1] to [Starting frequency] . Factory setting: 300 s

[Acceleration time 2]

Setting	Description
0.1...3000 s	Setting range The acceleration time of the ATV6100's frequency from [Ramp Switching Point 1] to [Ramp Switching Point 2] . Factory setting: 10 s

[Deceleration time 2]

Setting	Description
0.1...3000 s	Setting range The deceleration time of the ATV6100's frequency from [Ramp Switching Point 2] to [Ramp Switching Point 1] . Factory setting: 10 s

[Acceleration time 3]

Setting	Description
0.1...3000 s	Setting range The acceleration time of the ATV6100's frequency from [Ramp Switching Point 2] to Max frequency point. Factory setting: 10 s

[Deceleration time 3]

Setting	Description
0.1...3000 s	Setting range The deceleration time of the ATV6100's frequency from Max frequency point to [Ramp Switching Point 2] . Factory setting: 10 s

[Acceleration time 4]

Setting	Description
0.1...3000 s	Setting range The acceleration time of the ATV6100's frequency from Frequency point 3 to Frequency point 4. Factory setting: 10 s

[Deceleration time 4]

Setting	Description
0.1...3000 s	Setting range The deceleration time of the ATV6100's frequency from Frequency point 4 to Frequency point 3. Factory setting: 10 s

[Acceleration time 5]

Setting	Description
0.1...3000 s	Setting range The acceleration time of the ATV6100's frequency from Frequency point 4 to Max frequency point. Factory setting: 10 s

[Deceleration time 5]

Setting	Description
0.1...3000 s	Setting range The deceleration time of the ATV6100's frequency from Max frequency point to Frequency point 5. Factory setting: 10 s

[Ramp Type]

Setting	Description
[Linear]	Type of acceleration and deceleration curve. The reference frequency increases or decreases linearly. Factory setting
[S-curve]	Type of acceleration and deceleration curve. The reference frequency is an S-curve increase or decrease.

[S-Ramp Start %-coeff.]

Setting	Description
10 %...90 %	Setting range The proportion of acceleration and deceleration time at the beginning of the S-curve in the total acceleration time. Factory setting: 20 %

[S-Ramp End %-coeff.]

Setting	Description
10 %...90 %	Setting range The proportion of acceleration and deceleration time at the end of the S-curve in the total acceleration time. Factory setting: 20 %

Control Parameter

Access

Settings → Control Parameter → Control Parameter

[Motor Type]

Setting	Description
[Synchronous motor]	Type of the motor given by the drive. Motor control type specific for synchronous motors.
[Asynchronous motor]	Type of the motor given by the drive. Motor control type specific for Asynchronous motors. Factory setting

[Motor Control Law]

Setting	Description
[U/F Control]	Means constant voltage to frequency ratio control. Factory setting
[Vector Control]	For synchronous motor, Encoder feedback is needed.
If vector Control mode is selected, check if: <ul style="list-style-type: none"> • The resistance and inductance parameters of the motor are set correctly. • The detected phase orders of the output voltage and current are correct. 	

[U/f - Start Mode]

Setting	Description
[Normal]	The drive increases the frequency from the [Starting frequency] to the set frequency. Factory setting
[Vector]	For synchronous motor, Encoder feedback is needed.
If [Vector] mode is selected, check if: <ul style="list-style-type: none"> • The resistance and inductance parameters of the motor are set correctly. • The detected phase orders of the output voltage and current are correct. 	

NOTE: When the motor is starting in **[Vector]** mode, it will employ vector control mode first. If the following conditions are satisfied at the same time, **[Motor Control Law]** will change from **[Vector control]** to **[U/F control]** mode automatically.

- Frequency of motor is no less than **[U/f-Start Mode-Freq Point]**
- If condition above is satisfied, the motor running time is no less than **[U/f-Start-Mod.Stabilize-Time]**.

[U/f-Start Mode-Freq Point]

Setting	Description
0...50 Hz	<p>Setting range</p> <p>In the Start Mode (vector), when the motor running at or larger than the setting value, the [Motor Control Law] is changed from [Vector Control] mode to [U/F control] mode.</p> <p>Factory setting: 30 Hz</p>

[U/f-Start-Mod.Stabilize-Time]

Setting	Description
0.1...50 s	<p>Setting range</p> <p>In the catch on fly mode, when the motor running at or larger than the setting value, motor operation with vector control mode lasts the setting value time.</p> <p>Factory setting: 10 s</p>

[PoC Bypass Type]

Setting	Description
[Single]	<p>Single power cell bypass mode (Angle Adapted bypass). When a power cell triggers an error, it will automatically bypass the affected power cell and adapt the output voltage angles by shifting the neutral point, ensuring a balanced voltage output.</p>
[Level]	<p>Same level power cell bypass mode (Balanced bypass). When a power cell triggers an error, it will automatically bypass the same position power cell in each phase from the inverter circuit.</p> <p>Factory setting</p>

[Max. PoC Bypass Nb]

Setting	Description
0...4	<p>Setting range</p> <p>When the power cell detect an error, the power cell is disabled by automatic bypass. Check that the setting value is less than the total number of the drive's power cells in series.</p> <p>Factory setting: 0</p>

[Simulation Mode]

Setting	Description
[Disable]	Disable to debug the electrical control logic in the field when medium voltage is not connected. Factory setting
[Enable]	Enable to debug the electrical control logic in the field when medium voltage is not connected.
After debugging the electrical control logic, verify that [Simulation Mode] setting is [Disable] so as to run the equipment with the motor properly.	

[Overcurrent Threshold]

Setting	Description
1.0...5000.0 A	Setting range Instantaneous breaking protection of output current. Set to 2 times that of the rated motor peak current, in A. Factory setting: 1130 A

[Reverse Rotation]

Setting	Description
[Enable]	The option box Motor Reverse in the main dialog box Function of the Integrated HMI is enabled. When Motor Reverse is enabled, if the motor runs forward, it will gradually decelerate to standstill, then accelerate in reverse to the corresponding frequency setting for reverse operation. Then the output frequency is displayed as a negative value, while the set frequency is positive.
[Disable]	Function disabled. Factory setting

[PWM Regulation Coefficient]

Setting	Description
0.4...1.1547	Setting range Only for [U/F control] mode. The regulation coefficient of the output voltage. This coefficient will influence the amplitude of the actual output voltage of the drive in a linear manner. When the drive runs in full-load to the rated frequency of the motor. This parameter can be adjusted to make the output voltage reach the rated value. Factory setting: 1
If the [Motor Control Law] is [Vector Control], the value has to be set as 1. Otherwise, the motor speed may be uncontrolled or lead to overcurrent error.	

[U/f Voltage Amplitude Comp]

Setting	Description
[Enable]	In constant voltage to frequency ratio ([Motor Control Law] set to [U/F Control]), when the drive's input side network voltage has a slow (no more than 2% per minute) but relatively wide (such as 10%) fluctuation, in order for the drive's output voltage to keep relatively stable. This function can be enabled optionally.
[Disable]	Factory setting

[Input PLL (Energy Feedback and Synchronous Switching Only)]

Setting	Description
[Enable]	Enable the input voltage phase-locked loop (PLL) function.
[Disable]	Disable the Input Voltage Phase-Locked Loop (PLL) function. Factory setting

[U/f Volt Amplitude Factor]

Setting	Description
0.5...2.0	Setting range Used in combination with [U/f Voltage Amplitude Comp] parameter. Factory setting: 1; means 100% of the reference voltage

[Output PLL]

Setting	Description
[Enable]	Before synchronization transfer, verify the amplitude, phase, and frequency of the drive's output voltage is synchronized with the network voltage, which is called output voltage synchronization. If Output synchronization enable is enabled, when the difference between the drive's output frequency and the network frequency is less than 0.5 Hz, the output synchronization will begin, otherwise it will not. If the output voltage has not enough capacity for the drive to run in the range of network frequency ± 0.5 Hz due to bypass, the phase synchronization will not begin.
[Disable]	Parameter disabled. Factory setting

[Output PLL Volt Ampl Factor]

Setting	Description
0.5...2.0	Setting range During the synchronization, the drive's output voltage will be the current network voltage multiplied by this coefficient. "1" corresponds to 100% of the current amplitude of the drive's input voltage. Factory setting: 1.01

[Output PLL Phase Angl Offset]

Setting	Description
-20...359.9°	Setting range The angle of the output voltage ahead of the input voltage. Factory setting: -2°
If the setting value is less than -2, the output voltage phase will lead the input voltage phase.	

[Output PLL Phase Pos PI Reg]

Setting	Description
[Enable]	In synchronous process, adjust the output voltage angle of the drive through a PI regulator to track the input voltage angle.
[Disable]	In synchronous process, adjust the output voltage angle of the drive to track the input voltage angle through angle compensation. Factory setting

[Output PLL Phase Pos Reg Kp]

Setting	Description
1.0...10000.0	Setting range The proportional coefficient for phase synchronization. Factory setting: 500

[Output PLL Phase Pos Reg Ki]

Setting	Description
1.0...10000.0	Setting range The integral coefficient for phase synchronization. Factory setting: 1000

[Output PLL Phase Pos Speed]

Setting	Description
-360.0...359.9 deg/s	Setting range The rate at which the output voltage phase tracks the input voltage phase during synchronous switching. Factory setting: 20 deg/s

[Output PLL Volt Amp Reg Kp]

Setting	Description
0.0001...100	Setting range The proportional gain of PI regulator when output voltage tracks input voltage amplitude during synchronous switching. Factory setting: 0.1

[Output PLL Volt Amp Reg Ki]

Setting	Description
0.0001...100	Setting range The integral gain of PI regulator when output voltage tracks input voltage amplitude during synchronous switching. Factory setting: 0.2

[F-ref - Trigger Mode]

Setting	Description
[No trigger required]	The frequency reference set in HMI is activated immediately. Factory setting
[Trigger required]	The frequency reference set in HMI is activated if there has the trigger signal.
The trigger signal is the digital input of the master controller.	

[Low Frequency Brake]

Setting	Description
[Disable]	This function is only used during the motor freewheel stopping process. No voltage will send to motor. Factory setting
[Enable]	Power Drive System (PDS) will send a low frequency and low magnitude voltage to the motor, which will generate a braking torque to short the motor's stopping time.

[HW Over Current Protection]

Setting	Description
[Disable]	The two times overcurrent signal detected by master controller's hardware is not processed by master controller software. Factory setting
[Enable]	The two times overcurrent signal detected by master controller's hardware is processed by master controller software.
<p>The over-current value depends on the hardware circuit. When the voltage on the ISU or ISV of signal adjusting board is larger than 4.71V, then two times overcurrent detection circuit on signal adjusting board will send the overcurrent signal.</p> <p>When set the [HW Over Current Protection] as [Enable] and the overcurrent signal is received, the PDS output depends on the motor state.</p> <ul style="list-style-type: none"> • When the inverter is in motoring mode, PDS outputs zero voltage. • When the inverter is in generation mode, PDS blocks all PWM outputs. • This function is used to limit the PDS output current to 2 times of the rated current. • It will not trip the PDS. 	

[Input CT Phase Sequence]

Setting	Description
[Phase A & B]	Input current sampling phase sequence is positive sequence.
[Phase A & C]	The sampling phase sequence of the input current is reversed.
[Phase B & C]	Input current sampling phase sequence reversed. Factory setting

Error Management

Access

Settings → Error Management

[Auto-Restart after Mains Dip]

Setting	Description
[Enable]	After drive input high voltage drop, when the high voltage is recovered, the drive can recover the state before high voltage drop. Factory setting
[Disable]	After drive input high voltage drop, when the high voltage is recovered, the drive cannot recover the state before high voltage drop.

[Power On Self Diagnosis Time]

Setting	Description
0.1...300.0 s	Setting range After medium voltage power-on of the ATV6100, it will take this delay time to perform a hardware self-test, so as to exclude the possibility of hardware self-test anomalies caused by system power-up interference. Factory setting: 12 s

If meet one of the following conditions, the motor will start with catch on flying:

- Motor type is Asynchronous motor and Motor control mode is Vector Control;
- Motor type is Asynchronous motor and Motor control mode is U/F control, and the motor stop time is less than stationary time or the **[Starting frequency]** is larger than 5 Hz;
- Motor type is Synchronous motor and the motor voltage is larger than 3 % of the rated motor voltage no matter what Control Mode is set;

When the catch on flying conditions are met, if the time from medium voltage input voltage power off to restoration is less than the value that is set here, the ATV6100 will automatically identify and track the motor rotation speed, as well as restore motor running; if the time from medium voltage input voltage power-off to restoration is greater than the value that is set here, the ATV6100 will enter standby state.

[Auto-Restart Timeout]

Setting	Description
0.5...300.0 s	Setting range The permitted time period for the system to restart after power-loss. In case of medium voltage power-loss, if the power-loss time is not longer than this period, then when the medium voltage power resumes, the system can restart automatically. Factory setting: 6.0 s

[Auto-Restart Delay Time]

Setting	Description
0.1...300.0 s	<p>Setting range</p> <p>The delay time from input high voltage drop recovery to the resumption of operation of the drive. And generally, set to be smaller than [Power On Self Diagnosis Time].</p> <p>Factory setting: 2 s</p>

[Mains Voltage Dip Threshold]

Setting	Description
15 %...90 %	<p>Setting range</p> <p>Determine whether the system input has power based on the input voltage.</p> <p>Factory setting: 50 %</p>

[Light Overload Protection]

Setting	Description
30%...500 %	<p>Setting range</p> <ul style="list-style-type: none"> If the ATV6100's output current ratio exceeds the value, which equals $(1 + [\text{Light Overload Hysteresis}] * [\text{Light Overload Protection}] * [\text{Nominal Motor Current}])$, it will gradually decrease the output frequency If the ATV6100's output current ratio is between $(1 + [\text{Light Overload Hysteresis}] * [\text{Light Overload Protection}] * [\text{Nominal Motor Current}])$ and $(1 - [\text{Light Overload Hysteresis}] * [\text{Light Overload Protection}] * [\text{Nominal Motor Current}])$, it will keep the output frequency. If the ATV6100's output current ratio is less than $(1 - [\text{Light Overload Hysteresis}] * [\text{Light Overload Protection}] * [\text{Nominal Motor Current}])$, it will increase the output frequency after [Light Overload Recover Time] delay. The unit is the percent of the rated motor current. <p>Factory setting: 120 %</p>

[Light Overload Filter Const]

Setting	Description
0.2...32767 rad/s	<p>Setting range</p> <p>Output current RMS value will be filtered by a low-pass filter for Light overload control. This parameter is the cut-off frequency of the low-pass filter.</p> <p>Factory setting: 30 rad/s</p>

[Light Overload Hysteresis]

Setting	Description
1...100 %	Setting range See [Light Overload Protection] parameter's description. Factory setting: 10 %

[Light Overload Recover Time]

Setting	Description
0...60 s	Setting range See [Heavy Overload Protection] parameter's description. Factory setting: 12 s

[Heavy Overload Protection]

Setting	Description
100 %...500 %	Setting range <ul style="list-style-type: none"> The ATV6100's output current ratio has exceeded this setting The time set by Heavy overload time has elapsed. If the two conditions above are met at the same time, the ATV6100 will report a "Detected error", System Overload, and blocks the output immediately. Factory setting: 120 %

[Heavy Overload Time]

Setting	Description
0...60 s	Setting range The permitted time period for the ATV6100's output current ratio being higher than the [Heavy Overload Protection] . In this period, the ATV6100 will continue running. After the period, it will block the output immediately. Factory setting: 12 s

[Inverse Time I> Protection]

Setting	Description
[Enable]	Enable inverse time current protection.
[Disable]	Enable inverse time current protection.
	Factory setting

[Inverse Time I> Setting]

Setting	Description
30 %...500 %	Setting range Inverse time overcurrent protection function overcurrent multiple Factory setting: 110 %

[Inverse Time I> Timer]

Setting	Description
1.0...10000.0 s	Setting range The permit time of inverse time overcurrent protection function for light overload. Factory setting: 60 s

[Power Cell Error Filter Time]

Setting	Description
0.0...300.0 s	Setting range <ul style="list-style-type: none"> Power cell alarm: cell under voltage, cell phase loss, cell overheating. Alarm delay: the time period for the power cell Alarm permitted by the ATV6100. If an anomaly occurs to the power cell, the master system will report a cell alarming through the I/O port to the PLC; If the cell alarm disappears during the preset delay time, the master system will stop sending cell alarm signal to PLC, and the system will continue normal operation. If the cell alarm does not disappear during the preset delay time, the power cell in cell alarm will come into bypass state (optional function), meanwhile displaying the information Bypass running on the HMI. If the ATV6100 is set without cell bypass function, the ATV6100 will trip at the same time as the upstream breaker Factory setting: 3.5 s

[Ground Error Delay Time]

Setting	Description
1...1800 s	<p>Setting range</p> <ul style="list-style-type: none"> When the master controller detects single phase grounding of the output, the ATV6100 state bar in the HMI will indicate Output Grounding Operation, meanwhile sending a Alarming to the PLC. If the grounding error disappears in the period of the [Ground Error Delay Time] and the duration of normal state is equal or longer than 2 s, the master will cancel the alarming to PLC and the display on the HMI. If the abnormal lasts longer than the [Ground Error Delay Time], the ATV6100 will report Stopping with Detected error, and be displayed on the HMI When the [Ground Error Delay Time] in the Debug Parameters of the embedded HMI is set to the maximum value (1800 seconds), the ATV6100 will not stop in the case of grounding error, instead, it will keep running. <p>Factory setting: 1800 s</p>

[Remaining CPU Time]

Value range	Description
–	<p>Read only</p> <p>Timer interrupt cycle remaining time.</p> <p>Factory setting: _ us</p>

[Used CPU Time]

Value range	Description
–	<p>Read only</p> <p>Timer interrupt cycle used time.</p> <p>Factory setting: _ us</p>

[Input Overvoltage Detection]

Setting	Description
[Enable]	<p>Enable input voltage high protection function. If input voltage high is higher than Drive Nominal Input Voltage, device will report an error.</p> <p>Factory setting</p>
[Disable]	<p>Disable input voltage high protection function.</p>

[Voltage Dip Speed Adaption]

Setting	Description
[Enable]	When a bypass occurs, it will automatically operate at a reduced frequency based on the output voltage capability.
[Disable]	When a bypass occurs, it will not automatically downshift according to the output voltage capability. Factory setting

[Anti-Interference Mode]

Setting	Description
[Close]	When a major error occurs, the main control will reset the error on its own and re detect the error. If there is still a error, respond and handle it. If the error disappears after resetting, continue running. Factory setting
[Open]	When a major error occurs, the main control will not reset the error and retest it on its own. Directly respond to the handling of errors.

[SW Over Current Protection]

Setting	Description
[Normal]	When an overcurrent error occurs, immediately report a serious error and shut down the machine. Factory setting
[Synchronous switching protection]	After overcurrent occurs, the pulse will be turned off. If the overcurrent disappears within 1 ms, the pulse will be turned on to continue running. Otherwise, a serious error will be reported and the machine will be shut down.

[Motor Surge Limitation]

Setting	Description
[Normal]	Carrier phase shifting method during normal operation. Factory setting
[BypassMode]	The way of carrier phase shift when bypass occurs.

[Catch on Fly Test]

Setting	Description
[Freewheel than restart]	Test whether the fly up function is effective. NOTE: The function only for engineer use.
[Disable]	Disable the test of fly up function. Factory setting

[M/S Max Frequency Deviation]

Setting	Description
0...120 Hz	Setting range When controlling multiple motors, the frequency command of the slave is ahead of that of the master. Factory setting: 0 Hz

[M/S Max. Torque Ref. Source]

Setting	Description
[Internal]	The torque limit amplitude comes from internal variables. Factory setting
[External Analog]	The torque limit amplitude comes from external analog variables.

[M/S Max. Torque Actual Value]

Value range	Description
-2000000...2000000 N·m	Read only The maximum torque value. Factory setting: 0 N·m

[Phase U Ampl [V] Factor]

Setting	Description
0.8...1.2 pu	Setting range U-phase output voltage coefficient. Factory setting : 1 pu

[Phase V Ampl [V] Factor]

Setting	Description
0.8...1.2 pu	Setting range V-phase output voltage coefficient. Factory setting : 1 pu

[Phase W Ampl [W] Factor]

Setting	Description
0.8...1.2 pu	Setting range W-phase output voltage coefficient. Factory setting : 1 pu

[Temperature Controller Model]

Setting	Description
[LD_B10_10F]	Temperature controller model number Factory setting
[NT579]	Temperature controller model number

[Vin Under Voltage Threshold]

The threshold for determining input medium voltage undervoltage. It is based on a percentage of the nominal input voltage, applicable only for the phase loss detection function.

Setting	Description
0...1	Setting range Factory setting : 0.6

[Under Voltage Behavior]

Setting	Description
[1]	HMI display message "Mains voltage interrupted during running" only if PWM is enable (RUN state).
[2]	Under-voltage warning. Factory setting

[Under Voltage Trigger QF1]

This parameter is only configurable if **[Under Voltage Behavior]** is set to **[1]**.

Setting	Description
[0]	NO: QF1 will maintain the same status during medium voltage loss.
[1]	YES: QF1 will open when a medium voltage loss error is triggered. Factory setting

[Mains Phase Loss Time]

The delay time for the monitoring action during mains phase loss.

Setting	Description
0.1...10 s	Setting range Factory setting: 0.5 s

[Mains Phase Loss Error response]

Selection of the error response when the **[Mains Phase Loss Time]** is reached.

Setting	Description
[0]	No: [Main Input Phase Loss Warning] is active.
[1]	Yes: [Main Input Phase Loss Error] is active. Factory setting

[Mains Phase Loss Trigger QF1]

Setting	Description
[0]	No: When mains input phase error is triggered, QF1 remains unchanged.
[1]	Yes: When [Mains Phase Loss Time] is reached, [Main Input Phase Loss Error] is triggered and QF1 opens. Factory setting

[PoC Phase Loss Time]

The delay time for **[Total POC Phase Loss Error]**.

Setting	Description
0.1...1 s	Setting range Factory setting: 0.1 s

[PoC Phase Loss Trigger QF1]

Setting	Description
[0]	No: When [PoC Phase Loss Time] is reached, [Total POC Phase Loss Error] is triggered and QF1 remains unchanged.
[1]	Yes: When [PoC Phase Loss Time] is reached, [Total POC Phase Loss Error] is triggered and QF1 opens. Factory setting

[PoC Phase Loss Trigger QF1]

Setting	Description
[0]	No: When [PoC Phase Loss Time] is reached, [Total POC Phase Loss Error] is triggered and QF1 remains unchanged.
[1]	Yes: When [PoC Phase Loss Time] is reached, [Total POC Phase Loss Error] is triggered and QF1 opens. Factory setting

[Phase Detection Board]

Setting	Description
[Enable]	Enables the phase angle detection board function.
[Disable]	Disables the phase angle detection board function. Factory setting

NOTE: If the inverter is running, this function will be disabled regardless of whether the parameter is set to "Enable" or "Disable."

[Phase Detection Compensation]

Specifies the compensation angle for filters used in phase detection sampling.

Setting	Description
-180...180°	Setting range Factory setting: 0°

Motor/Drive Data

Nominal Value

Access

Settings → Motor/Drive Data → Nominal Value

[Motor Nominal Voltage]

Setting	Description
100.0...15000.0 V	Setting range Rated motor voltage given on the nameplate. Factory setting: 10000 V

[Motor Nominal Current]

Setting	Description
1.0...5000.0 A	Setting range Rated motor current given on the nameplate. Factory setting: 500 A

[Motor Nominal Frequency]

Setting	Description
1.0...120.0 Hz	Setting range Rated motor frequency given on the nameplate. Factory setting: 50 Hz

[Motor Nominal Power]

Setting	Description
2.0...20000.0 kW	Setting range Rated motor power given on the nameplate. Factory setting: 7500 kW

[Motor Nominal Speed]

Setting	Description
1.0...3600.0 rpm	Setting range Rated motor speed given on the nameplate. Factory setting: 1000 rpm

[Number of Pole Pairs]

Setting	Description
1.0...15.0	Setting range Number of pairs of poles, calculated by the drive. Factory setting: 3

[Motor Nominal Power Factor]

Setting	Description
-0.99...0.99	Setting range Rated motor power factor given on the nameplate. Factory setting: 0.9

[Drive Nominal Input Voltage]

Setting	Description
100.0...15000.0 V	Setting range Rated input voltage of the drive. Factory setting: 10000 V

[Drive Nominal Input Current]

Setting	Description
1.0...5000.0 A	Setting range Rated input current of the drive. Factory setting: 500 A

[Drive Apparent Power]

Setting	Description
2.0...20000.0 kVA	Setting range Rated power of the drive. Factory setting: 8000 kVA

[Drive Nominal Input Frequency]

Setting	Description
1.0...60.0 Hz	Setting range Rated input frequency of the drive. Factory setting: 50 Hz

[Drive Nominal Output Voltage]

Setting	Description
100.0...15000.0 V	Setting range Rated output voltage of the drive. Factory setting: 10000 V

[Drive Nominal Output Current]

Setting	Description
1.0...5000.0 A	Setting range Rated output current of the drive. Factory setting: 500 A

[Motor Nominal Torque]

Value range	Description
0...10000000 N·m	Read only Motor Nominal Torque = Motor Nominal Power * 9550 / Motor Nominal Speed Factory setting: 71625 N·m

Advanced Settings

Access

Settings → Advanced Settings

Overview

Settable options include

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Temp Management

Access

Settings → Advanced Settings → Temp Management

[Device ID]

Setting	Description
0...1.00E+10	The ID number of transformer temperature equipment. Factory setting : ID number

[Heater Operation Mode]

Setting	Description
[Manual]	The heater is selected as manual mode.
[Auto]	The heater is selected as automatic mode. Factory setting

[Force Heating Function]

Setting	Description
[Disable]	Disable heating. Factory setting
[Enable]	Enable heating.

[Transf Overheat Warning]

Setting	Description
0...200 °C	If the temperature of the transformer exceeds [Transf Overheat Warning] , it will lead transformer over temperature alarm. Factory setting : 95 °C

[Transf Overheat Trip]

Setting	Description
0...200 °C	If the temperature of the transformer exceeds [Transf Overheat Trip] , it will lead transformer over temperature error. Factory setting : 110 °C

[Cabinet Overheat Warning]

Setting	Description
0...200 °C	If the temperature of the cabinet exceeds [Transf Overheat Warning] , it will lead cabinet over temperature alarm. Factory setting : 50 °C

[Cabinet Humidity Warning]

Setting	Description
0...100 %	When the humidity of the cabinet exceeds [Cabinet Humidity Warning] , it will lead an alarm for excessive humidity in the cabinet. Factory setting : 75 %

[Temp. Meas. Server]

Setting	Description
[Enable]	Enable temperature measurement service function board.
[Disable]	Disable temperature measurement service function board. Factory setting

[Temp. Meas. Client 1]

Setting	Description
[Enable]	Enable temperature measurement control function board.
[Disable]	Disable temperature measurement control function board. Factory setting

[Transf Thermal Warning Level]

High temperature elevation for the transformer.

Setting	Description
0...200 °C	Setting range Factory setting : 100 °C

[Transf Thermal Trip Level]

Maximum temperature elevation for the transformer.

Setting	Description
0...200 °C	Setting range Factory setting : 115 °C

[Transf High Amb Temp.]

High ambient temperature for transformer operation.

Setting	Description
0...200 °C	Setting range Factory setting: 40°C

[Transf Max Amb Temp.]

Maximum ambient temperature for transformer operation.

Setting	Description
0...200 °C	Setting range Factory setting: 55°C

[PoC N+x Option]

N refers to the number of PoC, excluding any additional PoCs added by the N+1 or N+2 options.

Setting	Description
[Standard]	Standard number of PoC. Factory setting
[N+1 Option]	PoC with N+1
[N+2 Option]	PoC with N+2

[Transf Temp. Channel1 Err Mask]

Setting	Description
[Mask]	Mask error of Transf Temp. Channel1
[Disable]	No mask error of the Transf Temp. Channel1 Factory setting

[Transf Temp. Channel2 Err Mask]

Setting	Description
[Mask]	Mask error of Transf Temp. Channel2
[Disable]	No mask error of the Transf Temp. Channel2 Factory setting

[Transf Temp. Channel3 Err Mask]

Setting	Description
[Mask]	Mask error of Transf Temp. Channel3
[Disable]	No mask error of the Transf Temp. Channel3 Factory setting

Tuning Result

Access

Settings → Advanced Settings → Tuning Result

About The Menu

If the following parameters are configured as:

- **[Motor Control Law]** is set to **[Vector Control]**
- **[Motor Control Law]** is set to **[U/F Control]** and **[U/f - Start Mode]** is set to **[Vector]**. (refer to: **Settings Panel** → **Control Parameter** → **Control Parameter**, page 58)

The **Tuning Result** setting values have to be configured correct values.

[ASM Rs - Stator Resistance]

Setting	Description
0.0001...20 Ohm	Setting range The asynchronous motor's inherent parameter, filled in according to the measurement value or the estimated value. Factory setting : 0.1 Ohm

[ASM Rr - Rotor Resistance]

Setting	Description
0.0001...20 Ohm	Setting range The asynchronous motor's inherent parameter, filled in according to the measurement value or the estimated value. Factory setting : 0.1 Ohm

[ASM Ls - Stator Inductance]

Setting	Description
0.0001...5 H	Setting range The asynchronous motor's inherent parameter, filled in according to the measurement value or the estimated value. Factory setting : 0.12 H

[ASM Lr - Rotor Inductance]

Setting	Description
0.0001...5 H	Setting range The asynchronous motor's inherent parameter, filled in according to the measurement value or the estimated value. Factory setting : 0.12 H

[ASM Lm - Main Inductance]

Setting	Description
0.0001...5 H	Setting range The asynchronous motor's inherent parameter, filled in according to the measurement value or the estimated value. Factory setting : 0.1 H

[ASM Inertia]

Setting	Description
0...10000 Kgmm	Setting range The moment of inertia of the motor. Includes the moment of inertia converted onto the rotor from the mechanical load. Factory setting : 500 Kgmm

[ASM Rs - Measurement]

Setting	Description
0...20 Ohm	Setting range Automatically measured by the asynchronous motor blockage and no-load test program. Factory setting : 0.1 Ohm

[ASM Rr - Measurement]

Setting	Description
0...20 Ohm	Setting range Automatically measured by the asynchronous motor blockage and no-load test program. Factory setting : 0.1 Ohm

[ASM Ls - Measurement]

Setting	Description
0...5 H	Setting range Automatically measured by the asynchronous motor blockage and no-load test program. Factory setting : 0.12 H

[ASM Lr - Measurement]

Setting	Description
0...5 H	Setting range Automatically measured by the asynchronous motor blockage and no-load test program. Factory setting : 0.12 H

[ASM Lm - Measurement]

Setting	Description
0...5 H	Setting range Automatically measured by the asynchronous motor blockage and no-load test program. Factory setting : 0.1 H

[ASM No Load Current]

Setting	Description
1...100 %	Setting range Current command for static parameter identification settings. Factory setting : 40 %

[ASM Auto-tuning Mode Select]

Setting	Description
[With load]	During the static parameter identification process, automatically adjust the parameters related to the parameter identification function based on the load.
[Without Load]	During the static parameter identification process, the parameters related to the parameter identification function will not be automatically adjusted based on the load. Factory setting

[ASM Auto-tuning Frequency]

Setting	Description
5...30 Hz	Setting range If [ASM Auto tuning Mode Select] is enabled, the static measurement value of the asynchronous motor will be automatically adjusted based on the output voltage when the operating frequency is greater than the set value. Factory setting : 15 Hz

[ASM Stator Inductance Adjust]

Value range	Description
0...5 H	Read only Adjustment value of stator inductance for asynchronous motor. Factory setting : 0.105 H

[ASM Rotor Inductance Adjust]

Value range	Description
0...5 H	Read only Adjustment value of rotor inductance for asynchronous motor. Factory setting : 0.105 H

[ASM Main Inductance Adjust]

Value range	Description
0...5 H	Read only Adjustment value of mutual inductance between stator and rotor of asynchronous motor. Factory setting : 0.1 H

[SM Stator Resistance]

Setting	Description
0...20 Ohm	Setting range The synchronous motor's inherent parameter, filled in according to the measurement value. Factory setting : 0.35 Ohm

[SM D-axis Inductance]

Setting	Description
0...20 H	Setting range The synchronous motor's inherent parameter, filled in according to the measurement value. Factory setting : 1.009 H

[SM Q-axis Inductance]

Setting	Description
-2...20 H	Setting range The synchronous motor's inherent parameter, filled in according to the measurement value. Factory setting : 0.33 H

[SM Excit Base Current]

Setting	Description
0.1...20	Setting range Excitation current base value of electrically excited synchronous motor. Factory setting : 1

[SM Stator Resistance Meas]

Setting	Description
0...20 Ohm	Setting range Automatically measured by the synchronous motor parameter auto-tuning. Factory setting : 0.35 Ohm

[SM D-axis Inductance Meas]

Setting	Description
0...20 H	Setting range Automatically measured by the synchronous motor parameter auto-tuning. Factory setting : 1.009 H

[SM Q-axis Inductance Meas]

Setting	Description
-20...20 H	Setting range Automatically measured by the synchronous motor parameter auto-tuning. Factory setting : 0.33 H

[SM Excit Base Current Meas]

Setting	Description
0.1...20	Setting range Measurement value of excitation current base value for electrically excited synchronous motor. Factory setting : 1

[Flux Meas at 60% Excit Curr]

Setting	Description
0.2...4 Wb	Setting range Automatically measured by the synchronous motor parameter auto-tuning. Factory setting : 1 Wb

[Flux Meas at 75% Excit Curr]

Setting	Description
0.2...4 Wb	Setting range Automatically measured by the synchronous motor parameter auto-tuning. Factory setting : 1 Wb

[Flux Meas at 90% Excit Curr]

Setting	Description
0.2...4 Wb	Setting range Automatically measured by the synchronous motor parameter auto-tuning. Factory setting : 1 Wb

Base value for per unit (p.u.) transformation

Name	Symbol	Value	Remark	Unit
Voltage base	u_base	$U_n / \sqrt{3} \cdot \sqrt{2}$	$U_n = \text{Max}[U_{n_motor}, U_{n_invt_in}, U_{n_invt_out}]$	V
Current base	i_base	$I_n \cdot \sqrt{2}$	$I_n = \text{Max}[I_{n_motor}, I_{n_invt_in}, I_{n_invt_out}]$	A
Power base	P_base	$u_base \cdot i_base \cdot \sqrt{3} / 2$	-	W
Time base	t_base	1	-	s
Impedance base	r_base	u_base / i_base	-	Ohm
Inductance base	l_base	$r_base \cdot \omega_base$	-	H
Torque base	torq_base	$P_base / (\omega_base / NP)$	NP is the pole pairs of the motor	N·m
Frequency base	f_base	F_n	Rated frequency	Hz
Angular frequency base	w_base	$2 \cdot \pi \cdot F_n$	Rated angular frequency	rad/s
Rotor speed base	n_base	$60 \cdot F_n / NP$	Motor synchronous speed	r/min
Flux base	flux_base	u_base / ω_base	-	Wb

NOTE:

the calculation of per unit values of the all variable are realized in HMI. U_n motor is the motor rated voltage, $U_{n_invt_in}$ is the drive's rated input voltage, $U_{n_invt_out}$ is the drive's rated output voltage.

I_n motor is the motor rated current, $I_{n_invt_in}$ is the drive's rated input current, $I_{n_invt_out}$ is the drive's rated output current.

The inertia of a freewheel can be found in the motor manual, and can be converted into moment of inertia.

The moment of inertia of the rotor also includes the value converted from the moment of inertia of the load. If the motor parameters values can be found in the motor manual, filling in the blanks with these values is OK.

If these values cannot be found in this table, the drive can use its function of automatically detecting resistance and inductance parameters of the asynchronous motor's stator and rotor, i.e., rotor blockage method, but the following conditions are required to perform the test:

Step	Action
1	The detected phase orders of the output voltage and current are correct. For the information about how to detect the phase order.
2	The sampling scaling coefficient of voltage and current is set correctly.
3	The Zero-Offset Correction is done without medium voltage.
4	<p>For asynchronous motor</p> <ul style="list-style-type: none">• if the axle of the asynchronous motor has been decoupled with the mechanical load, we can use Asynchronous Motor Rotate-tuning or Asynchronous Motor Static-tuning.• if the axle of the asynchronous motor has not been decoupled with the mechanical load, we can only use Asynchronous Motor Static-tuning. <p>For synchronous motor, the axle of the synchronous motor has to be decoupled with the mechanical load.</p>
5	The drive system is OK with medium voltage.
After the test, the result should be Positive Real Numbers. Manually writing the corresponding values to the first five columns of the Stator/Rotor settings table is OK.	

Sampling Scalar

Access

Settings → Advanced Settings → Sampling Scalar

[Ia Sampling Scalar]

Setting	Description
Related to the input current transformer ratio	The current scaler of input phase A. Factory setting: Related to the input current transformer ratio.

[Ib Sampling Scalar]

Setting	Description
Related to the input current transformer ratio	The current scaler of input phase B. Factory setting: Related to the input current transformer ratio.

[Uab Sampling Scalar]

Setting	Description
Related to the divider resistor value on the input side.	The voltage scaler of input line voltage AB. Factory setting: Related to the divider resistance value on the input side.

[Ubc Sampling Scalar]

Setting	Description
Related to the divider resistor value on the input side.	The voltage scaler of input line voltage BC. Factory setting: Related to the divider resistance value on the input side.

[Iu Sampling Scalar]

Setting	Description
Related to the Hall conversion ratio of the output current and the Hall load resistance.	The current scaler of output phase U. Factory setting: Related to the Hall conversion ratio of the output current and the Hall load resistance.

[Iw Sampling Scalar]

Setting	Description
Related to the Hall conversion ratio of the output current and the Hall load resistance.	The current scaler of output phase W. Factory setting: Related to the Hall conversion ratio of the output current and the Hall load resistance.

[Uuv Sampling Scalar]

Setting	Description
Related to the divider resistance value on the output side.	The voltage scaler of input line voltage UV. Factory setting: Related to the divider resistance value on the output side.

[Uvw Sampling Scalar]

Setting	Description
Related to the divider resistance value on the output side.	The voltage scaler of input line voltage VW. Factory setting: Related to the divider resistance value on the output side.

The Sampling parameter setting formula are shown as following:

- **[Ia Sampling Scalar] = [Ib Sampling Scalar] = KCT.**
- **[Uab Sampling Scalar] = [Ubc Sampling Scalar] = $(RL+RH_{input}) / RL$.**
- **[Iu Sampling Scalar] = [Iw Sampling Scalar] = $- K_{Hall}/R_{Load}$.**
- **[Uuv Sampling Scalar] = [Uvw Sampling Scalar] = $-(RL+RH_{output}) / RL$.**

Where:

- KCT is the input current transformer conversion ratio;
- $RL = 5 \text{ k}\Omega$; RH_{input} is high voltage resistance on input voltage divider board;
- K_{Hall} is the attenuation ratio of current hall;
- R_{Load} is the Hall load resistance;
- RH_{output} is high voltage resistance on output voltage divider board.

NOTE:

- The drives with different voltage and power have different sampling scalars. Settings of sampling scalars have been completed in the factory before the drive's delivery, so the user does not need to modify them
- After modification of the sampling scalars, it is necessary to perform zero-offset correction again, and fill in the offset correction values obtained into the corresponding columns in the table **Offset parameters** see below.

Offset Correction

Access

Settings → Advanced Settings → Offset Correction

[Ia Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The current zero offset correction coefficient of input phase A;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Ib Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The current zero offset correction coefficient of input phase A;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Uab Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The voltage zero offset correction coefficient of input line voltage AB;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Ubc Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The voltage zero offset correction coefficient of input line voltage BC;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Iu Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The current zero offset correction coefficient of output phase U;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Iw Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The current zero offset correction coefficient of output phase W;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Uuv Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The voltage zero offset correction coefficient of output line voltage UV;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

[Uvw Offset Correction Coeff]

Setting	Description
-2048...2048	<p>Setting range</p> <p>The voltage zero offset correction coefficient of output line voltage VW;</p> <p>It requires setting the Sampling Adjustment function correctly check in the lists of parameters.</p> <p>It is only necessary to activate the Offset Correction function and then fill in the values obtained from the correction into corresponding blanks in this table.</p> <p>After any modification of Sampling Scalers (including the sign), perform zero offset correction again.</p> <p>Factory setting: 0</p>

Vector Control

Access

Settings → Advanced Settings → Vector Control

About The Menu

If the controlled object is an **Asynchronous motor**, enter to **Settings** → **Control Parameter** → Control Parameter, page 58 and verify the following parameters:

- **[Motor Control Law]** is set to **[Vector Control]**
- **[Motor Control Law]** is set to **[U/f Control]** and **[U/f - Start Mode]** is set to **[Vector]**.

[Reference Flux]

Setting	Description
0.0...1000 Wb	Setting range The reference value of the rotor flux; Obtained from the ASM Estimation . Factory setting: 15 Wb

[Maximum Torque Limit]

Setting	Description
0.0...2000000 N·m	Setting range The permitted maximum torque output of the motor axle. Usually taken as 1.2 x Rated torque. In the case of starting with a heavy load, it can be set to 1.5 x Rated torque. Factory setting: 2000 N·m

[Current Loop Control Coeff.]

Setting	Description
1...32767	Setting range It has been set properly before delivery and cannot be set by the user. In unusual cases, it can be set only by the manufacturer's own technicians. Factory setting: 1200

[Current Loop Adaption]

Setting	Description
[Enable]	It is up to the system to select the corresponding current loop controlling parameter according to the current rotation speed when Vector Control is used.
[Disable]	Parameter disabled Factory setting
NOTE: Valid when Vector Control is used.	

[Torque Current Pos. Limit]

Setting	Description
1...5000 A	<p>Setting range</p> <p>The current amplitude limit of forward torque when in Vector Control.</p> <p>Factory setting: 42 A</p>

[Torque Current Neg. Limit]

Setting	Description
-5000...50 A	<p>Setting range</p> <p>The current amplitude limit of reverse torque when in Vector Control.</p> <p>Factory setting: -10 A</p>

[Speed Regulation Coeff. Kp]

Setting	Description
0...32767	<p>Setting range</p> <p>It has been set properly before delivery and cannot be set by the user. In unusual cases, it can be set only by the manufacturer's own technicians.</p> <p>Factory setting: 6</p>

[Speed Regulation Coeff. Ki]

Setting	Description
0...32767	<p>Setting range</p> <p>It has been set properly before delivery and cannot be set by the user. In unusual cases, it can be set only by the manufacturer's own technicians.</p> <p>Factory setting: 24</p>

[Speed/Torque control select]

Setting	Description
[Torque Ctrl]	If the [Speed/Torque control select] is [Torque Ctrl], the Control Mode is Vector Control at given torque.
[Speed Ctrl]	If the [Speed/Torque control select] is [Speed Ctrl], the Control Mode is Vector Control at given speed.
	Factory setting

[Speed Encoder Activation]

Setting	Description
[Without Encoder]	The speed feedback value is estimated by output current and output voltage. Factory setting
[With Encoder]	The speed feedback value is measured by the encoder.
NOTE: Available only when Vector Control is used.	

[Number of Pulses]

Setting	Description
1000...20000	Setting range Pulse number per round of the incremental photoelectric encoder for speed measurement. Factory setting: 5000
NOTE: Available only when Vector Control is used.	

[Speed Tracking Time]

Setting	Description
0...60 s	Setting range The time from the moment when no torque is output at startup until the moment when torque begins to be output. Factory setting: 0.5 s

[ASM Fluxing Time]

Setting	Description
0.1...60 s	Setting range The flux building time of the asynchronous motor when it starts up in Vector Control mode. Usually the default value is OK. Factory setting: 2 s

[ASM Flux Comp Coeff.]

Setting	Description
0...2	Setting range Asynchronous motor flux observer compensating factor. Factory setting: 0.9

[ASM Rotor Flux Filter Const]

Setting	Description
0.2...10000 rad/s	<p>Setting range</p> <p>It has been set properly before delivery and cannot be set by the user. In unusual cases, it can be set only by the manufacturer's own technicians.</p> <p>Factory setting: 2 rad/s</p>

[ASM Speed Est Filter Const]

Setting	Description
1...10000 rad/s	<p>Setting range</p> <p>The low pass filter's cut-off frequency of the estimation speed. It has been set properly before delivery and cannot be set by the user. In unusual cases, it can be set only by the manufacturer's own technicians.</p> <p>Factory setting: 60 rad/s</p>

[ASM Sync Speed Filter Const]

Setting	Description
1...10000 rad/s	<p>Setting range</p> <p>The low pass filter's cut-off frequency of the estimation synchronous speed. It has been set properly before delivery and cannot be set by the user. In unusual cases, it can be set only by the manufacturer's own technicians.</p> <p>Factory setting: 732 rad/s</p>

[ASM DC Injection Time]

Setting	Description
0...120 s	<p>Setting range</p> <p>The duration of asynchronous motor executing DC braking function.</p> <p>Factory setting: 0 s</p>

[ASM DC Injection I-Level]

Setting	Description
40...200 %	<p>Setting range</p> <p>The proportion of current when asynchronous motors perform DC braking function.</p> <p>Factory setting: 40 %</p>

[ASM Flux Filter Function]

Setting	Description
[Enable]	Enable asynchronous motor magnetic flux filtering function.
[Disable]	Disable asynchronous motor magnetic flux filtering function. Factory setting

[ASM Feedback Current Filter]

Setting	Description
[Enable]	Enable asynchronous motor feedback current filtering function.
[Disable]	Disable asynchronous motor feedback current filtering function. Factory setting

[ASM Flux PLL Function]

When **[ASM Flux PLL Function]** is set to **[Disable]**, the motor may sometimes rotate for a few cycles in a direction opposite to that intended when starting from 0 speed, then accelerate until correct operation.

⚠ WARNING

UNEXPECTED EQUIPMENT OPERATION DUE TO MOTOR STARTING IN OPPOSITE DIRECTION

- Keep **[ASM Flux PLL Function]** on **[Enable]** if the application only allows rotation in one direction.
- If the application requires to rotate in both directions, contact technical support to set **[ASM Flux PLL Function]** to **[Disable]** and verify that this setting does not result in unsafe conditions by performing extensive commissioning tests.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Setting	Description
[Enable]	Enable asynchronous motor flux phase-locked loop function for pre-excitation period. Factory setting
[Disable]	Asynchronous motor flux phase-locked loop function in normal mode.

[ASM Flux PLL Function Enable Time]

Setting	Description
0...60 s	Setting range This parameter take effected only if [ASM Flux PLL Function] is enabled. If set to 0..59: the effective time when [ASM Flux PLL Function] enabled from the start-up, disable the function when time exceeded. If set to 60: [ASM Flux PLL Function] is enabled continuously. Factory setting: 10 s

[ASM Flux PLL Coeff. Kp Max]

Setting	Description
0...32767	Setting range Maximum proportional gain coefficient of asynchronous motor flux phase-locked loop during pre-excitation period. Factory setting: 50

[ASM Flux PLL Coeff. Kp Low speed]

Setting	Description
0...32767	Setting range Proportional gain coefficient of asynchronous motor flux phase-locked loop at low speed (below 5 Hz) start-up. Factory setting: 0.1

[ASM Flux PLL Coeff. Ki Low speed]

Setting	Description
0...32767	Setting range Integral gain coefficient of asynchronous motor flux phase-locked loop at low speed (below 5 Hz) start-up. Factory setting: 1

[ASM Flux PLL Track Time]

Setting	Description
0...60 s	Setting range Flux establishment tracking time. Factory setting: 0.5 s

[ASM Flux PLL Flux threshold]

Setting	Description
0...1	Setting range Threshold of flux establishment. Factory setting: 0.1

[ASM Flux PLL Coeff. Kp]

Setting	Description
0...32767	Setting range Proportional gain coefficient of asynchronous motor flux phase-locked loop. Factory setting: 5

[ASM Flux PLL Coeff. Ki]

Setting	Description
0...32767	Setting range Integral gain coefficient of asynchronous motor flux phase-locked loop. Factory setting: 50

[ASM Voltage Compensation]

Setting	Description
[Enable]	Enable asynchronous motor voltage compensation function.
[Disable]	Disable asynchronous motor voltage compensation function. Factory setting

[ASM Flux Close Loop Control]

Setting	Description
[Setting Open Loop]	Asynchronous motor magnetic flux open-loop control command. Factory setting
[Setting Close Loop]	Asynchronous motor magnetic flux close-loop control command.

[ASM Flux Control Coeff.]

Setting	Description
0...32676	Setting range Used for magnetic flux closed-loop control calculation, generally not requiring modification. Factory setting: 5

[ASM Fluxing Time 2]

Setting	Description
0...32676 (10 ms)	Setting range Second time for establishing magnetic flux of asynchronous motor. Factory setting: 5 (10 ms)

[ASM Speed Tracking Time 2]

Setting	Description
0...32676 (10 ms)	Setting range Asynchronous motor speed tracking second time. Factory setting: 5 (10 ms)

[ASM Rs Measurement I1]

Setting	Description
0...500 A	<p>Setting range</p> <p>Measurement current1 which is set when measuring the motor's stator resistance automatically; Usually taken as 30% of the rated motor current.</p> <p>Factory setting: 10 A</p>

[ASM Rs Measurement I2]

Setting	Description
0...500 A	<p>Setting range</p> <p>Measurement current2 which is set when measuring the motor's stator resistance automatically; Usually taken as 70% of the rated motor current.</p> <p>Factory setting: 21 A</p>

[ASM Rs Locked Rotor Current]

Setting	Description
0...500 A	<p>Setting range</p> <p>Measurement current which is set when measuring the motor's inductance parameter automatically; Usually taken as 70% of the rated motor current.</p> <p>Factory setting: 21 A</p>

[SM Volt Closeloop Ctrl]

Setting	Description
[Enable]	<p>Enable electrically excited synchronous motor voltage closed-loop function.</p> <p>Factory setting</p>
[Disable]	<p>Disable electrically excited synchronous motor voltage closed-loop function.</p>

[SM Volt Closeloop Ctrl f]

Setting	Description
0...120 Hz	<p>Setting range</p> <p>Frequency when enabling electrically excited synchronous motor voltage closed-loop function.</p> <p>Factory setting: 15 Hz</p>

[SM Volt Closeloop Ctrl]

Setting	Description
0.5...1.3	Setting range Electrically excited synchronous motor voltage closed-loop function output voltage coefficient. Factory setting: 1.01

[SM Volt Loop Neg Amp Limit]

Setting	Description
-2...0	Setting range Voltage closed-loop function output negative limiting amplitude. Factory setting: -1

[SM Current Loop PI Reg Kp]

Setting	Description
0...32767	Setting range Vector control current loop proportional gain coefficient of electrically excited synchronous motor. Factory setting: 0.5

[SM Current Loop PI Reg Ki]

Setting	Description
0...32767	Setting range Vector control current loop integral gain coefficient of electrically excited synchronous motor. Factory setting: 10

[SM Speed Estimation Filter]

Setting	Description
1...10000 rad/s	Setting range Used for filtering the estimated speed of electrically excited synchronous motors. Factory setting: 30 rad/s

[SM Flux PLL Function]

Setting	Description
[Enable]	Enable the phase-locked loop function of the magnetic flux linkage in electrically excited synchronous motors.
[Disable]	Prohibit the phase-locked loop function of the magnetic flux linkage in electrically excited synchronous motors. Factory setting

[SM Flux PLL Coefficient Kp]

Setting	Description
0...32767	Setting range Proportional gain coefficient of magnetic flux phase-locked loop in electrically excited synchronous motor. Factory setting: 0.5

[SM Flux PLL Coefficient Ki]

Setting	Description
0...32767	Setting range Integral gain coefficient of magnetic flux phase-locked loop in electrically excited synchronous motor. Factory setting: 5

[SM Flux Compensation]

Setting	Description
[Enable]	Enable electrically excited synchronous motor voltage loop control command.
[Disable]	Prohibit electrically excited synchronous motor voltage loop control command. Factory setting

[SM Rotor Alignment Current 1]

Setting	Description
0...1 Rated Ex. Current	Setting range Electrically excited synchronous motor initial positioning excitation first given command. Factory setting: 0.75 Rated Ex. Current

[SM Rotor Alignment Current 2]

Setting	Description
0...1 Rated Ex. Current	Setting range Electrically excited synchronous motor initial positioning excitation second given command. Factory setting: 0.1 Rated Ex. Current

[SM Alignment Current Ramp]

Setting	Description
0...6000 ms	Setting range Rising time of excitation current command for initial positioning of electrically excited synchronous motor. Factory setting: 300 ms

Reference values

Rated voltage (V)	Rated frequency (Hz)	Reference flux (Wb)	Rated line voltage (V)	Rated frequency (Hz)	Reference flux (Wb)
3000	50	7.25	3000	60	6.04
3300	50	7.98	3300	60	6.65
4160	50	10.8	4160	60	9.0
6000	50	14.5	6000	60	12.1
6600	50	16	6600	60	13.3
10000	50	24.2	10000	60	20.1
11000	50	26.6	11000	60	22.2

U/f Catch on Fly

Access

Settings → Advanced Settings → U/f Catch on Fly

[Motor Freewheel Stop Time]

Setting	Description
0.1...3000 s	<p>Setting range</p> <p>The time from activation of a freewheel stop in the interface until the motor comes to standstill. For the asynchronous motor, if the system is restarted during Motor stationary time, the drive will perform flying start-up. Otherwise, the drive will start the output from the [Starting frequency]. The adjustment of this value corresponds to the inertia of the machine.</p> <p>Factory setting: 20 s</p>

[Motor EMF Detection Function]

Setting	Description
[Enable]	<p>The function is used to the asynchronous motor catch on fly start-up quickly. If Motor Type is asynchronous motor and Motor control law is U/F Control and U/f-Start Mode is Normal.</p> <p>If the Maximum bypass number is not zero and when the power cell is abnormal, the power cell is disabled by automatic bypass. If the quantity of the disabled power cell less than the Maximum bypass number, the asynchronous motor will catch on fly start-up quickly.</p> <p>Factory setting</p>
[Disable]	<p>The function is used to the asynchronous motor catch on fly start-up quickly. If Motor Type is asynchronous motor and Motor control law is U/F Control and U/f-Start Mode is Normal.</p> <p>If the Maximum bypass number is not zero and when the power cell is abnormal, the power cell is disabled by automatic bypass. If the quantity of the disabled power cell less than the Maximum bypass number, the asynchronous motor will not catch on fly start-up quickly.</p>

[U/f CoF - Initial Voltage]

Setting	Description
0.01...0.6 %	<p>Setting range</p> <p>The initial voltage output of the drive when in catch on flying start-up (the proportion to the rated system voltage).</p> <p>Factory setting: 0.05 %</p>

[U/f CoF - Voltage Step]

Setting	Description
0.001...0.1 %	<p>Setting range</p> <p>The incremental voltage step (the proportion to the rated system voltage).</p> <p>Factory setting: 0.002 %</p>

[U/f CoF - Current Limit]

Setting	Description
0.5...1.5 %	<p>Setting range</p> <p>Current limit value when the motor is in spinning start-up (the proportion to the rated motor current). When the current is over the limit value, the system will adjust the drive's output automatically.</p> <p>Factory setting: 1 %</p>

[U/f CoF - Time Constant]

Setting	Description
1...100 s	<p>Setting range</p> <p>During the catch on flying process, if the output current is larger than VF current limit, the motor will decrease with VF time constant.</p> <p>Factory setting: 30 s</p>

Synchronous Motor

Access

Settings → Advanced Settings → Synchronous Motor

[Excit Curr Ramp Time]

Setting	Description
0...6000 ms	Setting range The duration of the command Increasing Excitation or Decreasing Excitation. Factory setting: 300 ms

[Excit Curr Ramp Pause Time]

Setting	Description
0...6000 ms	Setting range The time interval between two consecutive excitation adjustment commands. Factory setting: 500 ms

[Min. Excitation Current]

Setting	Description
0...2 s of Rated Ex. Current	Setting range The minimum exciting current given by the drive. The value unit is the times of the rated exciting current. Factory setting: 0.1 s of rated exciting current.

[Max. Excitation Current]

Setting	Description
0.5...2 s of Rated Ex. Current	Setting range The maximum exciting current given by the drive. The value unit is the times of the rated exciting current. Factory setting: 0.85 s of rated exciting current.

[Pre-start Excit Current]

Setting	Description
0.0...2 s of Rated Ex. Current	Setting range The exciting current given when the drive is standby. The value unit is the times of the rated exciting current. Factory setting: 0.25 s of rated exciting current.

[U/f Auto-Excit Regulation]

Setting	Description
[Enable]	Enable the drive to automatically adjust the auto-excitation of synchronous motors.
[Disable]	Disable the drive to automatically adjust the auto-excitation of synchronous motors. Factory setting

[U/f Auto-Excit Start Freq]

Setting	Description
0...120 Hz	Setting range When the output is higher than this frequency setting, the excitation auto-adjustment will begin. Factory setting: 20 Hz

[U/f Power Factor Setpoint]

Setting	Description
-0.99...1	Setting range The objective of the power factor control. Factory setting: -0.9

[U/f PF Regulation Thresh 1]

Setting	Description
-0.99...1	Setting range The permitted deviation of the power factor. When the power factor exceeds this deviation, the excitation adjustment with [U/f Auto-Excitation Step 1] will begin. Factory setting: 0.08

[U/f Auto-Excitation Step 1]

Setting	Description
0.0001...0.2	Setting range The percentage of excitation increase or decrease in the amount of the rated excitation in every adjustment period. Factory setting: 0.01

[U/f PF Regulation Thresh 2]

Setting	Description
-0.99...1	<p>Setting range</p> <p>The permitted deviation of the power factor. When the power factor exceeds this deviation, the excitation adjustment with [U/f Auto-Excitation Step 2] will begin.</p> <p>Factory setting: 0.12</p>

[U/f Auto-Excitation Step 2]

Setting	Description
0.0001...0.2	<p>Setting range</p> <p>The percentage of excitation increase or decrease in the amount of the rated excitation in every adjustment period.</p> <p>Factory setting: 0.02</p>

[U/f Auto-Excit Min Current]

Setting	Description
0...2	<p>Setting range</p> <p>The minimum excitation current of an electrically excited synchronous motor in VF operating mode.</p> <p>Factory setting: 0.5</p>

[U/f Manual Excit Current]

Setting	Description
0...2	<p>Setting range</p> <p>The excitation current in the amount of the rated excitation when the synchronous motor in normally operation.</p> <p>Factory setting: 0.5</p>

[U/f CoF Start Excit Curr]

Setting	Description
0...2	<p>Setting range</p> <p>The excitation current in the amount of the rated excitation when the synchronous motor in catch on flying operation.</p> <p>Factory setting: 0.35</p>

NOTE: The parameter [U/f CoF Start Excit Curr] is recommended to set as 0.3...0.4. Not use the default value in actual application.

[U/f CoF Start Excit CurrRamp]

Setting	Description
0.1...100 s	Setting range The exciting current increasing delay time from [U/f CoF Start Excit Curr] to rated exciting current. Factory setting: 2 s

[U/f CoF Start Voltage Coeff]

Setting	Description
0.01...2	Setting range The voltage output of the drive when in the flying-startup of synchronous motors (the factor to motor-side voltage of the synchronous motor). Usually the default value is OK. Factory setting: 0.98

NOTE: Following parameters available only when the control mode is Vector Control with synchronous motor.

[U/f CoF Start f-Correction]

Setting	Description
-2...2 Hz	Setting range The voltage output of the drive when in the flying-startup of synchronous motors (the factor to motor-side voltage of the synchronous motor). Usually the default value is OK. Factory setting: 0 Hz

[U/f CoF Start Ang-Correction]

Setting	Description
-359.9...359.9 degree	Setting range Phase correction angle of electrically excited synchronous motor during catch-on fly starting up. Factory setting: 0 degree

[VC Auto-Excitation]

Setting	Description
[Enable]	Enable the drive to automatically adjust the auto-excitation of synchronous motors.
[Disable]	Disable the drive to automatically adjust the auto-excitation of synchronous motors. Factory setting

[VC Auto Excit Start Freq]

Setting	Description
0...120 Hz	<p>Setting range</p> <p>When the output is higher than this frequency setting, the excitation auto-adjustment will begin.</p> <p>Factory setting: 20 Hz</p>

[VC Power Factor Setpoint]

Setting	Description
-0.99...1	<p>Setting range</p> <p>The objective of the power factor control.</p> <p>Factory setting: -0.9</p>

[VC PF Regulation Thresh 1]

Setting	Description
-0.99...1	<p>Setting range</p> <p>The permitted deviation of the power factor. When the power factor exceeds this deviation, the excitation adjustment with [VC Auto-Excitation Step 1] will begin.</p> <p>Factory setting: 0.08</p>

[VC Auto-Excitation Step 1]

Setting	Description
0.0001...0.2	<p>Setting range</p> <p>The percentage of excitation increase or decrease in the amount of the rated excitation in every adjustment period.</p> <p>Factory setting: 0.01</p>

[VC PF Regulation Thresh 2]

Setting	Description
-0.99...1	<p>Setting range</p> <p>The permitted deviation of the power factor. When the power factor exceeds this deviation, the excitation adjustment with [VC Auto-Excitation Step 2] will begin.</p> <p>Factory setting: 0.12</p>

[VC Auto-Excitation Step 2]

Setting	Description
-0.0001...0.2 Rated Ex. Current	<p>Setting range</p> <p>The percentage of excitation increase or decrease in the amount of the rated excitation in every adjustment period.</p> <p>Factory setting: 0.02</p>

[VC Auto-Excit Min Current]

Setting	Description
0...2	<p>Setting range</p> <p>The excitation current in the amount of the rated excitation when the synchronous motor in normally operation.</p> <p>Factory setting: 0.5</p>

[VC Manual Excit Current]

Setting	Description
0...0.7	<p>Setting range</p> <p>Excitation current during vector control of electrically excited synchronous motors.</p> <p>Factory setting: 0.7</p>

[VC CoF Start Excit Curr]

Setting	Description
0.0...2	<p>Setting range</p> <p>The excitation current in the amount of the rated excitation when the synchronous motor in catch on flying operation.</p> <p>Factory setting: 0.75</p>

[VC CoF Start Excit Curr Ramp]

Setting	Description
0.1...100 s	<p>Setting range</p> <p>The exciting current increasing delay time from [(Vector) I_{excite_Flyst}] to rated exciting current.</p> <p>Factory setting: 2 s</p>

[VC CoF Start f-Correction]

Setting	Description
-2...2	<p>Setting range</p> <p>Phase correction angle for catch on flying of electrically excited synchronous motor in vector control mode.</p> <p>Factory setting: 0</p>

Sync Transfer

Access

Settings → Advanced Settings → Sync Transfer

[ND Voltage Amplitude Factor]

Setting	Description
0.5...2.0	<p>Setting range</p> <p>The coefficient of output voltage to system voltage when performing synchronization transfer. Change of this value can change the drive's output voltage amplitude, so as to achieve the objective to make the output and input have the same voltage amplitude.</p> <p>Factory setting: 1.01</p>

[ND Voltage Phase Ang Offset]

Setting	Description
-20...359.9 degree	<p>Setting range</p> <p>This value can change the phase of the output voltage in synchronization transfer, so as to make the phase of the output voltage equal to that of the input voltage, achieving the objective of synchronization of output and input.</p> <p>Factory setting: -2 degree</p>

[ND Excitation I Setting]

Setting	Description
0.3...1.1547	<p>Setting range</p> <p>Sets the excitation current when in synchronization transfer.</p> <p>Factory setting: 0.85</p>

[HD Voltage Amplitude Factor]

Setting	Description
0.5...2	<p>Setting range</p> <p>Same as the Light-load Vamp.</p> <p>Factory setting: 1.01</p>

[HD Voltage Phase Ang Offset]

Setting	Description
-20...359.9 degree	<p>Setting range</p> <p>Same as the Light-load angle.</p> <p>Factory setting: 3 degree</p>

[HD Excitation I Setting]

Setting	Description
0.3...1.1547	Setting range Same as the Light-load exciting. Factory setting: 0.85

[ST Auto-Excitation Control]

Setting	Description
[Enable]	Determines whether to enable automatic adjustment to the exciting current in synchronization transfer.
[Disable]	Parameter disabled Factory setting

[ST PLL Time Limit]

Setting	Description
10...200 s	Setting range The time limit for voltage synchronization tracking during synchronization transfer. If exceeded, the synchronization transfer will be considered interrupted. Factory setting: 30 s

[ST Stability Filter Timer]

Setting	Description
1...200 s	Setting range When click the synchronous switching button, the frequency of output voltage will increase automatic. When the deviation between the frequency of output voltage and input voltage less than 2.5 Hz and maintain the deviation less than 2.5 Hz time longer than ST Stability Filter Timer, then the drive will execute synchronous transfer operation. Factory setting: 1 s

[Input Frequency Actual Value]

Value range	Description
0	Read-only The detect actual frequency of input voltage. Factory setting: 0

[Reactor Hardware Selection]

Setting	Description
[Enable]	In the synchronous transfer process, there is no electric reactor connect to the output of drive.
[Disable]	In the synchronous transfer process, there is electric reactor connect to the output of drive. Factory setting

[KM43 Min. Close Time]

Setting	Description
0...32767	Setting range If [Reactor Hardware Selection] is set enable, after phase locked successfully and allow to switch. The switching cabinet will control the contactor operate, meanwhile send the contactor status to drive. Start from drive receive the status, after [KM43 Min. Close Time] , the drive will determine whether to stop drive through judge the current amplitude. Factory setting: 1

[KM43 Max. Close Time]

Setting	Description
0...32767	Setting range If [Reactor Hardware Selection] is set enable, after phase locked successfully and allow to switch. The switching cabinet will control the contactor operate, meanwhile send the contactor status to drive. Start from drive receive the status, after [KM43 Max. Close Time] , the drive will stop automatic. The value should be smaller than [KM43 Actual Closing Time] . Factory setting: 150

[KM43 Actual Closing Time]

Value range	Description
0	Read-only If [Reactor Hardware Selection] is set enable, before actual synchronous switching operation, should measure the average time of the contactor operate as reference for [KM43 Max. Close Time] set. Factory setting: 0

MaC AI/AO

Access

Settings → Advanced Settings → MaC AI/AO

[IN1 Function Selection]

Setting	Description
[Spare]	It means this analog input channel is not valid.
[Setpoint Frequency]	The analog input value represents the frequency given. Factory setting
[Setpoint Torque]	The analog input value represents the torque given.
[Max Torque given]	The analog input value represents the max torque given
[Humidity sensor]	Humidity sensor used for the PLC of the drive

[IN1 Min. Input Value]

Setting	Description
0...24.0 mA	Setting range The minimum valid value of the analog input. Factory setting: 4 mA

[IN1 Max. Input Value]

Setting	Description
0...24.0 mA	Setting range The maximum valid value of the analog input. Factory setting: 20.0 mA

[IN1 Loss Behavior]

Setting	Description
[Lost Retain]	When the analog input is lost, the value of the analog input keeps the pre-value. Factory setting
[Lost Preset]	When the analog input is lost, the value of the analog input changes to [IN1 Loss Preset] value.

[IN1 Loss Preset]

Setting	Description
3...20 mA	Setting range When the analog input is lost, it is the value of the analog input if [IN1 Loss Behavior] is set as Lost Preset. Factory setting: 4 mA

[IN1 Min. Scaling Value]

Setting	Description
-10...10	Setting range The physical variable's minimum value, represented by [IN1 Min. Input Value] value. The unit is the rated value of the physical variable. Factory setting: 0

[IN1 Max. Scaling Value]

Setting	Description
-10...10	Setting range The physical variable's maximum value, represented by [IN1 Max. Input Value] . The unit is the rated value of the physical variable. Factory setting: 0

[IN2 Function Selection]

Setting	Description
[Backup]	It means this analog input channel is not valid. Factory setting
[Frequency given]	The analog input value represents the frequency given.
[Torque given]	The analog input value represents the torque given.
[Max Torque given]	The analog input value represents the max torque given
[Humidity densor]	Humidity sensor used for the PLC of the drive

[IN2 Min. Input Value]

Setting	Description
0...24.0 mA	Setting range The minimum valid value of the analog input. Factory setting: 4 mA

[IN2 Max. Input Value]

Setting	Description
0...24.0 mA	Setting range The maximum valid value of the analog input. Factory setting: 20.0 mA

[IN2 Loss Behavior]

Setting	Description
[Lost Retain]	When the analog input is lost, the value of the analog input keeps the pre-value. Factory setting
[Lost Preset]	When the analog input is lost, the value of the analog input changes to [IN2 Loss Preset] value.

[IN2 Loss Preset]

Setting	Description
3...20 mA	Setting range When the analog input is lost, it is the value of the analog input if [IN2 Loss Behavior] is set as Lost Preset. Factory setting: 4 mA

[IN2 Min. Scaling Value]

Setting	Description
-10...10	Setting range The physical variable's minimum value, represented by [IN1 Min. Input Value]. The unit is the rated value of the physical variable. Factory setting: 0

[IN2 Max. Scaling Value]

Setting	Description
-10...10	Setting range The physical variable's maximum value, represented by [IN1 Max. Input Value]. The unit is the rated value of the physical variable. Factory setting: 1

[IN3 Function Selection]

Setting	Description
[Spare]	It means this analog input channel is not valid. Factory setting
[Setpoint Frequency]	The analog input value represents the frequency given.
[Setpoint Torque]	The analog input value represents the torque given.
[Max Torque given]	The analog input value represents the max torque given
[Humidity sensor]	Humidity sensor used for the PLC of the drive

[IN3 Input Source]

Setting	Description
[Current source]	This analog input channel receive current signal (4-20 mA). Factory setting
[Voltage source]	This analog input channel receive current signal (0-10 V).

[IN3 Min. Input Value]

Setting	Description
0...24 (4--20 mA or 0--10 V)	Setting range, depending on the [Current source] or [Voltage source] selected for the [IN3 Input Source]. The minimum valid value of the analog input. Factory setting: 4 mA

[IN3 Max. Input Value]

Setting	Description
0...24 (4--20 mA or 0--10 V)	Setting range, depending on the [Current source] or [Voltage source] selected for the [IN3 Input Source]. The maximum valid value of the analog input. Factory setting: 20.0 mA

[IN3 Loss Behavior]

Setting	Description
[Maintain Speed]	When the analog input is lost, the value of the analog input keeps the pre-value.
[Preset Speed]	When the analog input is lost, the value of the analog input changes to [IN3 Loss Preset] value. Factory setting

[IN2 Loss Preset]

Setting	Description
0...24 (4--20 mA or 0--10 V)	Setting range, depending on the [Current source] or [Voltage source] selected for the [IN3 Input Source]. When the analog input is lost, it is the value of the analog input if [IN3 Loss Behavior] is set as Lost Preset. Factory setting: 4 mA

[IN3 Min. Scaling Value]

Setting	Description
-10...10	<p>Setting range</p> <p>The physical variable's minimum value, represented by [IN3 Min. Input Value]. The unit is the rated value of the physical variable.</p> <p>Factory setting: 0</p>

[IN3 Max. Scaling Value]

Setting	Description
-10...10	<p>Setting range</p> <p>The physical variable's maximum value, represented by [IN3 Max. Input Value]. The unit is the rated value of the physical variable.</p> <p>Factory setting: 1</p>

[AIO1 Function Code]

Setting	Description
0...200	<p>Setting range</p> <p>It can select most 200 physic variable. It is used to debug the system.</p> <p>Factory setting: 0</p>

[AIO1 Min. Output Value]

Setting	Description
0...24 (4–20 mA or 0–10 V)	<p>Setting range</p> <p>The minimum value of the analogue output AIO1.</p> <p>Factory setting: 4 mA</p>

[AIO1 Max. Output Value]

Setting	Description
0...24 mA	<p>Setting range</p> <p>The maximum value of the analogue output AIO1.</p> <p>Factory setting: 20 mA</p>

[AIO1 Min. Scaling Value]

Setting	Description
-3000...3000	<p>Setting range</p> <p>The minimum value of the analogue output AIO1 represents how much torque given. The unit is factor of the rated torque.</p> <p>Factory setting: 0</p>

[AIO1 Max. Scaling Value]

Setting	Description
-3000...3000	<p>Setting range</p> <p>The maximum value of the analogue output AIO1 represents how much torque given. The unit is factor of the rated torque.</p> <p>Factory setting: 10</p>

[AIO2 Function Code]

Setting	Description
0...200	<p>Setting range</p> <p>It can select most 200 physic variable. It is used to debug the system.</p> <p>Factory setting: 0</p>

[AIO2 Min. Output Value]

Setting	Description
0...24 mA	<p>Setting range</p> <p>The minimum value of the analogue output AIO2.</p> <p>Factory setting: 4 mA</p>

[AIO2 Max. Output Value]

Setting	Description
0...24 mA	<p>Setting range</p> <p>The maximum value of the analogue output AIO2.</p> <p>Factory setting: 20 mA</p>

[AIO2 Min. Scaling Value]

Setting	Description
-3000...3000	<p>Setting range</p> <p>The minimum value of the analogue output AIO2 represents how much torque given. The unit is factor of the rated exciting current.</p> <p>Factory setting: 0</p>

[AIO2 Max. Scaling Value]

Setting	Description
-3000...3000	<p>Setting range</p> <p>The maximum value of the analogue output AIO2 represents how much torque given. The unit is factor of the rated exciting current.</p> <p>Factory setting: 10</p>

[DA2 Function Code]

Setting	Description
0...200	Setting range It can select most 200 physic variable. It is used to debug the system. Factory setting: 0

[DA2 Min. Output Value]

Setting	Description
0...5 V	Analogue output minimum value. Factory setting: 0 V

[DA2 Max. Output Value]

Setting	Description
0...5 V	Analogue output maximum value. Factory setting: 5 V

[DA2 Min. Scaling Value]

Setting	Description
-3000...3000	Analogue output minimum value represents how many physical variables are. The unit is factor of the rated value of physical variable. Factory setting: 0

[DA2 Max. Scaling Value]

Setting	Description
-3000...3000	Analogue output maximum value represents how many physical variables are. The unit is factor of the rated value of physical variable. Factory setting: 1

[DA3 Function Code]

Setting	Description
0...200	It can select most 200 physic variable. It is used to debug the system. Factory setting: 0

[DA3 Min. Output Value]

Setting	Description
0...5 V	Analogue output minimum value. Factory setting: 0 V

[DA3 Max. Output Value]

Setting	Description
0...5 V	Analogue output maximum value. Factory setting: 5 V

[DA3 Min. Scaling Value]

Setting	Description
-3000...3000	Analogue output minimum value represents how many physical variables are. The unit is factor of the rated value of physical variable. Factory setting: 0

[DA3 Max. Scaling Value]

Setting	Description
-3000...3000	Analogue output maximum value represents how many physical variables are. The unit is factor of the rated value of physical variable. Factory setting: 1

[Analog f-ref Hysteresis]

Setting	Description
0...2 Hz	Frequency simulation with given hysteresis threshold. Factory setting: 0.2 Hz

[De-excitation I-ref]

Setting	Description
[Min Value]	The analog output of demagnetization current is the minimum excitation current. Factory setting
[0mA]	The analog output of demagnetization current is 0 mA.

[Torque reference]

Value range	Description
-2000000...2000000 N·m	Read only The exciting current value automatically calculated according to the analog input value. Factory setting: 0 N·m

Speed Measure

Access

Settings → Advanced Settings → Speed Measure

[Encoder Speed on HMI]

Setting	Description
[Show]	Determine whether to display the motor's actual rotation speed in the interface.
[Hide]	Speed display hidden Factory setting

[Calculated Speed by MaC]

Setting	Description
[Enable]	Enable the main control to monitor the measured speed function.
[Disable]	Disable the main control to monitor the measured speed function. Factory setting

[Calculated Motor Frequency]

Value range	Description
10000...-10000 Hz	Read only Read-only parameter, observation value of motor speed. Factory setting: 0 Hz

[Encoder Measured Frequency]

Value range	Description
10000...-10000 Hz	Read only Read-only parameter, the observation value of motor speed obtained through encoder signal. Factory setting: 0 Hz

[Syn. Motor PLL Ang Frequency]

Value range	Description
-10000... 10000 Hz	Read only Observation value of angular velocity output by synchronous motor phase-locked loop. Factory setting: 0 Hz

MaC DI/DO

Access

Settings → Advanced Settings → MaC DI/DO

[DI1 Input Assignment]

Value range	Description
[Stop]	<p>Read only</p> <p>Master controller digital input channel 1. This value is unadjustable. It receives the stop command.</p> <p>Factory setting: [Stop]</p>

[DI2 Input Assignment]

Setting	Description
[Frequency Trigger]	The frequency reference activation input. If the [Frequency reference trigger mode] is set as [trigger required], frequency reference in HMI activation only when the digital input channel receives the rising edge.
[Motor Direction]	Motor reverse rotation cmd. If the option box Motor Reverse in the main dialog box Function of the Integrated HMI is enabled, this digital input will activate the reverse It is system hot bypass cmd. It is active-high.rotation no matter [Motor Reverse Enable] configuration.
[Sync. Transfer]	It is system hot bypass cmd. It is active-high.
[Spare]	<p>Factory setting</p> <p>Input channel not used.</p>
[SM Rotor Alignment]	Initial positioning and use of synchronous motors.
[KM43 Closed]	Suitable for synchronous switching application, indicates the opening and closing status of the drive lower circuit breaker.

[DI3 Input Assignment]

Value range	Description
[Free-wheel Stop]	<p>Read only</p> <p>Master controller digital input channel 3. This value is unadjustable. It receives the stop command.</p> <p>Factory setting: [Free-wheel Stop]</p>

[DI4 Input Assignment]

Value range	Description
[Start]	<p>Read only</p> <p>Master controller digital input channel 4. This value is unadjustable. It receives the stop command.</p> <p>Factory setting: [Start]</p>

[DI5 Input Assignment]

Setting	Description
[Frequency Trigger]	The frequency reference activation input. If the [Frequency reference trigger mode] is set as [trigger required], frequency reference in HMI activation only when the digital input channel receives the rising edge.
[Motor Direction]	Motor reverse rotation cmd. If the option box Motor Reverse in the main dialog box Function of the Integrated HMI is enabled, this digital input will activate the reverse It is system hot bypass cmd. It is active-high.rotation no matter [Motor Reverse Enable] configuration.
[Sync. Transfer]	It is system hot bypass cmd. It is active-high.
[Spare]	Factory setting Input channel not used.
[SM Rotor Alignment]	Initial positioning and use of synchronous motors.
[KM43 Closed]	Suitable for synchronous switching application, indicates the opening and closing status of the drive lower circuit breaker.

[DI6 Input Assignment]

Value range	Description
[reset]	Read only Master controller digital input channel 6. This value is unadjustable. It receives the stop command. Factory setting: [reset]

[DI7 Input Assignment]

Value range	Description
[POE]	Read only Master controller digital input channel 7. This value is unadjustable. It receives the stop command. Factory setting: [POE]

[DO1 Output Assignment]

Value range	Description
[Detected Error]	Read only If the master controller detects an Error , this channel will output high level. Factory setting: [Detected Error]

[DO2 Output Assignment]

Value range	Description
[Warning]	Read only If the master controller detects a Warning , this channel will output high level. Factory setting: [Warning]

[DO3 Output Assignment]

Setting	Description
[Spare (NO)]	Digital output relay is normally open.
[Sync. Completed]	It is used in automatic synchronous bypass function. If the output voltage and PLC status both meet the bypass conditions, master controller will output [Contact close enable] signal through digital output. It is high-active.
[Running Ind]	It indicates the drive's running status.
[Spare (NC)]	Digital output relay is normally close.
[MV Power ON]	It is used to indicate the input voltage status of the drive. Factory setting
[Rotor Alignment Ind.]	It is used to indicate the initial orient status of synchronous motor.

[DO4 Output Assignment]

Value range	Description
[Controller ready]	Read only Master controller digital output channel 4. This value is unadjustable. If the master controller is standby, this channel will output high level. Factory setting: [Controller ready]

[DO5 Output Assignment]

Setting	Description
[Spare (NO)]	Digital output relay is normally open. Factory setting
[Sync. Completed]	It is used in automatic synchronous bypass function. If the output voltage and PLC status both meet the bypass conditions, master controller will output [Contact close enable] signal through digital output. It is high-active.
[Running Ind.]	It indicates the drive's running status.
[Spare (NC)]	Digital output relay is normally close.
[MV Power ON]	It is used to indicate the input voltage status of the drive.
[Rotor Alignment Ind.]	It is used to indicate the initial orient status of synchronous motor.

[DO6 Output Assignment]

Setting	Description
[Spare (NO)]	Digital output relay is normally open. Factory setting
[Sync. Completed]	It is used in automatic synchronous bypass function. If the output voltage and PLC status both meet the bypass conditions, master controller will output [Contact close enable] signal through digital output. It is high-active.
[Running Ind.]	It indicates the drive's running status.
[Spare (NC)]	Digital output relay is normally close.

Setting	Description
[MV Power ON]	It is used to indicate the input voltage status of the drive.
[Rotor Alignment Ind.]	It is used to indicate the initial orient status of synchronous motor.

[DO7 Output Assignment]

Setting	Description
[Spare (NO)]	Digital output relay is normally open.
[Sync. Completed]	It is used in automatic synchronous bypass function. If the output voltage and PLC status both meet the bypass conditions, master controller will output [Contact close enable] signal through digital output. It is high-active.
[Running Ind.]	It indicates the drive's running status. Factory setting
[Spare (NC)]	Digital output relay is normally close.
[MV Power ON]	It is used to indicate the input voltage status of the drive.
[Rotor Alignment Ind.]	It is used to indicate the initial orient status of synchronous motor.

Load Sharing

Access

Settings → Advanced Settings → Load Sharing

[Load Sharing]

Setting	Description
[Disable]	The load sharing control- droop control is not activated. Factory setting
[Enable]	The load sharing control- droop control is activated.

[Load Sharing Setpoint Source]

Setting	Description
[Analog]	If the droop control function is enabled, the frequency command is analog given. Factory setting
[HMI]	If the droop control function is enabled, the frequency command is display given.

[Load Sharing Correction Freq]

Setting	Description
0...4 Hz	Setting range The correction value for the slip generation at nominal motor torque. Factory setting: 1 Hz

[Load Sharing Start f Factor]

Setting	Description
0...60 Hz	Setting range In case of frequency reference values close to a speed of zero, a compensation that leads to an undesired change in the output rotating field could result at high load due to the set load balance. In order to prevent this compensation, the load balancing is only activated from an adjustable minimum frequency [Load Sharing Start f Factor]. Factory setting: 0 Hz

[Load Sharing End f Factor]

Setting	Description
0...60 Hz	Setting range If the motor speed is larger than this setting value, the corrective factor of motor speed equal to 1. Factory setting: 6 Hz

[Load Sharing Start Torque]

Setting	Description
0...80 %	<p>Setting range</p> <p>By means of this parameter setting, the start of the load balancing can be delayed up to the set torque limit. In this way, torque imprecision or fluctuations can be suppressed at low speeds. Its unit is the percent of the rated motor torque.</p> <p>Factory setting: 5 %</p>

[Load Sharing Torque Filter]

Setting	Description
1...32767 rad/s	<p>Setting range</p> <p>In order to be able to achieve a good load balance even in case of instable or fluctuating torque behavior of the load, the torque determined by the frequency inverter can be filtered temporally before evaluation through the load balance by adjusting this parameter.</p> <p>Factory setting: 10 rad/s</p>

VF Advanced

Access

Settings → Advanced Settings → VF Advanced

[Stator Voltage Compensation]

Setting	Description
[Disable]	Not compensation the resistance voltage drop in U/F Control. Factory setting
[Enable]	Compensation the resistance voltage drop to improve the load capability of U/F Control.
NOTE: Normally operation only when <ul style="list-style-type: none"> • Motor type is Asynchronous motor. • The resistance and inductance parameters of the motor are set correct. • The detected phase orders of the output voltage and current are correct. 	

[Current Oscillation Damping]

Setting	Description
[Disable]	Not restrain the current oscillation in U/F Control. Factory setting
[Enable]	Restrain the current oscillation to improve the stability of U/F Control.
NOTE: Normally operation only when <ul style="list-style-type: none"> • Motor type is Asynchronous motor or Synchronous motor. • The detected phase orders of the output voltage and current are correct. 	

[Current Oscillation Filter]

Setting	Description
0.2...10000 rad/s	Setting range Current filter's cut-off frequency for current oscillation restrain. Factory setting: 6.28 rad/s

[Current Oscillation Coeff.]

Setting	Description
0...20	Setting range Voltage compensation factor for current oscillation restrain. Factory setting: 0.05

[Current Oscillation Min f]

Setting	Description
0...120 Hz	Setting range The low limit frequency for current oscillation restrain. Factory setting: 0.5 Hz

[Current Oscillation Max f]

Setting	Description
0...120 Hz	Setting range The high limit frequency for current oscillation restrain. Factory setting: 20 Hz

[Dec Ramp Adaption]

Setting	Description
[Enable]	If Motor control law is U/F Control and the power generated during deceleration is greater than [U/f Max Power Generator Mode], the deceleration time will be extended.
[Disable]	The deceleration time will not change even if power is generated during deceleration. Factory setting

[U/f Max Power Generator Mode]

Setting	Description
0...200000 kW	Setting range Generating power limit value in U/F Control. Factory setting: 0 kW

[Current Vector Control]

Setting	Description
[Enable]	Enable the drive to start with current vector control.
[Disable]	Disable the drive to start with current vector control. Factory setting

[Switchover Frequency Point]

Setting	Description
0...120 Hz	Setting range The switching frequency point from vector start operation to VF operation. Factory setting: 10 Hz

[Switchover Stabilization Time]

Setting	Description
2...60 s	Setting range The duration of switching from vector startup to VF operation. Factory setting: 3 s

[Starting Current Vector Ampl]

Setting	Description
0...200 %	Setting range Proportional amplitude of current command during vector startup. Factory setting: 40 %

[Current Vector Adjust Step]

Setting	Description
0...20 %	Setting range The step which current rises to [Starting Current Vector Ampl] . Factory setting: 5 %

[Current Vector Volt Ratio]

Setting	Description
0...1	Setting range The threshold voltage of current vector start control loop. Factory setting: 0.3

V.Ride Through

Access

Settings → Advanced Settings → V.Ride Through

[Voltage Ride Through (VRT)]

Setting	Description
[Enable]	Enable voltage ride through function.
[Disable]	Disable voltage ride through function. Factory setting

[Input Volt Filter Constant]

Setting	Description
30...10000 rad/s	Setting range Input voltage sampling low-pass filtering time constant. Factory setting: 150 rad/s

[LVRT Flux Weakening Factor]

Setting	Description
80...110 %	Setting range The coefficient multiplied by the rotor magnetic flux during voltage ride through. Factory setting: 95 %

[LVRT Torq Current Neg. Limit]

Setting	Description
-5000...0 A	Setting range The torque negative limit of the speed loop in voltage ride through function. It is usually set as -2 % of the rated current peak. Factory setting: -10 A

[LVRT Level 1]

Setting	Description
80...110 %	Setting range The first stage threshold of low voltage ride through. Factory setting: 90 %

[LVRT Level 1 Time]

Setting	Description
0...1800 s	<p>Setting range</p> <p>This parameter defines the threshold time for the first stage of Low Voltage Ride Through (LVRT).</p> <ul style="list-style-type: none"> • If set to 1800 seconds, the system will operate continuously without a time limit. • If set to a value greater than 0 and less than 1800 seconds, it defines the maximum duration the system will continue operating during a low voltage condition. <p>Factory setting: 5 s</p>

[LVRT Level 2]

Setting	Description
40...80 %	<p>Setting range</p> <p>The second stage threshold of low voltage ride through.</p> <p>Factory setting: 60 %</p>

[LVRT Level 2 Time]

Setting	Description
0...5 s	<p>Setting range</p> <p>The threshold time in second stage of low voltage ride through.</p> <p>Factory setting: 0.5 s</p>

[LVRT Level 3 Time]

Setting	Description
0...5 s	<p>Setting range</p> <p>The threshold time in third stage of low voltage ride through.</p> <p>Factory setting: 0 s</p>

[HVRT Level 1]

Setting	Description
100...130 %	<p>Setting range</p> <p>The first stage threshold of high voltage ride through.</p> <p>Factory setting: 110 %</p>

[HVRT Level 1 Time]

Setting	Description
0...300 s	Setting range The threshold time in first stage of high voltage ride through. Factory setting: 100 s

[HVRT Level 2]

Setting	Description
100...130 %	Setting range The second stage threshold of high voltage ride through. Factory setting: 130 %

[HVRT Level 2 Time]

Setting	Description
0...10 s	Setting range The threshold time in second stage of high voltage ride through. Factory setting: 1 s

Ball Mill

Access

Settings → Advanced Settings → Ball Mill

[Ball Mill Application]

Setting	Description
[Enable]	Enable the application function of ball mill.
[Disable]	Disable the application function of ball mill. Factory setting

[Ball Mill Control Mode]

Setting	Description
[Normal]	Normal operating mode Factory setting
[Position control]	Control the ball mill to operate at a specific angle position.
[Creeping]	Control the ball mill to operate in low-speed crawling mode.
[Inching]	Control the ball mill to operate in low-speed Inching mode.
[Adhesion Removal]	Control the ball mill to remove adhesions.

[Ball Mill Gear Ratio]

Setting	Description
0.001...10000	Setting range Used to convert drum speed or angle. Usually, when the motor runs at its rated speed, the ball mill also runs at the corresponding rated speed. In this case, the gear ratio is equal to the rated speed of the motor divided by the rated speed of the ball mill. Factory setting : 16.7

[Ball Mill Pre-set Starting F]

Setting	Description
0...50 Hz	Setting range The preset starting speed for ball mill applications is generally 5% -10% of the rated speed. Factory setting : 3 Hz

[Ball Mill Creeping Frequency]

Setting	Description
0...50 Hz	<p>Setting range</p> <p>When the ball mill application is in crawling mode, the given speed command.</p> <p>Factory setting: 3 Hz</p>

[Ball Mill Torque Filter]

Setting	Description
1...32767 rad/s	<p>Setting range</p> <p>Time constant of torque estimation filter.</p> <p>Factory setting: 10 rad/s</p>

[Adhesion Torque Threshold 1]

Setting	Description
1...120 %	<p>Setting range</p> <p>When the detected load torque is less than the set value, adhesion monitoring is not performed.</p> <p>Factory setting: 50 %</p>

[Adhesion Torque Threshold 2]

Setting	Description
1...100 %	<p>Setting range</p> <p>When the main control detects a torque drop greater than or equal to the set value, it is considered that there is no adhesion, otherwise it is considered that there is adhesion.</p> <p>Factory setting : 30 %</p>

[Adhesion Torque Threshold 3]

Setting	Description
1...100 %	<p>Setting range</p> <p>When no adhesion is detected and the torque stabilizes at or below the "adhesion monitoring torque stability threshold", the "release" signal is output, and the main control tracks the DCS speed command.</p> <p>Factory setting : 30 %</p>

[Reverse Braking Torque]

Setting	Description
1...80 %	Setting range Rotary parking torque threshold. Factory setting : 30 %

[Numbers of Adhesion Removal]

Setting	Description
1...10000 Times	Setting range Adhesion removal execution times. Factory setting : 10 Times

[Removing Torque Amplitude]

Setting	Description
0...100 %Real-Time	Setting range The amplitude of torque pulsation during adhesion execution. Factory setting : 20 %Real-Time

[Removing Torque Cycle Time]

Setting	Description
0.1...60 s	Setting range Cycle of torque pulsation during adhesion execution. Factory setting : 1 s

[Removing Torque Ramp Up]

Setting	Description
0.01...60 s	Setting range The time for the slope rises of adhesive clearance torque pulsation. Factory setting : 0.5 s

[Removing Torque Ramp Down]

Setting	Description
0.01...60 s	Setting range The time for the slope descent of adhesive clearance torque pulsation. Factory setting : 1 s

[Positioning PI Regulator Kp]

Setting	Description
0...32767	Setting range Proportional gain for ball mill position control. Factory setting : 0.1

[Positioning PI Regulator Ki]

Setting	Description
0...32767	Setting range Integral gain for ball mill position control. Factory setting : 0

[Position Control - Cycle]

Setting	Description
0...10000 cycle	Setting range The set value for the number of rotations of the grinder in position control mode. Factory setting : 0 cycle

[Position Control - Degree]

Setting	Description
0...359.9 deg	Setting range When in position control mode, the instruction value for the rotation angle of the grinder. The rotation angle of the drum is jointly determined by the number of rotations of the ball mill. Factory setting : 60 deg

[Roller Speed Feedback]

Value range	Description
0...10000 rpm	Read Only Feedback of ball mill drum speed. Factory setting : 0 rpm

[Roller Angle Feedback]

Value range	Description
-360...359.9 deg	Read Only Ball mill drum angle feedback. Factory setting : 0 deg

Auto Tuning

Access

Settings → Auto tuning

Overview

Settable options include

- **Offset Correction** , page 145,
- **ASM Rotational**, page 145,
- **ASM Static**, page 145,
- **SM Rotational**, page 146,
- **ASM Estimation**, page 146.

Offset Correction

Access

Settings → Auto Tuning → Offset Correction

About This Menu

When performing zero offset correction function, ensure that the following conditions are met:

Step	Action
1	The parameter Sampling Scaler has already been set correctly .
2	There is no medium voltage applied to the drive.
3	The corrected values have been filled in the corresponding blanks for the parameters of Offset Correction.
4	After any modification of the Sampling Scaler, perform zero offset correction again.

ASM Rotational

Access

Settings → Auto Tuning → ASM Rotational

About This Menu

Click the **Start** button, the system will perform motor parameter auto-tuning, and the obtained values will automatically be filled into the **Tuning Result** panel of the **Advanced Settings**.

ASM Static

Access

Settings → Auto Tuning → ASM Static

About This Menu

Click the **Start** button, the system will perform motor parameter auto-tuning, and the obtained values will automatically be filled into the **Tuning Result** panel of the **Advanced Settings**.

The Motor Parameter Auto-Tuning function is meant to accomplish the inherent motor parameters measurement in the **Tuning Result**, page 83 item. When the measurement conditions and parameter settings specified in the **Tuning Result** item are fulfilled, click the **Start** button, then the system will automatically measure the inherent parameters of the asynchronous motor according to parameter settings, and automatically fill the measurement values into corresponding parameter columns. Then the user is only required to fill the measurement values of **Tuning Result** item into the first five columns so as to accomplish motor measurement.

SM Rotational

Access

Settings → Auto Tuning → SM Rotational

About This Menu

Click the **Begin** button, the system will perform motor parameter auto-tuning, and the obtained values will automatically be filled into the **Tuning Result menu**, page 83 .

ASM Estimation

Access

Settings → Auto Tuning → ASM Estimation

About This Menu

Click the **Start** button, the system will perform motor parameter auto-tuning, and the obtained values will automatically be filled into the **Tuning Result menu**, page 83 .

The Motor Parameter Auto-Tuning function is meant to accomplish the inherent motor parameters measurement in the **Tuning Result** item. When the measurement conditions and parameter settings specified in the **Tuning Result** item are fulfilled, click the **Start** button, then the system will automatically measure the inherent parameters of the asynchronous motor according to parameter settings, and automatically fill the measurement values into corresponding parameter columns. Then the user is only required to fill the measurement values of **Tuning Result** item into the first five columns so as to accomplish motor measurement.

PLC Parameters

Access

Settings → PLC Parameter → PLC Parameter

Overview

The ATV6100 drive includes several PLC functions depending on the application. The following table shows the functions and their related parameters:

Functions	Parameters
Cooling Fans Control Function, page 151	Fan Stop Delay
Transformer Thermal Monitoring Function, page 153	Transformer Thermal Warning
	Transformer Thermal Error
	Transformer thermal monitoring
Fieldbus Link Loss Monitoring Function, page 152	Com Interrupted Behavior
	Com Interrupted Timeout
Motor Thermal Monitoring Function, page 155	OCT1_Motor available PT100 selection
	Motor Winding Overheat Warning Threshold
	Motor Bearing Overheat Warning Threshold
	Motor Winding Overheat Error Threshold
	Motor Bearing Overheat Error Threshold
Motor Stall Monitoring Function, page 157	Stall monitoring configuration
	Stalling monitoring time
	Stalling monitoring frequency
	Stalling monitoring current
Anti-start Monitoring Function, page 158	Cyclic start window time
QF1 Cyclic Switch On Monitoring Function, page 158	QF1 Switch on cycling window Time
Pre-charge Function, page 159	Precharge selection
	Check MV with 2 Level pre-charge resistors
	MV threshold with 2 Level precharge resistors
	QF92 Closed To MV RDY Time
	QF92 Closed To KM91 Close CMD Time
	KM91 Close CMD To Closed Time
	KM91 Closed To MV RDY Time
	MV RDY To QF1 Close CMD Time
	QF1 Close CMD To QF1 Closed Time
	KM91 Open CMD To Opened Time
	QF91 Open CMD To LV Pwr Off Time
	LV Precharge Sequence Cycle Time
	MV Precharge contactor transition Time
	MV Contactor Close CMD To Closed Time
	MV Contactor Open CMD To Opened Time
MV contactor closed assignment	

Functions	Parameters
	MV contactor opened assignment
	LV panel energize order assignment
	LV remote energize order assignment
	LV KM91 feedback assignment
	LV KM92 feedback assignment
	LV power supply ready assignment
	R107 assignment
	R114 assignment
	R115 assignment
	LV QF92 CB close command assignment
	LV QF92 CB open command assignment
	LV QF92 CB Start pulse time
	LV QF92 CB Stop pulse time
	LV QF92 CB Switch ON delay
	LV QF92 CB Switch OFF delay
	LV QF92 CB Closing Filter time
	LV QF92 CB Opening Filter time
	LV QF91 CB open command assignment
	LV KM91 contactor command assignment
	LV Energizing command assignment
Alx Assignable to Customer Function, page 168	AMxA_AlXMonitorAssignment
	AMxF_AlXMonitorFilterTime
	AMxX_AlXScalingInputMin
	AMxY_AlXScalingInputMax
	AMxL_AlXProcessMinForAMxX
	AMxH_AlXProcessMaxForAMxY
	AMxB_AlXMonitorBehavior
	AMxD_AlXMonitorDelayTime
	AMxU_AlXMonitorWarningLevelHigh
	AMxV_AlXMonitorWarningLevelLow
	AMxW_AlXMonitorDelayWarning
	AMxR_AlXMonitorProcessTripLevelHigh
	AMxS_AlXMonitorProcessTripLevelLow
	AMxT_AlXMonitorProcessTripTimeOut
	AMxZ_AlXMonitoringTripBehavior
	PoC Cabinet Thermal Monitoring Function, page 172
	PoC Cabinet Overheat Warning Threshold
	PoC Cabinet Overheat Error Threshold
Control Mode Selection Function, page 173	PLS0_mode selector switch
	Local mode selector assignment
	Local Mode DO Assignment
	OFF Mode DO Assignment

Functions	Parameters
Remote 2 wires/3 wires Control Function, page 175	TCC_Type of remote control
	TCT_2 wire type of remote control
	Remote start assignment
	Remote stop assignment
	Remote freewheel stop assignment
	Remote fault reset assignment
	Remote 3 wires start type
Motor Reverse Inhibition Function, page 178	Motor rotation direction assignment
Local 2 wires/3 wires Control Function, page 179	PL10_Cabinet Type of control
	PL09_Cabinet running mode selection
	Local start assignment
	Local stop assignment
	Local freewheel stop assignment
	Local fault reset assignment
	PL18_3-wire run/stop dependency
	Cabinet 3 wires start type
Logic Input Assignment For QF1 Feedback Signal Function, page 182	PLIC_QF1 feedback signal assignment
QF1 Tripped Signal Assignment Function, page 182	PLI1_QF1 Tripped signal assignment
LV Surge Arrestor Function, page 182	LV Surge Arrestor tripped signal assignment
Cabinet Heater Monitoring Function, page 183	Heater ready signal assignment
Battery Undervoltage Monitoring Function, page 183	Battery undervoltage signal assignment
Arc Unit Error Monitoring Function, page 184	Arc unit error signal assignment
Encoder Link Loss Monitoring Function, page 184	Encoder interface warning assignment
	Encoder interface error assignment
Error Group Monitoring Function, page 185	Error Group Selection
	Error Group1_MW2 Masked....Error Group1_MW4 Masked
	ErrorGroup1_MW9Masked...ErrorGroup1_MW12Masked
	Error Group2_MW2 Masked...ErrorGroup2_MW4Masked
	ErrorGroup2_MW9Masked...ErrorGroup2_MW12Masked
	Error Group 1 DOx assignment
	Error Group 2 DOx assignment
External Device Thermal Monitoring Function, page 189	External Device 1 Overheat warning threshold
	External Device 1 Overheat error threshold
	External Device 2 Overheat warning threshold
	External Device 2 Overheat error threshold
	External Device 3 Overheat warning threshold
	External Device 3 Overheat error threshold
	External Device 4 Overheat warning threshold
	External Device 4 Overheat error threshold
Transformer Winding Thermal Monitoring Function, page 192	Thermal transformer winding U1 monitoring assignment
	Thermal transformer winding V1 monitoring assignment
	Thermal transformer winding W1 monitoring assignment

Functions	Parameters
Cabinet Thermal Monitoring Assignment Function, page 194	Thermal transformer cabinet monitoring assignment
	Thermal PoC cabinet monitoring assignment
Motor Thermal Monitoring Assignment Function, page 194	Thermal motor winding U1 monitoring assignment
	Thermal motor winding V1 monitoring assignment
	Thermal motor winding W1 monitoring assignment
	Thermal motor winding U2 monitoring assignment
	Thermal motor winding V2 monitoring assignment
	Thermal motor winding W2 monitoring assignment
	Thermal motor bearing 1 monitoring assignment
	Thermal motor bearing 2 monitoring assignment
External Device Thermal Monitoring Assignment Function, page 197	Thermal external device 1 monitoring assignment
	Thermal external device 2 monitoring assignment
	Thermal external device 3 monitoring assignment
	Thermal external device 4 monitoring assignment

Cooling Fans Control Function

[Fan Stop Delay]

Setting	Description
0...30 minutes	When the medium voltage is not ready and no error is detected, the fan continues to run for the "fan stop delay time" before stopping. Factory setting : 3 minutes

NOTE: The fan will be stopped immediately in case of an error is detected to avoid further damage to the system.

Fieldbus Link Loss Monitoring Function

[Com Interrupted Behavior]

⚠ WARNING

LOSS OF CONTROL

If **[Com Interrupted Behavior]** is set to **[Ignore]**, communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Only use this setting for tests during commissioning.
- Verify that communication monitoring has been re-enabled before completing the commissioning procedure and performing the final commissioning test.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Setting	Description
[Ignore]	Only HMI display fieldbus link loss.
[Warning]	HMI display fieldbus link loss and warning.
[Freewheel stop]	HMI display fieldbus link loss and freewheel stop. Factory setting
NOTE: When Fieldbus link loss, PLC will perform Fieldbus link loss processing operation.	

[Com Interrupted Timeout]

Setting	Description
0...60 s	When remote control and fieldbus control allowed, if the time of fieldbus heartbeat bit not change more than Fieldbus link loss timeout , PLC determine that Fieldbus link loss. Factory setting : 15 s

Transformer Thermal Monitoring Function

[Transformer Thermal Warning]

Setting	Description
0...200 °C	Anyone of the transformer three-phase temperature more than [Transformer Overheat Alarming] , PLC perform warning logic. Factory setting : 95 °C

[Transformer Thermal Error]

Setting	Description
0...200 °C	Anyone of the transformer three-phase temperature more than [Transformer Overheat Trip] , PLC perform detected error logic. Factory setting : 110 °C

[Transformer Thermal Monitoring]

Setting	Description
[TM3 module]	3-wire PT100 sensors were used to measure the transformer primary winding temperature.
[Optic Fibre]	Optic fibre probes were used to measure the transformer primary winding temperature Factory setting

[PoC Cabinet Thermal Monitoring]

Setting	Description
[NO]	Function inactive
[YES]	Function active Factory setting

[PoC Cabinet Overheat Warning Threshold]

NOTICE	
OVERHEATING	
Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.	
Failure to follow these instructions can result in equipment damage.	

If the measured cabinet temperature is higher than this setting, the drive triggers a warning **[PoC Cabinet Overheat Warning]** without stopping the application.

Setting	Description
0...100 °C	Factory setting : 50 °C

[PoC Cabinet Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured cabinet temperature is higher than this setting, the drive triggers an error **[PoC Cabinet Overheat Error]** and stops the application.

Setting	Description
0...100 °C	Factory setting : 60 °C

Motor Thermal Monitoring Function

[OCT1_Motor Available PT100 Selection]

This parameter defines each sensor (PT100) use in binary format.

Bit	Description, Value
0	1: Thermal motor PT100 number 1
1	1: Thermal motor PT100 number 2
2	1: Thermal motor PT100 number 3
3	1: Thermal motor PT100 number 4
4	1: Thermal motor PT100 number 5
5	1: Thermal motor PT100 number 6
6	1: Thermal motor PT100 number 7
7	1: Thermal motor PT100 number 8
8	1: Thermal device PT100 number 1
9	1: Thermal device PT100 number 2
10	1: Thermal device PT100 number 3
11	1: Thermal device PT100 number 4
12	1: Thermal device PT100 number 5
13	1: Thermal device PT100 number 6
14	1: Thermal device PT100 number 7
15	1: Thermal device PT100 number 8

[Motor Winding Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured motor winding temperature is higher than this setting, the drive triggers a warning [**Motor Winding OverHeat warning**] without stopping the application.

Setting	Description
0...200 °C	Factory setting : 120 °C

[Motor Bearing Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured motor bearing temperature is higher than this setting, the drive triggers a warning [**Motor Bearing OverHeat warning**] without stopping the application..

Setting	Description
0...200 °C	Factory setting : 120 °C

[Motor Winding Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured motor winding temperature is higher than this setting, the drive triggers an error [**Motor Winding OverHeat error**] and stops the application.

Setting	Description
0...200 °C	Factory setting : 120 °C

[Motor Bearing Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured motor bearing temperature is higher than this setting, the drive triggers an error [**Motor Bearing OverHeat error**] and stops the application.

Setting	Description
0...200 °C	Factory setting : 130 °C

Motor Stall Monitoring Function

[Stall Monitoring Configuration]

The function is used to prevent motor rotor blocking.

Setting	Description
[NO]	No Stall monitoring function
[YES]	Stall monitoring selected Factory setting

[Stalling Monitoring Time]

The timer will start when the output frequency is below **[Stalling Monitoring Frequency]** and the output current is above **[Stalling Monitoring current]**. If the time elapses, the drive triggers an error **[Motor Stall Error]** and stops the application.

Setting	Description
0...200 s	Factory setting : 60 s

[Stalling Monitoring Current]

Stalling monitoring current versus output current is one of the conditions to trigger **[Motor Stall Error]**.

Setting	Description
0...300 A	Factory setting : 150 A

Anti-start Monitoring Function

[Cyclic Start Window Time]

This function is used to prevent frequent VSD starting. When set to 0, the function is inactive.

The timer will start when a new VSD start order is considered. A new VSD start order will be considered after the time has elapsed.

Setting	Description
0...300 s	Factory setting : 0 s

QF1 Cyclic Switch On Monitoring Function

[QF1 Switch on Cycling Window Time]

This function is used to prevent frequent QF1 operation. "0" means the function is inactive.

The timer will start when new QF1 closed feedback is detected. The elapsed time is one of the conditions to activate the "QF1 Enable to Close" signal.

Setting	Description
0...7200 s	Factory setting : 0 s

Pre-charge Function

[Precharge Selection]

This parameter allows the selection of the automatic pre-charge sequence.

Setting	Description
[NO]	No precharge sequence selected.
[LV precharge]	Low voltage precharge sequence selected. Factory setting
[MV precharge]	Medium voltage precharge sequence selected.

[Check MV with 2 Level pre-charge resistors]

Select whether to check the voltage of the primary side of the mains transformer during the low voltage pre-charge sequence through two-level pre-charge resistors:

Setting	Description
[NO]	No checking of the voltage of the primary side of the mains transformer
[YES]	Check the voltage of the primary side of the mains transformer Factory setting

[MV Threshold with 2 Level precharge resistors]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**. It would be used if **[Check MV with 2 Level pre-charge resistors]** is set to **[YES]**.

Setting	Description
0...100 % (% of nominal input voltage)	Factory setting : 10 % of nominal input voltage

[QF92 Closed To MV RDY Time]

The time from QF92 closed feedback to measured **[Input voltage] > [MV threshold with 2 Level precharge resistors]**.

NOTE: For more details about measured input voltage (% MW1008), refer to the ATV6100 PLC Communication Address Table, page 302.

This parameter is available when **[MV threshold with 2 Level precharge resistors]** is set to **[1 - YES]**.

Setting	Description
0...70 s	Factory setting : 4 s

[QF92 Closed To KM91 Close CMD Time]

The time from QF92 closed feedback to "PLC issuing KM91 close command"

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...70 s	Factory setting : 5 s

[KM91 Close CMD To Closed Time]

The time from KM91 closed feedback to "KM91 closed feedback".

This parameter is available when [Precharge Selection] is set to [1 - LV precharge].

NOTICE	
OVERHEATING OF THE PRE-CHARGE RESISTORS	
Any modification to this setting must be approved and/or performed by the SE Expert Service Team.	
Failure to follow these instructions can result in equipment damage.	

Setting	Description
0...100 s	Factory setting : 0.5 s

[KM91 Closed To MV RDY Time]

The time from KM91 closed feedback to measured [Input voltage] > [MV threshold with 2 Level precharge resistors].

NOTE: For more details about measured input voltage (% MW1008), refer to the ATV6100 PLC Communication Address Table, page 302.

The parameter [KM91 Closed To MV RDY Time] is related to the "Mains Voltage Ready Threshold", which is managed by the MaC system. According to the default setting for [DO3 Output Assignment] to [MV Power ON]. When the measured input voltage exceeds the "Mains Voltage Ready Threshold", DO3 closes. The PLC monitors the status of MaC's DO3 output, and a closed feedback signal from DO3 indicates that the voltage on the transformer's primary side has reached the threshold.

This parameter is available when [MV threshold with 2 Level precharge resistors] is set to [1 - YES].

Setting	Description
0...60 s	Factory setting : 3 s

[KM91 Closed To KM92 Close CMD Time]

The time from KM91 closed feedback to "PLC issuing KM92 close command".

This parameter is available when [Precharge Selection] is set to [1 - LV precharge].

Setting	Description
0...60 s	Factory setting : 7 s

[MV RDY To QF1 Close CMD Time]

The time from "the voltage of the transformer primary side reaching *"Mains Voltage Ready Threshold"*, measured by the master controller" to "PLC issuing QF1 close command."

The parameter **[MV RDY To QF1 Close CMD Time]** is related to the *"Mains Voltage Ready Threshold"*, which is managed by the MaC system. According to the default setting for [DO3 Output Assignment] to [MV Power ON]. When the measured input voltage exceeds the *"Mains Voltage Ready Threshold"*, DO3 closes. The PLC monitors the status of MaC's DO3 output, and a closed feedback signal from DO3 indicates that the voltage on the transformer's primary side has reached the threshold.

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...10 s	Factory setting : 0 s

[QF1 Close CMD To QF1 Closed Time]

The time from "PLC issuing QF1 close command" to "QF1 closed feedback".

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

NOTICE	
OVERHEATING OF THE PRE-CHARGE RESISTORS	
Any modification to this setting must be approved and/or performed by the SE Expert Service Team.	
Failure to follow these instructions can result in equipment damage.	

Setting	Description
0...100 s	Factory setting : 30 s

[KM91 Open CMD To Opened Time]

The time from "KM91 open command" to "KM91 opened feedback"

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...100 s	Factory setting : 0.5 s

[QF91 Open CMD To LV Pwr Off Time]

The time from the "QF91 open command" to "powering off low voltage power supply for pre-charge sequence"

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
1...60 s	Factory setting : 0 s

[LV Precharge Sequence Cycle Time]

The time span between two low voltage pre-charge sequences.

This parameter is available when **[Precharge Selection]** is set to **[2 - MV precharge]**.

NOTICE	
OVERHEATING OF THE PRE-CHARGE RESISTORS	
Any modification to this setting must be approved and/or performed by the SE Expert Service Team.	
Failure to follow these instructions can result in equipment damage.	

Setting	Description
0...3600 s	Factory setting : 1800 s

[MV Precharge Contactor Transition Time]

MV precharge resistors bypass contactor allowed non-synchronized time between close/open command and status feedback.

This parameter is available when **[Precharge Selection]** is set to **[2 - MV precharge]**.

Setting	Description
0...30 s	Factory setting : 0.5 s

[MV Contactor Close CMD To Closed Time]

Defines the time from "MV contactor close command" to "MV contactor closed feedback".

This parameter is available when **[Precharge Selection]** is set to **[2 - MV precharge]**.

Setting	Description
0...30 s	Factory setting : 2 s

[MV Contactor Open CMD To Opened Time]

Defines the time from "MV contactor opencommand" to "MV contactor opened feedback".

This parameter is available when **[Precharge Selection]** is set to **[2 - MV precharge]**.

Setting	Description
0...30 s	Factory setting : 2 s

[MV Contactor Closed Assignment]

Defines the contactor closed feedback. A high level indicates that the feedback signal is in the closed state.

This parameter is available when **[Precharge Selection]** is set to **[2 - MV precharge]**.

Setting	Description
[NO]	NO
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23 Factory setting: KPC1:I2
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15

[MV Contactor Opened Assignment]

Defines the contactor opened feedback. A high level indicates that the feedback signal is in the opened state.

This parameter is available when **[Precharge Selection]** is set to **[2 - MV precharge]**.

Setting	Description
[NO]	NO
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23 Factory setting: KPC1:I9
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15

[LV Panel Energize Order Assignment]

The signal is considered active when at high level.

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15

[LV Remote Energize Order Assignment]

The signal is considered active when at high level.

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15

[LV KM91 Feedback Assignment]

Defines the LV KM91 feedback assignment:

- Low level corresponds to "KM91 is opened".
- High level corresponds to "KM91 is closed".

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15

[LV KM92 Feedback Assignment]

Defines the LV KM92 feedback assignment:

- Low level corresponds to "KM91 is opened".
- High level corresponds to "KM91 is closed".

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15;

[LV Power Supply Ready Assignment]

Defines the LV power supply Ready assignment:

- Low level corresponds to "LV power supply is not Ready".
- High level corresponds to "LV power supply is Ready".

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[100-I0_100]... [123-I0_123]	KPC1:I0...KPC1:I23;
[700-I1_700]... [715-I1_715]	KPC7:I0...KPC7:I15

[R107 Assignment]

R107 refers to "KPC1:Q7"

Setting	Description
[NO]	NO Factory setting
[LV QF91 Open CMD]	LV QF91 Open command
[VSD unavailable]	VSD unavailable
[MV bypass contactor CMD]	MV bypass contactor command
[LV KM91 CMD]	LV KM91 command
[Local control mode]	Local control mode
[LV Energizng]	LV Energizng;

[R114 Assignment]

R114 refers to "KPC1:Q14"

Setting	Description
[NO]	NO Factory setting
[LV QF91 Open CMD]	LV QF91 Open command
[VSD unavailable]	VSD unavailable
[MV bypass contactor CMD]	MV bypass contactor command
[LV KM91 CMD]	LV KM91 command
[Local control mode]	Local control mode
[LV Energizng]	LV Energizng;

[R115 Assignment]

R115 refers to "KPC1:Q15"

Setting	Description
[NO]	NO Factory setting
[LV QF91 Open CMD]	LV QF91 Open command
[VSD unavailable]	VSD unavailable
[MV bypass contactor CMD]	MV bypass contactor command
[LV KM91 CMD]	LV KM91 command
[Local control mode]	Local control mode
[LV Energizng]	LV Energizng;

[LV QF92 CB Close Command Assignment]

Defines the LV QF92 CB close command assignment.

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]... [815-Q1_815]	KPC8:Q0...KPC8:Q15

[LV QF92 CB Open Command Assignment]

Defines the LV QF92 CB open command assignment.

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]... [815-Q1_815]	KPC8:Q0...KPC8:Q15

[LV QF92 CB Start Pulse Time]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...600 s	Factory setting : 0.5 s

[LV QF92 CB Stop Pulse Time]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...600 s	Factory setting : 0.5 s

[LV QF92 CB Switch ON delay]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...600 s	Factory setting : 0.5 s

[LV QF92 CB Switch OFF delay]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...600 s	Factory setting : 0.5 s

[LV QF92 CB Closing Filter Time]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...600 s	Factory setting : 0.5 s

[LV QF92 CB Opening Filter Time]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
0...600 s	Factory setting : 0.5 s

[LV QF91 CB Open Command Assignment]

Defines the LV QF91 CB open command assignment.

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]... [815-Q1_815]	KPC8:Q0...KPC8:Q15

[LV KM91 Contactor Command Assignment]

This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]... [815-Q1_815]	KPC8:Q0...KPC8:Q15

[LV Energizing Command Assignment]

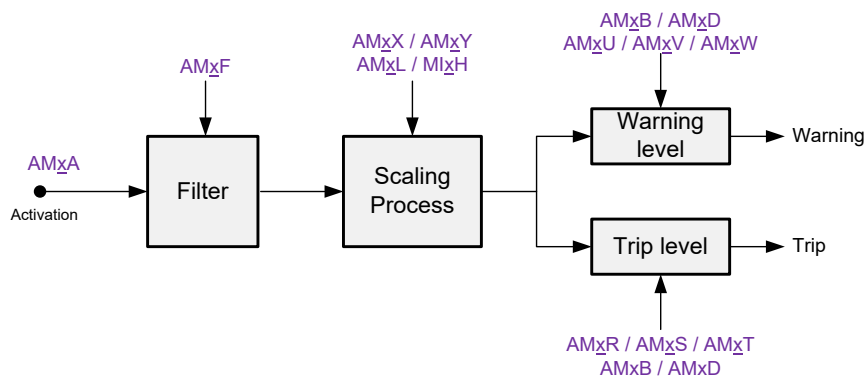
This parameter is available when **[Precharge Selection]** is set to **[1 - LV precharge]**.

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]... [815-Q1_815]	KPC8:Q0...KPC8:Q15

Alx Assignable to Customer Function

[AMxA_AlxMonitorAssignment]

This parameter allow to configure up to 4 Analog monitoring function which can configured and monitored on HMI.



Bit	Description, Value
0	1: Analog Monitor Assignment function 1 activated Factory setting
1	1: Analog Monitor Assignment function 2 activated
2	1: Analog Monitor Assignment function 3 activated
3	1: Analog Monitor Assignment function 4 activated

[AMxF_AlxMonitorFilterTime]

Analog input filter time.

Setting	Description
0...60 s	Factory setting : 1 s

[AMxX_AlxScalingInputMin]

Analog input scaling input minimum value.

Setting	Description
0...100 %	Factory setting : 0 %

[AMxY_AlxScalingInputMax]

Analog input scaling input maximum value.

Setting	Description
0...100 %	Factory setting : 100 %

[AMxL_AlxProcessMinForAMxX]

Analog input process minimum value for AMxX.

Setting	Description
0...32767	Factory setting : _

[AMxH_AlxProcessMaxForAMxX]

Analog input process maximum value for AMxX.

Setting	Description
0...32767	Factory setting : _

[AMxB_AlxMonitorBehavior]

Analog monitoring behavior

Setting	Description
[ALL]	Monitor always active Factory setting
[PWR]	Monitor when MV power supply ON Main present
[RUN]	Monitor in Run state Operation enable

[AMxD_AlxMonitorDelayTime]

Analog Monitor delay time after start-up.

Setting	Description
0...60 s	Factory setting : 0 s

[AMxU_AlxMonitorWarningLevelHigh]

Process warning level high.

A warning **[Vibration x High warning]** for analog Monitoring Assignment function x, is triggered if the value of Analog Input Monitoring (AMxP) is higher than this Level.

The warning is reset when Analog Input Monitoring AMxP is $< AMxU - 1\% * AMxU$.

NOTE: x = function 1...4 (E.g. Analog Input Monitoring AM1P or **[Vibration 1 High warning]** for analog Monitoring Assignment function 1)

Setting	Description
0...32767	Factory setting : _

[AMxV_AlxMonitorWarningLevelLow]

Process warning level low.

A warning **[Vibration x High warning]** for analog Monitoring Assignment function x, is triggered if the value of Analog Input Monitoring (AMxP) is lower than this Level.

The warning is reset when Analog Input Monitoring AMxP $> AMxV + 1\% * AMxV$.

NOTE: x = function 1...4 (E.g. Analog Input Monitoring AM1P or **[Vibration 1 High warning]** for analog Monitoring Assignment function 1)

Setting	Description
0...32767	Factory setting : _

[AMxW_AlxMonitorDelayWarning]

Process delay warning.

Setting	Description
0...60 s	Factory setting : 0 s

[AMxR_AlxMonitorProcessTripLevelHigh]

Process error level high.

An error **[Vibration x High error]** for analog Monitoring Assignment function x is triggered is the value of Analog Input Monitoring (AMxP) is higher than this Level.

The error is reset when Analog Input Monitoring $AMxP < AMxR - 1\% * AMxR$.

NOTE: x = function 1...4 (E.g. Analog Input Monitoring AM1P or **[Vibration 1 High error]** for analog Monitoring Assignment function 1)

Setting	Description
0...32767	Factory setting : _

[AMxS_AlxMonitorProcessTripLevelLow]

Process error level low.

An error **[Vibration x High error]** for analog Monitoring Assignment function x is triggered is the value of Analog Input Monitoring (AMxP) is lower than this Level.

The error is reset when Analog Input Monitoring $AMxP > AMxS + 1\% * AMxS$.

NOTE: x = function 1...4 (E.g. Analog Input Monitoring AM1P or **[Vibration 1 High error]** for analog Monitoring Assignment function 1)

Setting	Description
0...32767	Factory setting : _

[AMxT_AlxMonitorProcessTripTimeOut]

Process delay warning.

Setting	Description
0...60 s	Factory setting : 0 s

[AMxZ_AlxMonitoringTripBehavior]

Analog monitoring behavior

Setting	Description
[NO]	Detected error ignored Factory setting
[YES]	Freewheel stop

PoC Cabinet Thermal Monitoring Function

[PoC Cabinet Thermal Monitoring]

Setting	Description
[NO]	Function inactive
[YES]	Function active Factory setting

[PoC Cabinet Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured cabinet temperature is higher than this setting, the drive triggers a warning **[PoC Cabinet Overheat Warning]** without stopping the application.

Setting	Description
0...100 °C	Factory setting : 50 °C

[PoC Cabinet Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured cabinet temperature is higher than this setting, the drive triggers an error **[PoC Cabinet Overheat Error]** and stops the application.

Setting	Description
0...100 °C	Factory setting : 60 °C

Control Mode Selection Function

[PLS0_mode Selector Switch]

Type of installed optional mode selector switch

Setting	Description
[No]	No Switch
[OLRP]	4 positions switch (Off - Local - Remote - Panel)
[LRP]	3 positions switch (Local - Remote - Panel)
[ORP]	3 positions switch (Off - Remote - Panel)
[OLR]	3 positions switch (Off - Local - Remote)
[LR]	2 positions switch (Local - Remote)
[RP]	2 positions switch (Remote - Panel)
	Factory setting

[Local Mode Selector Assignment]

High level corresponds to "Local mode is activated"

This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO
[I0_100]...[I0_123]	KPC1:I0...KPC1:I23 Factory setting: KPC7:I3
[I1_700] ... [I1_715]	KPC7:I0...KPC7:I15

[Local Mode DO Assignment]

This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO Factory setting
[107-Q0_107]	KPC1:Q7
[114-Q0_114]	KPC1:Q14
[115-Q0_115]	KPC1:Q15
[800-Q1_800] ... [815-Q1_815]	KPC8:Q0...KPC8:Q15

[OFF Mode DO Assignment]

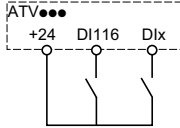
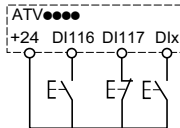
This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO Factory setting
[107-Q0_107]	KPC1:Q7
[114-Q0_114]	KPC1:Q14
[115-Q0_115]	KPC1:Q15
[800-Q1_800] ... [815-Q1_815]	KPC8:Q0...KPC8:Q15

Remote 2 wires/3 wires Control Function

[TCC_Type of remote control]

⚠ WARNING
UNANTICIPATED EQUIPMENT OPERATION
Verify that the parameter setting is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Setting	Description
[2 wires control]	<p>2-wire control (level commands): This is the input state (0 or 1) or edge (0 to 1 or 1 to 0), which controls running or stopping.</p> <p>Example of source wiring:</p>  <p>DI116 Remote start: 1 = start; 0 = Stop</p> <p>DIx Motor Rotation Direction: 0 = Forward direction; 1 = Reverse direction</p>
[3 wires control]	<p>3-wire control (pulse commands) [3 wire]: A start/stop pulse command running or stopping. A Forward or Reverse pulse is sufficient to command starting.</p> <p>Example of source wiring:</p>  <p>DI116 Remote start: 1 = Active (pulse signal)</p> <p>DI117 Remote stop: 0 = Active (pulse signal)</p> <p>DIx Motor rotation direction: 0 = Forward direction; 1 = Reverse direction</p> <p>Factory setting</p>

[TCT_2 wire Type of Remote Control]

This parameter can be accessed if [TCC_Type of remote control] is set to [2 wires control].

⚠ WARNING
UNANTICIPATED EQUIPMENT OPERATION
Verify that the parameter setting is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Setting	Description
[Level detection]	State 0 or 1 is taken into account for run (1) or stop (0)
[Transition detecting]	A change of state (transition or edge) is necessary to initiate operation in order to avoid accidental restarts after a break in the supply mains. Factory setting

[Remote Start Assignment]

If [TCC_Type of remote control] is set to [3 wires control], the signal will be a PULSE, and the high-level signal will be the active one.

If [TCC_Type of remote control] is set to [2 wires control] and [TCT_2 wire Type of Remote Control] is set to [Transition detecting], then a transition from 0 to 1 will be considered the active signal.

If [TCC_Type of remote control] is set to [2 wires control] and [TCT_2 wire Type of Remote Control] is set to [Level detection], the high-level signal will be the active one.

Setting	Description
[NO]	NO
[I0_116]	KPC1: I0.16 Active level is high level Factory setting

[Remote Stop Assignment]

If [TCC_Type of remote control] is set to [3 wires control], the signal will be a PULSE, and the low-level signal will be the active one.

If [TCC_Type of remote control] is set to [2 wires control] and [TCT_2 wire Type of Remote Control] is set to [Transition detecting], then a transition from 1 to 0 will be considered the active signal.

If [TCC_Type of remote control] is set to [2 wires control] and [TCT_2 wire Type of Remote Control] is set to [Level detection], the high-level signal will be the active one.

Setting	Description
[NO]	NO
[I0_117]	KPC1: I0.17 Active level is high level Factory setting
[I0_117L]	KPC1: I0.17L Active level is low level Factory setting

[Remote Freewheel Stop Assignment]

It is PULSE signal, and low level signal would be active one

Setting	Description
[NO]	NO
[I0_117L]	KPC1: I0.17L Active level is low level
[I0_118L]	KPC1: I0.18L Active level is low level Factory setting

[Remote Fault Reset Assignment]

It is PULSE signal, and high level signal would be active one

Setting	Description
[NO]	NO
[I0_117]	KPC1: I0.17 Active level is high level
[I0_118]	KPC1: I0.18 Active level is high level
[I0_119]	KPC1: I0.19 Active level is high level Factory setting

[Remote 3 Wires Start Type]

This parameter can be accessed if [TCC_Type of remote control] is set to [3 wires control].

⚠ WARNING	
UNANTICIPATED EQUIPMENT OPERATION	
Verify that the parameter setting is compatible with the type of wiring used.	
Failure to follow these instructions can result in death, serious injury, or equipment damage.	

Setting	Description
[Level detection]	State 0 or 1 is taken into account for run (1) or stop (0)
[Transition detecting]	A change of state (transition or edge) is necessary to initiate operation in order to avoid accidental restarts after a break in the supply mains. Factory setting

Motor Reverse Inhibition Function

[Motor Rotation Direction Assignment]

Allows to set motor rotation direction:

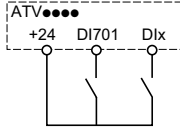
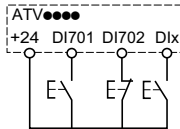
- I0_xxx = 0: forward direction
- I0_xxx = 1: reverse direction

NOTE: Active level is always high level.

Setting	Description
[NO]	NO
[I0_115]	KPC1:I15
[I0_117]	KPC1:I17
[I0_118]	KPC1:I18
[I0_119]	KPC1:I19
[I0_120]	KPC1:I20
[I0_121]	KPC1:I21
[I0_122]	KPC1:I22 Factory setting
[I0_123]	KPC1:I23

Local 2 wires/3 wires Control Function

[PL10_Cabinet Type of control]

⚠ WARNING	
UNANTICIPATED EQUIPMENT OPERATION	
Verify that the parameter setting is compatible with the type of wiring used.	
Failure to follow these instructions can result in death, serious injury, or equipment damage.	
Setting	Description
2 wires control]	<p>2-wire control (level commands): This is the input state (0 or 1) or edge (0 to 1 or 1 to 0), which controls running or stopping.</p> <p>Example of source wiring:</p>  <p>DI701 Local start: 1 = start; 0 = Stop</p> <p>DIx Motor Rotation Direction: 0 = Forward direction; 1 = Reverse direction</p>
[3 wires control]	<p>3-wire control (pulse commands) [3 wire]: A start/stop pulse command running or stopping. A Forward or Reverse pulse is sufficient to command starting.</p> <p>Example of source wiring:</p>  <p>DI701 Local start: 1 = Active (pulse signal)</p> <p>DI702 Local stop: 0 = Active (pulse signal)</p> <p>DIx Motor rotation direction: 0 = Forward direction; 1 = Reverse direction</p> <p>Factory setting</p>

[PL09_Cabinet Running Mode Selection]

This parameter can be accessed if [PL10_Cabinet Type of control] is set to [0 - 2 wires control].

⚠ WARNING	
UNANTICIPATED EQUIPMENT OPERATION	
Verify that the parameter setting is compatible with the type of wiring used.	
Failure to follow these instructions can result in death, serious injury, or equipment damage.	

Setting	Description
[Level detection]	State 0 or 1 is taken into account for run (1) or stop (0)
[Transition detecting]	A change of state (transition or edge) is necessary to initiate operation in order to avoid accidental restarts after a break in the supply mains. Factory setting

[Local Start Assignment]

If [PL10_Cabinet Type of control] is set to [3 wires control], the signal will be a PULSE, and the high-level signal will be the active one.

If [PL10_Cabinet Type of control] is set to [2 wires control] and [PL09_Cabinet Running Mode Selection] is set to [Transition detecting], then a transition from 0 to 1 will be considered the active signal.

If [PL10_Cabinet Type of control] is set to [2 wires control] and [PL09_Cabinet Running Mode Selection] is set to [Level detection], the high-level signal will be the active one.

NOTE: Active level is always high level.

This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO
[I1_700] ... [I1_715]	KPC7: I1_700...715 Active level is high level. Factory setting: [I1_704]

[Local Stop Assignment]

If [PL10_Cabinet Type of control] is set to [3 wires control], the signal will be a PULSE, and the low-level signal will be the active one.

If [PL10_Cabinet Type of control] is set to [2 wires control] and [PL09_Cabinet Running Mode Selection] is set to [Transition detecting], then a transition from 1 to 0 will be considered the active signal.

If [PL10_Cabinet Type of control] is set to [2 wires control] and [PL09_Cabinet Running Mode Selection] is set to [Level detection], the high-level signal will be the active one.

This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO
[I1_700]... [I1_715]	KPC7: I1_700...715 Active level is high level.
[I1_700L]... [I1_715L]	KPC7: I1_700L...715L Active level is low level. Factory setting: [I1_705L]

[Local Freewheel Stop Assignment]

It is PULSE signal, and low level signal would be active one .

This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO
[I1_700L]...[I1_715L]	KPC7: I0.2 Active level is low level Factory setting: [I1_706L]

[Local Fault Reset Assignment]

It is PULSE signal, and high level signal would be active one .

This parameter is available when [PLS0_mode Selector Switch], page 173 is set to [OLRP], [LRP], [OLR] or [LR].

Setting	Description
[NO]	NO
[I1_700]...[I1_715]	KPC7: I0.2 Active level is high level Factory setting: [I1_707]

[PL18_3-wire Run/Stop Dependency]

Setting	Description
[YES]	If set to YES, then the drive state depends on both local and remote 3-wire stop signals, regardless of whether channel commands are active. Factory setting
[NO]	If set to NO, then the drive state depends on the local or remote 3-wire stop signal only when the corresponding channel commands are active.

[Cabinet 3 Wires Start Type]

This parameter can be accessed if [PL10_Cabinet Type of control] is set to [3 wires control].

⚠ WARNING
UNANTICIPATED EQUIPMENT OPERATION
Verify that the parameter setting is compatible with the type of wiring used.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

Setting	Description
[Level detection]	State 0 or 1 is taken into account for run (1) or stop (0)
[Transition detecting]	A change of state (transition or edge) is necessary to initiate operation in order to avoid accidental restarts after a break in the supply mains. Factory setting

Logic Input Assignment For QF1 Feedback Signal Function

[PLIC_QF1 Feedback Signal Assignment]

The signal is used to monitor the QF1 feedback. It is a level-type signal: a low level indicates that QF1 is open, while a high level indicates that QF1 is closed.

Setting	Description
[NO]	NO
[I0_115]...[I0_123]	KPC1: I0.115...I0.123 Active level is high level Factory setting: [I0_115]
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level

QF1 Tripped Signal Assignment Function

[PLI1_QF1 Tripped Signal Assignment]

The signal is used to monitor the QF1 tripped feedback. It is a level-type signal: a low level indicates that QF1 is open, while a high level indicates that QF1 is closed.

Setting	Description
[NO]	NO Factory setting:
[I0_115]...[I0_123]	KPC1: I0.115...I0.123 Active level is high level
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level
[I1_700]...[I1_715]	KPC7: I1.700...I1.715 Active level is high level
[I1_700L]...[I1_715L]	KPC7: I1.700L...I1.715L Active level is low level

LV Surge Arrestor Function

[LV Surge Arrestor Tripped Signal Assignment]

It is a level-type signal. A low level is the active state and triggers the warning "LV Surge Arrestor is tripped".

NOTE: For more details about this state (% MW1008), refer to the , page 302.

Setting	Description
[NO]	NO
[I0_115]...[I0_123]	KPC1: I0.115...I0.123 Active level is high level
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level Factory setting: [I0_120L]
[I1_700]...[I1_715]	KPC7: I1.700...I1.715 Active level is high level
[I1_700L]...[I1_715L]	KPC7: I1.700L...I1.715L Active level is low level

Cabinet Heater Monitoring Function

[Heater Ready Signal Assignment]

It is a level-type signal. A low level is the active state and triggers the "Heater NOT ready warning".

NOTE: For more details about this state (% MW1008), refer to the ATV6100 PLC Communication Address Table, page 302.

Setting	Description
[NO]	NO
[I0_115]...[I0_123]	KPC1: I0.115...I0.123 Active level is high level
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level Factory setting: I0.121L
[I1_700]...[I1_715]	KPC7: I1.700...I1.715 Active level is high level
[I1_700L]...[I1_715L]	KPC7: I1.700L...I1.715L Active level is low level

Battery Undervoltage Monitoring Function

[Battery Undervoltage Signal Assignment]

It is a level-type signal. A high level is the active state and triggers the "Battery undervoltage warning".

NOTE: For more details about this state (% MW1008), refer to the ATV6100 PLC Communication Address Table, page 302.

Setting	Description
[NO]	NO
[I0_115]...[I0_123]	KPC1: I0.115...I0.123 Active level is high level Factory setting: I0.123
[I1_700]...[I1_715]	KPC7: I1.700...I1.715 Active level is high level

Arc Unit Error Monitoring Function

[Arc Unit Error Signal Assignment]

It is a level-type signal. A low level is the active state and triggers the "Arc Unit error" .

Setting	Description
[NO]	NO Factory setting:
[I0_115]...[I0_123]	KPC1: I0.115...I0.123 Active level is high level
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level
[I1_700]...[I1_715]	KPC7: I1.700...I1.715 Active level is high level
[I1_700L]...[I1_715L]	KPC7: I1.700L...I1.715L Active level is low level

Encoder Link Loss Monitoring Function

[Encoder Interface Warning Assignment]

It is a level-type signal. A low level is the active state and triggers the warning [Encoder Interface Warn], page 299.

Setting	Description
[NO]	NO Factory setting
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level
[I1_700L]...[I1_715L]	KPC7: I1.700L...I1.715L Active level is low level

[Encoder Interface Error Assignment]

It is a level-type signal. A low level is the active state and triggers the error [Encoder Interface Error], page 299.

Setting	Description
[NO]	NO Factory setting
[I0_115L]...[I0_123L]	KPC1: I0.115L...I0.123L Active level is low level
[I1_700L]...[I1_715L]	KPC7: I1.700L...I1.715L Active level is low level

Error Group Monitoring Function

[Error Group Selection]

This function allows to select specific error groups by setting the corresponding bits. Each bit represents a different error group, enabling you to customize which groups are active.

Bit	Description, Value
0	1: 1st Error Group selected Factory setting
1	1: 2nd Error Group selected
2	1: 3rd Error Group selected
3	1: 4th Error Group selected
4	1: 5th Error Group selected

[Error Group1_MW2 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0...7	Reserved Factory setting: 0
8	1: MW2.b8 error to Error Group 1
15	1: MW2.b15 error to Error Group 1

[Error Group1_MW3 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0	1: MW3.b0 error to Error Group 1 Factory setting: 0
15	1: MW3.b15 error to Error Group 1

[Error Group1_MW4 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0	1: MW4.b0 error to Error Group 1 Factory setting: 0
15	1: MW4.b15 error to Error Group 1

[Error Group1_MW9 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0	1: MW9.b0 error to Error Group 1 Factory setting: 0
15	1: MW9.b15 error to Error Group 1

[Error Group1_MW10 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0	1: MW10.b0 error to Error Group 1 Factory setting: 0
15	1: MW10.b15 error to Error Group 1

[Error Group1_MW11 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0	1: MW11.b0 error to Error Group 1 Factory setting: 0
15	1: MW11.b15 error to Error Group 1

[Error Group1_MW12 Masked]

1 = when the related error is triggered, Error group 1 is activated.

0 = when the related error is triggered, Error group 1 is not activated.

Bit	Description, Value
0	1: MW12.b0 error to Error Group 1 Factory setting: 0
15	1: MW12.b15 error to Error Group 1

[Error Group2_MW2 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	Reserved Factory setting: 0
8	1: MW2.b8 error to Error Group 1
15	1: MW2.b15 error to Error Group 1

[Error Group2_MW3 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	1: MW3.b0 error to Error Group 1 Factory setting: 0
15	1: MW3.b15 error to Error Group 1

[Error Group2_MW4 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	1: MW4.b0 error to Error Group 1 Factory setting: 0
15	1: MW4.b15 error to Error Group 1

[Error Group2_MW9 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	1: MW9.b0 error to Error Group 1 Factory setting: 0
15	1: MW9.b15 error to Error Group 1

[Error Group2_MW10 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	1: MW10.b0 error to Error Group 1 Factory setting: 0
15	1: MW10.b15 error to Error Group 1

[Error Group2_MW11 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	1: MW11.b0 error to Error Group 1 Factory setting: 0
15	1: MW11.b15 error to Error Group 1

[Error Group2_MW12 Masked]

1 = when the related error is triggered, Error group 2 is activated.

0 = when the related error is triggered, Error group 2 is not activated.

Bit	Description, Value
0	1: MW112b0 error to Error Group 1 Factory setting: 0
15	1: MW12.b15 error to Error Group 1

[Error Group 1 DOx assignment]

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]...[815-Q1_815]	KPC8 : 800-Q1_800 ... 815-Q1_815

[Error Group 2 DOx assignment]

Setting	Description
[NO]	NO Factory setting
[800-Q1_800]...[815-Q1_815]	KPC8 : 800-Q1_800 ... 815-Q1_815

External Device Thermal Monitoring Function

[External Device 1 Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 1 is higher than this setting, the drive triggers a warning **[External Device 1 Overheat Warning]** without stopping the application.

Setting	Description
0...200 °C	Factory setting : 120 °C

[External Device 1 Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 1 is higher than this setting, the drive triggers an error **[External Device 1 Overheat Error]** and stops the application.

Setting	Description
0...200 °C	Factory setting : 130 °C

[External Device 2 Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 2 is higher than this setting, the drive triggers a warning **[External Device 2 Overheat Warning]** without stopping the application.

Setting	Description
0...200 °C	Factory setting : 120 °C

[External Device 2 Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 2 is higher than this setting, the drive triggers an error **[External Device 2 Overheat Error]** and stops the application.

Setting	Description
0...200 °C	Factory setting : 130 °C

[External Device 3 Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 3 is higher than this setting, the drive triggers a warning **[External Device 3 Overheat Warning]** without stopping the application.

Setting	Description
0...200 °C	Factory setting : 120 °C

[External Device 3 Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 3 is higher than this setting, the drive triggers an error **[External Device 3 Overheat Error]** and stops the application.

Setting	Description
0...200 °C	Factory setting : 130 °C

[External Device 4 Overheat Warning Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 4 is higher than this setting, the drive triggers a warning **[External Device 4 Overheat Warning]** without stopping the application.

Setting	Description
0...200 °C	Factory setting : 120 °C

[External Device 4 Overheat Error Threshold]

NOTICE

OVERHEATING

Verify that the threshold level to trigger error and warning are properly set according to the technical data of the motor.

Failure to follow these instructions can result in equipment damage.

If the measured temperature of External Device 4 is higher than this setting, the drive triggers an error **[External Device 4 Overheat Error]** and stops the application.

Setting	Description
0...200 °C	Factory setting : 130 °C

Transformer Winding Thermal Monitoring Function

[Thermal Transformer Winding U1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403 Factory setting: IW1_400
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Transformer Winding V1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403 Factory setting: IW1_401
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Transformer Winding W1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403 Factory setting: IW1_402
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103

Setting	Description
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

Cabinet Thermal Monitoring Assignment Function

[Thermal Transformer Cabinet Monitoring Assignment]

Setting	Description
[NO]	NO Factory setting
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal PoC Cabinet Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403 Factory setting: IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

Motor Thermal Monitoring Assignment Function

[Thermal Motor Winding U1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503 Factory setting: IW2_500
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603

Setting	Description
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor Winding V1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503 Factory setting: IW2_501
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor Winding W1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503 Factory setting: IW2_502
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor Winding U2 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503 Factory setting: IW2_503

Setting	Description
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor Winding V2 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603 Factory setting: IW2_600
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor Winding W2 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603 Factory setting: IW2_601
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor bearing 1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403

Setting	Description
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603 Factory setting: IW2_602
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal Motor bearing 2 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603 Factory setting: IW2_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

External Device Thermal Monitoring Assignment Function

[Thermal External Device 1 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103 Factory setting: IW4_1100
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal External Device 2 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203 Factory setting: IW4_1101
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal External Device 3 Monitoring Assignment]

Setting	Description
[NO]	NO Factory setting
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103 Factory setting: IW4_1102
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

[Thermal External Device 4 Monitoring Assignment]

Setting	Description
[NO]	NO
[400 - IW1_400]...[403 - IW1_403]	KPC4: IW1_400...IW1_403
[500 - IW2_500]...[503 - IW2_503]	KPC5: IW2_500...IW2_503
[600 - IW3_600]...[603 - IW3_603]	KPC6: IW3_600...IW3_603
[1100 - IW4_1100]...[1103 - IW4_1103]	KPC11: IW4_1100...IW4_1103 Factory setting: IW4_1103
[1200 - IW5_1200]...[1203 - IW5_1203]	KPC12: IW5_1200...IW5_1203
[1400 - IW7_1400]...[1403 - IW7_1403]	KPC14: IW7_1400...IW7_1403

System Tool

Access

Settings → System Tool

Overview

Settable options include

- Config Tool, page 201
- Function, page 202
- Function Lock, page 205
- PID Regulation, page 206
- Preset Speed, page 208
- PLC AI, page 209
- PLC AO, page 211
- PLC DI Define, page 212
- Parameter Report, page 213
- Update Program, page 214
- Login again, page 215
- User Manage, page 216

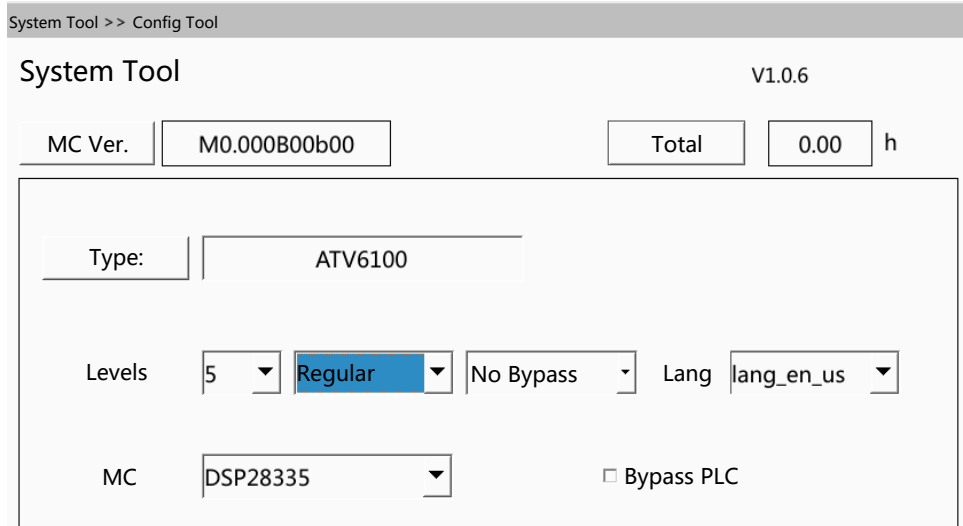
Config Tool

Access

Settings → System Tool → Config Tool

About This Menu

Through this **Config Tool** panel, the user can read the system version number of the master controller, set the system’s accumulated running time, VSD type and number, cascaded levels, and the master types (DSP28335, DSP28335-AFE).



The detailed functions of each button are listed in the following table.

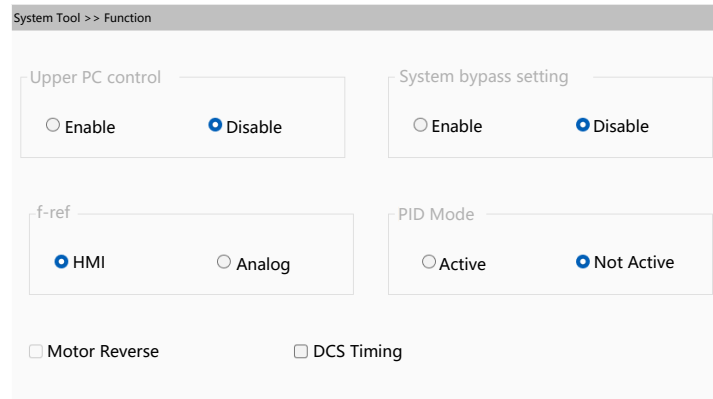
Item	Description
MC Ver.	Click this button to read the version number of the controller unit's program. This data is only for display, cannot be set or modified.
Total	Displays the accumulated running time with main power on, starting from the product's delivery from the factory.
[Type]	VSD type.
[Levels]	Sets the number of levels cascaded of ATV6100, Regular or Reverse and Without bypass or With bypass.
[Lang]	Sets the display language of screens and parameters of the program. lang_zh_cn stands for Chinese, lang_en_us for English, lang_FR for France, lang_DE for German, lang_IT for Italian, lang_PT for Portuguese, lang_ES for Spanish.
[MC]	Select the type of the drive controller: DSP control
<input checked="" type="checkbox"/> Bypass PLC	With this item checked, the corresponding commands sent by the interface, such as Start or Stop commands, will be transmitted to the master controlling box while not via the PLC; with this item unchecked, the corresponding commands are transmitted through the PLC. NOTE: This item must be unchecked in order to activate the Fan Start/Stop button from the HMI toolbar.

Function

Access

Settings → System Tool → Function

About The Menu



[PID Mode]

Setting	Description
Active	PID Active control
Not active	PID Not active control
	Factory setting

[f-ref]

Setting	Description
[HMI]	Sets the frequency reference through the acceleration/ deceleration buttons or frequency setting buttons in the main screen.
	Factory setting
[Analog]	Receives external analog setting signals of 0-10V or 4-20mA, then gets the frequency reference through analog-to digital treatment.

[Upper PC control]

Setting	Description
[Enable]	Allows upper PC control.
[Disable]	Upper PC control Not allow Factory setting

When the **Panel/Remote** switch on the cabinet door is on **Remote Control mode** position, the drive has the functions of:

- Starting,
- Stopping,
- Freewheel stopping,
- Resetting or
- Setting the output frequency

Select **[Enable]** to allow this function.

If the list of functions above are not allowed, select **[Disable]**.

NOTE: If the **Panel/Remote** Control switch on the cabinet door is on **Panel Control mode** position, no matter whether set to **[Enable]** or **[Disable]**, the **[Upper PC Control]** parameter is disabled.

[System bypass setting]

Setting	Description
[Enable]	Allows system bypass operation.
[Disable]	Forbids system bypass operation. Factory setting

When this function is enabled and a Medium Voltage bypass contactor has been installed, a **Detected error** will bypass the drive and connect the motor directly to the mains voltage.

<p>⚠ WARNING</p> <p>UNEXPECTED EQUIPMENT OPERATION</p> <p>Enabling this function will bypass the drive control and protection and will connect the motor directly to the mains voltage.</p> <ul style="list-style-type: none"> • It should be enabled only in extraordinary situations where a thorough risk analysis demonstrates that the presence of adjustable speed drive protection trip poses a greater risk than to continue to operate the motor at full nominal voltage. • Verify that the application can be connected directly and instantly to the mains voltage without the need of a controller. <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>

For example, in the water supply system, at a given water pressure, the water pump is running at the low speed state, driven by the inverter. If the bypass comes into operation at maximum speed suddenly, it can cause the sudden increase of water pressure, maybe endangering the water network and valves.

[System bypass] and **cell bypass** are two different concepts. Cell bypass **[enable]** is targeted to the bypass of the drive's internal defective power cell with de-rated mode rather than trip. If the system bypass happens when there is a "Detected error" on the drive, the whole system of the drive will exit operation.

[Motor Reverse]

Setting	Description
[Enable]	Allows motor reverse.
[Disable]	Forbids motor reverse. Factory setting

If the **Control parameter** in the **Settings Panel** item is selected, and **[Reverse motor speed]** is **Enabled**, the Motor reverse checkbox will be enabled.

When Motor reverse is enabled, if the motor runs forward, it will gradually decelerate to a standstill, then accelerate in reverse to the corresponding frequency setting for reverse operation. The output frequency will be displayed as a negative value, while the set frequency will be positive.

[DCS Timing]

Setting	Description
[Enable]	Synchronizes the HMI clock with the customer's DCS (Distributed Control System).
[Disable]	Uses the HMI's internal clock. Factory setting

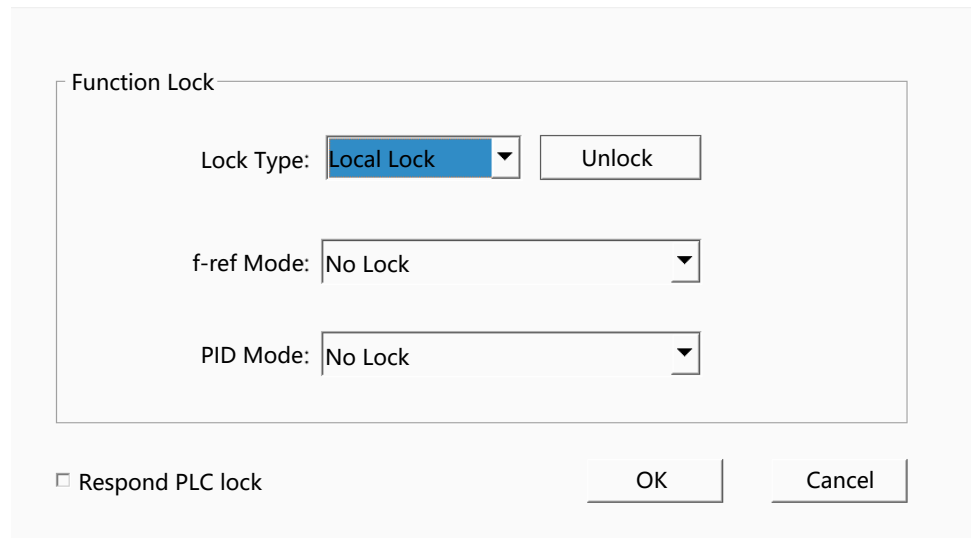
Function Lock

Access

Settings → System Tool → Function Lock

About The Menu

By setting the Function lock, the lock state of **Panel Control mode** or **Remote Control mode** can be defined.



The screenshot shows a dialog box titled "Function Lock". It contains three dropdown menus: "Lock Type" (set to "Local Lock"), "f-ref Mode" (set to "No Lock"), and "PID Mode" (set to "No Lock"). There is an "Unlock" button next to the "Lock Type" dropdown. Below the dropdowns is a checkbox labeled "Respond PLC lock" which is currently unchecked. At the bottom right are "OK" and "Cancel" buttons.

In **Local Lock** or **Remote Lock** mode, selecting whether **f-ref** mode, and **PID** Mode of the system are lock-enabled or not, also selecting whether to respond to the function lock set by PLC using the check box.

When the system is in **Panel Control mode** or **Remote Control mode**, it will bind all functions automatically according to the function lock selected.

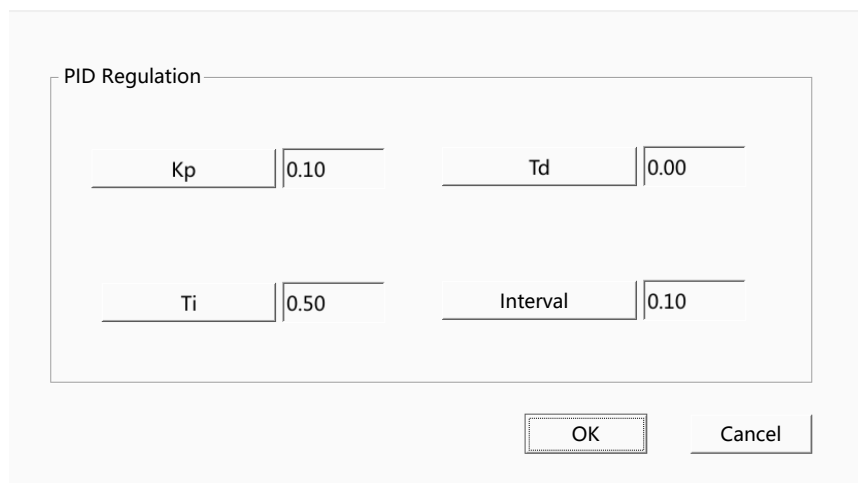
PID Regulation

Access

Settings → System Tool → PID Regulation

About The Menu

This function is used to input every parameter of the PID regulator. The proportional coefficient, integral time constant, and differential time constant of the PID regulator can be modified in real time during the ATV6100 operation.



The specific functions of each button are shown in the following table.

Item	Description
[Kp]	<p>The proportional coefficient of the PID regulator, can be positive, negative or of zero value.</p> <p>Increasing this coefficient's absolute value can speed up the regulation, but when too high, the system tends to oscillating due to overshoot.</p> <p>In the case that both integral and differential coefficients are positive, if the proportional coefficient is also positive, the ATV6100 will perform positive regulation,</p> <ul style="list-style-type: none"> • If the given value is higher than the feedback value, it will increase the output frequency. • If the given value is lower than the feedback value, it will decrease the output frequency. <p>For example, in the constant-pressure water supply application, if the given water pressure is higher than the actual value, the regulator will increase the ATV6100's output frequency to accelerate the pump, making the actual water pressure climb to the given value.</p> <p>In the case that both integral and differential coefficients are positive, if the proportional coefficient is also positive, the ATV6100 will perform negative regulation,</p> <ul style="list-style-type: none"> • If the given value is higher than the feedback value, it will decrease the output frequency • If the given value is lower than the feedback value, it will increase the output frequency <p>For example, in constant-temperature control systems which use fans to perform forced air cooling, if the given temperature is higher than the actual value, the regulator will decrease the ATV6100's output frequency to decelerate the fan so as to decrease the air flow rate, making the actual temperature climb to the given value.</p> <p>When there is no need for proportional regulation, the proportional coefficient should be set to zero. In this case, both the integral and differential regulation can be performed, in which the PID regulator will take the proportional coefficient as 1 when it is performing integral or differential operations.</p> <p>When the proportional coefficient is not zero, its change can also influence the effect of the integral and differential regulation of the regulator.</p>

Item	Description
[Ti]	<p>The integral time constant of the PID regulator in seconds, which can be positive, negative, but cannot be zero.</p> <p>Normally it is set to be a positive value. Only when there is no need for the proportional regulation while the integral regulation alone is needed and the regulator performs negative regulation, this coefficient will be set to a negative value.</p> <p>Increasing the absolute value of this coefficient will make the response slower.</p> <p>When the proportional coefficient is a positive value or zero, and the integral coefficient is set to be positive, the ATV6100 will perform positive regulation,</p> <ul style="list-style-type: none"> • if the given value is higher than the feedback value, it will increase the output frequency. • if the given value is lower than the feedback value, it will decrease the output frequency. <p>When the proportional coefficient is a positive value or zero, and the integral coefficient is set to be negative, the ATV6100 will perform negative regulation,</p> <ul style="list-style-type: none"> • if the given value is higher than the feedback value, it will decrease the output frequency. • if the given value is lower than the feedback value, it will increase the output frequency. <p>When there is no need for integral regulation, the integral coefficient should be set to infinity.</p>
[Td]	<p>The differential time constant of the PID regulator in seconds, which can be positive, negative or zero.</p> <p>When there is no need for the proportional regulation while the differential regulation alone is needed and the regulator performs negative regulation, this coefficient will be set to a negative value.</p> <p>Increasing the absolute value of this coefficient will make the dynamic response of the regulator faster.</p> <p>When the proportional coefficient is a positive value or zero, and the differential coefficient is set to be positive, the ATV6100 will perform positive regulation, i. e.,</p> <ul style="list-style-type: none"> • if there is a sudden increase of the given value or a sudden decrease of feedback value, it will increase the output frequency. <p>When the proportional coefficient is a positive value or zero, and the differential coefficient is set to be negative, the ATV6100 will perform negative regulation,</p> <ul style="list-style-type: none"> • if there is a sudden increase of the given value or a sudden decrease of feedback value, it will decrease the output frequency. <p>When there is no need for differential regulation, the differential coefficient should be set to zero.</p>
[Interval]	<p>The calculation period of the PID regulator in seconds, which is to be positive and not be negative or zero. Its default setting is 0.1 s.</p>

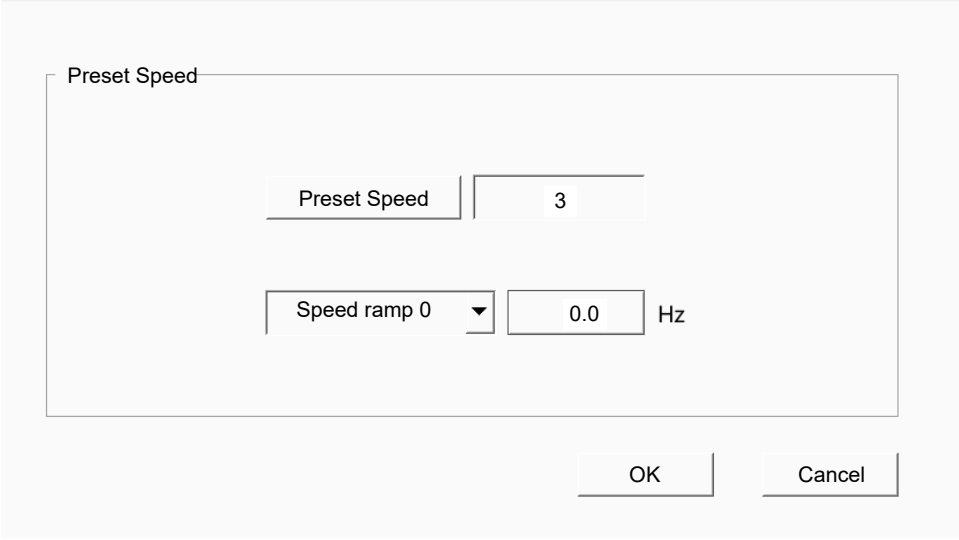
Preset Speed

Access

Settings → System Tool → Preset Speed

About This Menu

The method for setting the Speed ramp parameters is shown above. First, click **Preset Speed** button, then set the number of Speed ramp segments, such as 3. Click **OK**.



The screenshot shows a dialog box titled "Preset Speed". Inside the dialog, there is a button labeled "Preset Speed" followed by a text input field containing the number "3". Below this, there is a dropdown menu labeled "Speed ramp 0" with a downward arrow, followed by a text input field containing "0.0" and the unit "Hz". At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

In the list, you can see three speed points, select one of them, for example, Speed ramp 0, then click the speed button after it. Set the speed value of Speed ramp 0 to 2. Then click **OK**.

In special applications such as in steel factories, when there is need for high, medium, and low speed operation, you can set it to operate in three stages, then select high/low speed regulation production item. In case of using Remote Control and Display, three buttons will appear at the bottom of the main screen of the upper PC monitoring program, i.e., Low speed, Medium speed, and High speed, which corresponds to the frequencies of Speed point 0, Speed point 1 and Speed point 2, respectively. Simply through clicking the button corresponding to the desired speed, the given frequency can be set to the value of the corresponding speed point.

If the box is checked, the input and output active powers and their corresponding power factors will be displayed in the Field Data parameter item in the main monitoring screen of the ATV6100 and the monitoring screen of the upper PC.

PLC AI

Access

Settings → System Tool → PLC AI

About This Menu

Analog Input	CH1-Signal. Ref	<input type="checkbox"/> Display on HMI	OK	Cancel
Type of sensor	<input checked="" type="radio"/> Current Source	<input type="radio"/> Voltage Source		
Source Range	4	-	20	mA
Scale Range	0	-	10	Hz
Min Input value	-1			mA
Min Ref. Frequency	0.5			Hz
Max Ref. Frequency	50			Hz
Spare	0			

If the check box is selected Display on HMI, the values of the analog channel will be displayed in the Field Data parameter item of the drive system's main monitoring screen.

As shown above, in the dialog box, the analog input signal of the field given channel is set to be of **[Current Source]** type, and the Output Range of that signal is set to be **4-20 mA**, accordingly, the Measure Range of actual field values is set to be **0 - 10 Hz**.

When the **[f-ref]** is set to **[Analog]** and the **[PID Mode]** (Running mode) is set to **[Active]** mode, AD conversion can be performed according to this corresponding relationship, so as to make the drive system run at the corresponding controlled given values.

Meanwhile the break value of this signal is set to be **0 Hz**, i.e., when the value of the field given signal is less than this value, it is considered as signal break in the given channel. The minimum and maximum frequency values related to Open-Loop operation provide the correspondence of AD conversion when the drive system operates **[Not active]** mode with analog reference.

According to this, the speed adjustment system operates in **[Not active]**, page 202 at the Frequency Reference value corresponding to the analog reference signal.

“Spare” is a reserved parameter, which has no actual meaning, defined by the user here.

Select **[CH1-Signal Ref]** in the drop-down box **[Analog Input]** then select **[Current Source]** in the item.

Click the range buttons behind the **[Source Range]** and **[Scale Range]** for the soft keyboard to pop up, then use it to set corresponding ranges.

Finally, click the buttons of Break, **[Min Ref. Frequency]**, **[Max Ref. Frequency]** for the soft keyboard to pop up, then use it to set corresponding values, click the OK button to accomplish the setting.

- The analog signals received by the medium voltage drive system can be current source signals or voltage source signals. If the user selects Display in the Command mode, then any choice made in analog reference signal is invalid.

- The analog feedback signals are set by the user according to the type of the analog feedback signal source.
- When setting the type of the analog reference signal, please notice the wiring form of the signal at the same time. The wiring forms of current source signals and voltage source signals for connecting to the control cabinet are slightly different.

Through the editing of the definitions of analog inputs, the channel number of analog inputs can be increased or decreased, meanwhile the content and unit of other reserved parameters related to that input channel can be defined. The already defined name of the analog input and the content and unit of its reserved parameters can also be modified.

For example:

- the name of Channel 1 is Signal Reference, which has no data unit,
- the name of Parameter 1 of Channel1 is **[Min Input Value]**, of which the unit is mA,
- the name of Parameter 2 is **[Min Ref. Frequency]**, of which the unit is Hz,
- the name of Parameter 3 is **[Max Ref. Frequency]**, of which the unit is Hz,
- the name of Parameter 4 is **[Spare]**.

PLC AO

Access

Settings → System Tool → PLC AO

About This Menu

The screenshot shows a settings window for PLC AO. At the top, there is a 'Channel' dropdown menu set to 'Output Channel 0'. To the right are 'OK' and 'Cancel' buttons. Below this is a section titled 'Type of sensor'. Inside this section, there are four rows of settings:

- 'Output Data' with a dropdown menu set to 'Running Frequency'.
- 'Type of Source' with two radio buttons: 'Current Source' (selected) and 'Voltage Source'.
- 'Source Range' with two input fields: '4' and '20', followed by 'mA'.
- 'Scale Range' with two input fields: '0' and '50', followed by 'Hz'.

By selecting the channel number of the analog output and the data content output in this channel, defining the sensor type of the output meter as well as the correspondence between the meter's measurement range and voltage/current, the analog value required by the user can be output correctly.

For example, if the user wants to display the output frequency of the drive system through analog output channel 0, the external meter is a 4-20mA current meter, which has the dial plate range of 0-50 Hz, the corresponding settings are as shown below.

- Select [**Output Channel0**] in the *Channel* box.
- Then select [**Running Frequency**] in the *Output Data* box.
- Select the type of source (Current or Voltage)
- Then set the range values.

Here is the list of configurable *Output Data* :

- Reference frequency
- Running frequency
- PID feedback
- Running speed
- Input Current
- Output Current
- Input Voltage
- Output Voltage
- Total runing time
- Transformer Temperature L1
- Transformer Temperature L2
- Transformer Temperature L3
- Output Power
- Output Power Factor

PLC DI Define

Access

Settings → System Tool → PLC DI Define

About This Menu

The ATV6100 can set the definition of digital field signals according to the user's different needs.

By defining the PLC register bit and its field meaning, and according to the indication method corresponding to the value of the bit, the monitoring main interface, and upper PC monitoring interface of drive system can display digital inputs or outputs of the user's site accurately.

For example, if PLC register VB4.6 is defined to indicate **[Stop due to error]**, and its treatment method is to give indication when the state is 1, then when its state bit is 1, the monitoring interface will indicate **[Stop due to error]**. Furthermore, according to field requirements, the corresponding PLC register bits can be added in this dialog box through the Data Node Edit window, so as to facilitate the extension of user data nodes, as shown in the adding process of register bit VB4.0 in PLC Digital panel, page 38 .

Meaning : PLC Register :

No Prompt
 Prompt when state =1
 Prompt when state =0

In the editing box above select the **New** button, input VB4.0, then click the **New** button.

Meaning : PLC Register :

No Prompt
 Prompt when state =1
 Prompt when state =0

At the top of the **PLC register** edit box, you can see the newly added item.

Parameter Report

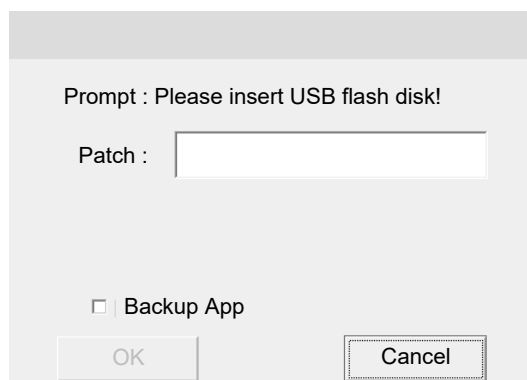
Access

Settings → System Tool → Parameter Report

About The Menu

This menu allows exporting data from the HMI and several functions.

NOTE: This action requires Manager or Master Level.



After entering the parameter report settings screen, If there is no USB disk inserted, a prompt will appear: **Please insert USB flash disk!**

Once the USB disk inserted, the export path will be automatically set to: **/media/report.csv**(this path cannot be modified), saving the parameters into the newly created Report.csv file in the USB disk.

Then, click the **OK** button to begin exporting the parameter report. If the export was successful, a Prompt dialog box will pop up automatically, indicating the success of exporting operation.

NOTE: If a Report.csv file already exists in the USB disk, the system will prompt whether to overwrite it.

Select **No** to cancel parameter file backup, or select **Yes** to overwrite the existing file to perform backup.

To save the entire HMI software on a USB disk:

Select **Backup App**.

The entire HMI software can be restored in the update menu.

For example, in the event of damage, it is possible to restore the entire HMI software on a new HMI.

In this case, the export path will automatically be set to : **/media/ATV6100_BAK** (this path cannot be changed).

The two following functions are also exported:

Function	File path	File name	Description	Menu
Error history	ATV6100/exception.dat	<i>exception.dat</i>	Last 150 error history	Error History , page 47
Log events (including the Error history record)	ATV6100/Log/ yyyy.MM.dd.txt	In format of yyyy.MM.dd.txt	Last 100 days history	Parameter report

Update Program

Access

Settings → System Tool → Update Program

About The Menu

NOTE: This action requires Master Level.

Update Program

Copy ATV6100 folder to USB flash disk.
*Full is update both the App and parameter.
*Partial is only update the App.

Full Update Partial Update

Prompt : Please insert USB flash disk!

After entering this menu, if there is no USB disk inserted, it will prompt: **Please insert USB flash disk!**

NOTE: Only signed version can be updated.

Login again

Access


Settings → System Tool → Login again

About The Menu

⚠ WARNING
UNEXPECTED EQUIPMENT OPERATION
Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
To avoid unauthorized people to access to the ATV6100 parameters and commands, the passwords must be changed from their default value.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

You can login the system to perform corresponding parameter settings.

Login

 Username:

Password:

For access level information refer to [Access Level Control on HMI](#), page 21.

NOTE: After logging into the Manager or Master account, if there is no user operation for 5 minutes, the user will be logged out.

User Manage

Access

Settings → System Tool → User Manage

About The Menu

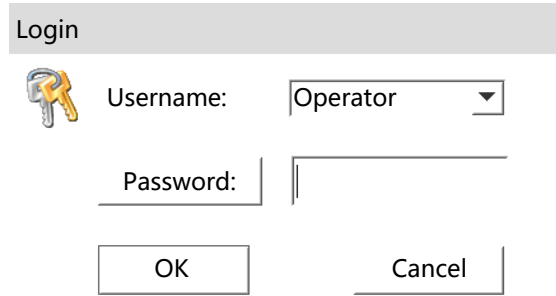
⚠ WARNING	
UNEXPECTED EQUIPMENT OPERATION	
<p>Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.</p> <p>To avoid unauthorized people to access to the ATV6100 parameters and commands, the passwords must be changed from their default value.</p> <p>Failure to follow these instructions can result in death, serious injury, or equipment damage.</p>	

Function Lock	Password	Authorization	
Operator	***	Operator	New
Manager	***	Manager	Delete
Master	***	Master	
			Ok
			Cancel

To ensure that only authorized persons are able to read and write data, it is possible to have three access levels.

- **Operator:** Not password requested
- **Manager:** Define during the commissioning, creation of a new password is requested during the commissioning.
- **Master:** Reserve for FSR, creation of a new password is requested during the commissioning.

When a profile has no access, the following dialog box opens, to insert the password.



The image shows a 'Login' dialog box with a grey title bar. Below the title bar is a key icon. To the right of the key icon is the label 'Username:' followed by a dropdown menu showing 'Operator'. Below this is the label 'Password:' followed by an empty text input field. At the bottom of the dialog are two buttons: 'OK' on the left and 'Cancel' on the right.

For access level information refer to [Access Level Control on HMI](#), page 21.

NOTE: After logging into the Manager or Master account, if there is no user operation for 5 minutes, the user will be logged out.

Running Modes

Running Modes of the ATV6100

Before the drive's first power-up, it is necessary to enter the Main panel and, then the Parameter Settings window to set the parameters for the motor and the drive.

The ATV6100 series has many running modes such as:

- Open-Loop,
- Normal Stop,
- Mains Voltage OFF

No matter in which running mode, the power-up of the ATV6100 to be performed with the system in standby state. When the prerequisites are met, that is, controller ready, motor ready, power-up enabled, **Mains Voltage OFF** button (including **Freewheel Stop** buttons on the HMI and at the remote control) released, and no **Detected error**, the system will send the **Medium Voltage Closing Permitted** signal. When the system receives the **System ready** signal, it will enter standby state.

Open-loop Running

When the system is in standby state, and the **Remote/Local Control** switch on the cabinet door is on

Remote Control mode, if there is a **Remote Start** command received, the drive system will start from the current state according to the acceleration time provided by the system, and operate according to the running frequency set by the user for drive system.

When the system is in **standby** state, and the **Remote/Local Control** switch on the cabinet door is on **Local Control mode**, the remote **Start** button is disabled, and the starting of the ATV6100 is achieved through the **Start** button on the HMI touch screen.

Normal Stop

When the **Remote/Local Control** switch on the cabinet door is on **Remote Control mode**, the remote **Stop** button can make the ATV6100 decelerate to standstill according to the deceleration time set by the system.

When the **Remote/Local Control** switch on the cabinet door is on **Local Control mode**, the Stop button on the HMI touch screen will have the same function.

If the position of the **Remote/Local Control** switch on the door is changed or the state of the following messages when the ATV6100 is running, the drive system will stop automatically:

- Controller Ready,
- System ready,
- Motor Ready,
- Power-up Enabled

Mains Voltage OFF

Under any conditions, the **Mains Voltage OFF** button on the door and the **Freewheel Stop** button on the HMI touch screen can both be operated. After the system receives the **Mains Voltage OFF** command or a Detected Error occurs, it will block the pulses of power cells immediately and the motor and the mechanism will stop in freewheel mode.

In addition to blocking the pulses of power cells immediately, the **Mains Voltage OFF** button on the door also has the function of medium voltage breaker. If the **Mains Voltage OFF** button on the door is locked, the system will not display the **Medium Voltage Closing Permitted** message anymore, then the remote **Mains Voltage OFF** button and the **Freewheel Stop** button on the HMI touch screen will not function as medium voltage breakers.

NOTE:

- In any case, the **Mains Voltage OFF** button on the door and the **Freewheel Stop** button on the HMI touch screen are valid at the same time.
- The **Mains Voltage OFF** button on the door has the function of tripping the upstream breaker, while the Stop button and the **Freewheel Stop** button on the HMI touch screen do not have this function.

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Commissioning

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Application Function Commissioning

Output voltage closed loop function

Under the **[U/F Control]** mode, when the voltage of drive input grid fluctuates relatively slowly (not faster than 2% per minute) but in a relatively wide range (such as 10%), to relatively stabilize the output voltage of the drive, the **[U/f Voltage Amplitude Comp]** function can be enabled.

Related parameter

Position of related parameters: **Settings Panel --> Control Parameter --> Control Parameter.**

Related parameter setting of drop restart

Parameter name	Factory setting	Maximum value	Minimum value	Remarks
[U/f Voltage Amplitude Comp]	[Disable]	-	-	Valid only under [U/F Control] mode.
[U/f Volt Amplitude Factor]	1	2	0.5	1 is equivalent to 100% reference voltage.

[U/f Volt Amplitude Factor] and **[PWM Regulation Coefficient]** can both affect output voltage of the drive under the **[U/F Control]** mode, but the functions are different. The definition of **[PWM Regulation Coefficient]** is described as follows.

About [PWM Regulation Coefficient]

Generally, for the **AC-DC-AC** voltage type drive under output voltage opened loop **[U/F Control]**, the direct-current bus voltage can also fluctuate along with different input grid voltage fluctuation and load, so that drive does not strictly obey the **voltage-frequency curve** output theoretic voltage value set by the parameter.

[PWM Regulation Coefficient] is set to prevent the direct-current bus voltage from being too high or too low constantly and stably. Generally speaking, the direct-current bus voltage is changed all the time. In case of relatively small change range, the fixed **[PWM Regulation Coefficient]** setting can meet the production requirements. When the input voltage fluctuates in a relatively large range for a long time, the fixed **[PWM Regulation Coefficient]** setting cannot overcome the fluctuation. There is a **[PWM Regulation Coefficient] theoretic value** under different direct-current bus voltages. The definition of the **[PWM Regulation Coefficient] theoretic value** is that under different direct-current bus voltages, when it is set as corresponding **[PWM Regulation Coefficient] theoretic value**, the drive can be enabled to strictly obey the **voltage-frequency curves** set by the user to output expected voltage.

Suppose:

1. **[PWM Regulation Coefficient]** is set as K_{pwm} ,
2. **[U/f Volt Amplitude Factor]** is K_{vout} ,
3. the reference frequency is F_t ,
4. reference voltage is U_t ,
5. torque boost voltage is V_b ,

- 6. operation frequency is $f (f \leq Ft)$,
- 7. PWM adjustment coefficient theoretical value is KN , then, the practical output voltage V_{out} of the drive under the **[U/F Control]** mode is:

$$V_{out} = (K_{pwm} / KN) \cdot K_{vout} \cdot [f / Ft \cdot (U_t - V_b) + V_b] \dots (1)$$

About [U/f Voltage Amplitude Comp] and [U/f Volt Amplitude Factor]

When the control mode is set as **[U/F Control]**, **[U/f Voltage Amplitude Comp] = [Enable]**, the drive can automatically adjust K_{pwm} by taking KN as target, so that $K_{pwm} = KN$. When the input voltage and load are both changed slowly, the target is easy to achieve, and then the equation (1) can be simplified as:

$$V_{out} = K_{vout} \cdot [f / Ft \cdot (U_t - V_b) + V_b] \dots (2)$$

If the torque boost voltage is set as $V_b = 0$, the equation (2) can be further simplified as:

$$V_{out} = K_{vout} \cdot f / Ft \cdot U_t \dots (3)$$

Therefore, when the input voltage and the load are both changed slowly, if the output voltage closed loop control function is enabled, the drive will output voltage corresponding to present frequency according to **[U/f Volt Amplitude Factor]** K_{vout} .

So even if the output voltage closed loop function is not enabled, the effect of **[U/f Volt Amplitude Factor]** on output voltage is valid. Generally, the default value is 1, i.e. 100% of the reference voltage.

Input voltage phase lock function

Function description

When the drive is applied for energy feedback, output voltage synchronization or synchronous switching, the input voltage phase lock function shall be used.

After the input voltage phase lock function is enabled, the phase A voltage waveform U_A and phase angle waveform agl_ua of phase A voltage obtained by locked phase can be observed on the HMI. When the three-phase input voltage is correctly wired, and the input voltage A is 120° ahead of input voltage B, input voltage B is 120° ahead of input voltage C and input voltage C is 120° ahead of input voltage A, the zero crossing point of the phase voltage U_A from negative half-wave to positive half-wave is consistent with the low point of the phase angle waveform agl_ua .

If the drive: (1) is executing synchronous switching, or (2) PWM rectification function is set as **[Allowed]**, or (3) output voltage synchronization is set as Allowed, no matter whether the **[Input PLL (AFE only)]** is allowed or not, the drive can execute input voltage phase lock automatically.

Related parameters

Input voltage phase lock function parameters

Parameter name	Factory setting	Maximum value	Minimum value	Remarks
[Input PLL Enable]	[Disable]	-	-	The parameter locates under Control Parameter .

Output synchronization function

Function description

Before synchronous switching, the amplitude, phase and frequency of the drive output voltage shall be synchronous with those of the grid voltage, and the process is called as output voltage synchronization. At present, the function can be achieved only under **[U/F Control]** mode.

After the **[Output PLL]** is enabled, the drive can automatically adjust the amplitude, phase and frequency of the output voltage according to function number setting, and then the output voltage can be consistent with the input voltage of the grid.

If the **[Output PLL]** is allowed, when the difference of the operation frequency of the drive and the grid frequency is smaller than 0.5 Hz, the output synchronization is started, or else it will not enter into the synchronization state. If the drive cannot operate within the 0.5 Hz range of the grid frequency as the output voltage is not achieved because of bypass, phase synchronization cannot be performed.

After entering into synchronization, the drive output voltage can be output according to the function number **[Output PLL Volt Ampl Factor]** by multiplying the present input grid voltage with the coefficient.

Related parameters

Output voltage synchronization function parameters

Parameter name	Factory setting	Maximum value	Minimum value	Remarks
[Output PLL]	[Disable]	-	-	No matter whether the function is set as Allowed or not, it can be automatically allowed when the drive executes synchronous switching. In the process of single unit debugging of drive, no synchronous switching command is needed, and the primary debugging of the synchronous switching function can be performed with the option.
[Output PLL Volt Ampl Factor]	1.01	2	0.5	1 is equivalent to 100% of the present input voltage of the drive.
[Output PLL Phase Angl Offset]	-2°	359.9°	-20°	Angle of output voltage ahead of input voltage.
[Output PLL Phase Pos Reg Kp]	500	10000	1	Phase synchronization ratio coefficient.
[Output PLL Phase Pos Reg Ki]	1000	10000	1	Phase synchronization integral coefficient.

Catch on flying start-up of asynchronous motor

No matter an asynchronous motor or synchronous motor is driven, the AC VSD products series drives based on new master controller can control the VF catch on flying start-up under the condition of loaded rotation.

Function description

In the way that **[Motor Control Law]** of the drives is set as **[U/F Control]** and **[U/f - Start Mode]** is set as **[Normal]**, if the stopping frequency is more than 1Hz, and the duration from the moment last stopping begins is shorter than the time set in the parameter of **[Motor Freewheel Stop Time]**, the drives starts from the frequency at which they stop. Search the motor's current rotating speed, and follow up whether the given frequency properly operates after the speed is found.

If the stopping frequency is less than 1Hz, or the stopping time is more than **[Motor Freewheel Stop Time]**, the drives start from **[Starting Frequency]**. If the **[Starting Frequency]** is more than 5 Hz, they start in the form of VF catch on flying from the **[Starting Frequency]**. Or, they normally start from the **[Starting Frequency]**.

NOTE: If the starting in the form of VF catch on flying is enabled, restart can be permitted only two seconds after the last stopping.

Related parameters

Related parameters of VF control catch on flying start-up

Parameter name	Factory setting	Maximum value	Minimum value	Unit	Remarks
[Starting Frequency]	0.5	50	0	Hz	Available in basic parameter, page 52.
[Motor Freewheel Stop Time]	20	3000	0.1	s	-
[U/f CoF - Initial Voltage]	0.05	0.6	0.01	%	If the asynchronous motor is loaded, it is the primary voltage applied set by the function number in V/F rotation starting.
[U/f CoF - Voltage Step]	0.002	0.1	0.001	%	It is the step length increased by the output voltage when V/F catch on flying start-up is set by the function number.
[U/f CoF - Current Limit]	1	1.5	0.5	%	It is the output current limit value when the V/F catch on flying start-up is set by the function number.
[U/f CoF - Time Constant]	30	100	1	s	The rotation speed searching speed when the V/F catch on flying start-up is set by this function number, the searching speed is defined as the deceleration time from the rated frequency to 0 Hz.

Rotation starting

Under the following setting, the drive performs the vector control rotation start-up of asynchronous motor:

- **[Motor type]** is set as **[Asynchronous motor]**
- **[Motor Control Law]** is set as **[Vector Control]**
- **[Motor Control Law]** is set as **[U/F Control]**, and **[U/f - Start Mode]** is set as **[Vector]**.

Precautions

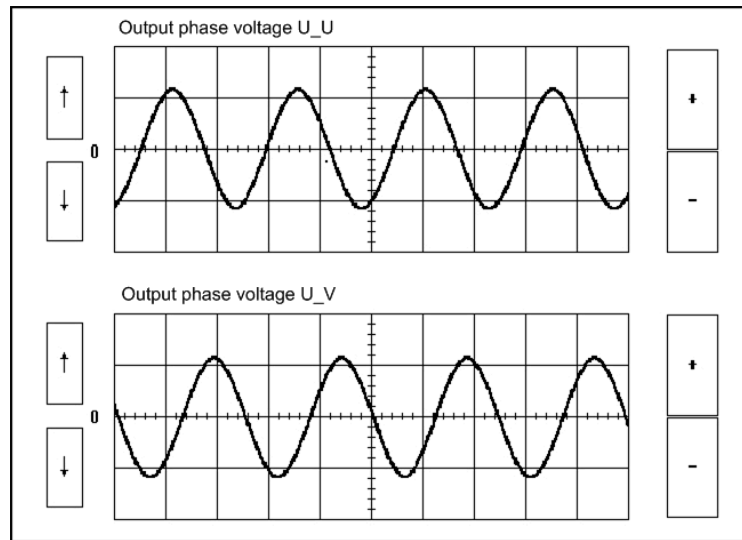
- The stator and rotor parameters of the asynchronous motor does not need to be set and checked the related parameters of vector control does not need to be set as well if **[Motor Control Law]** of the drives is set as **[U/F Control]** and **[U/f - Start Mode]** is set as **[Normal]**.

- If **[Motor Control Law]** of the drives is set as **[U/F Control]** and **[U/f - Start Mode]** is set as **[Vector]**, the motor rotation speed is calculated by using a motor parameter model in the vector control mode, and the operation is tracked. When **[Motor type]** is set as **[Asynchronous motor]** and, the line sequence of the output detection line is checked, and the parameters of stator and rotor of the asynchronous motor are correctly measured and set, the **[Vector]** setting can be used.

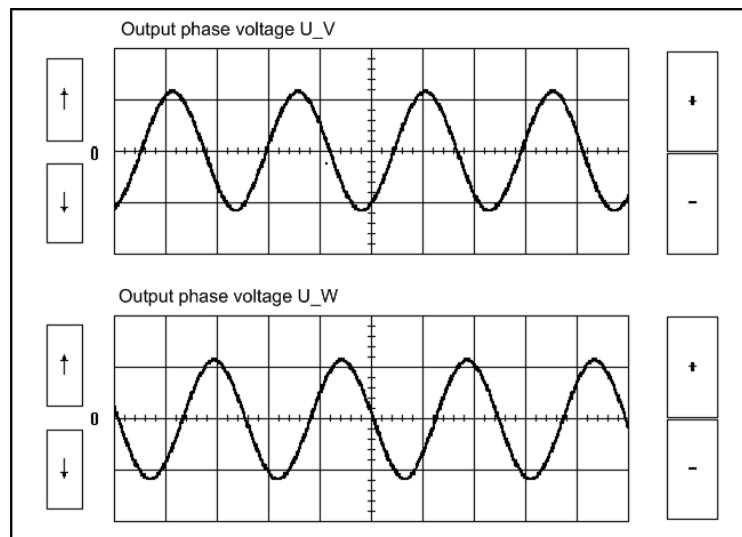
NOTE:

At present, under the situation that multiple motors are driven by one drive, **[Vector]** or **[Vector Control]** cannot be used, but only the drive control mode **[U/f - Start Mode]** to **[Normal]** can be adopted.

About how to judge the phase-lead and phase-lag of the two waveforms. Judge the phase relation between Waveform A and Waveform B: if the zero crossing point (ZCP) of Waveform B is located within the positive half cycle of Waveform A, we can say that Waveform B lags behind Waveform A. See the output voltage phase relation in Figures below.



The upper waveform is 120 degrees ahead of the lower waveform.



The upper waveform is 120 degrees ahead of the lower waveform.

For output phase voltages UU, UV and UW, the former is 120 degrees ahead of the later one.

Catch on flying start-up of synchronous motor

Condition judgment for catch on flying start-up of synchronous motor

When **[Motor type]** is set as **[Synchronous motor]**, the **[Motor Control Law]** is set as **[U/F Control]**, and **[U/f - Start Mode]** is set as **[Normal]**:

If DSP main control detects the voltage of the variable frequency output end of related to the motor is not 0, in spite of the stop time or the start frequency, synchronous motor catch on flying start-up is always performed.

If the voltage of the motor output end is detected as 0 by variable frequency, judge according to the stop time and the initial start frequency, and start.

Catch on flying start-up operation OF synchronous motor

In normal standby, the master controller provides given excitation current to the excitation cabinet according to the set parameter of the "catch on flying start-up excitation current". When being started, the drive PLC firstly provides excitation input signal to excitation cabinet, and transmits a start instruction to the drive master controller 1s after. Within 1s of previous excitation input, if the drive master controller detects that the voltage at the motor end is not 0, then it will start to perform "Catch on flying start-up operation of synchronous motor". If the voltage at motor end is 0, the drive master controller provides "normal operation excitation current" to start the synchronous motor.

When the drive performs the catch on flying start-up, after receiving the start instruction: it calculates the frequency, phase and amplitude according to the voltage at the motor end, outputs the instantaneous voltage accordant with them, the excitation current is set and output according to the parameter of "catch on flying start-up excitation current". The excitation current maintains the time set by the parameter of the "catch on flying start-up excitation time delay", in the period, the drive output voltage is increased gradually, after that the excitation is gradually increased to "normal operation excitation current" from the "catch on flying start-up excitation current" according to the set excitation current increase rate, and the motor is driven to operate in the given frequency. The excitation current increase rate is set by the "catch on flying start-up excitation increase rate", it refers to the time that the excitation current is increased to the rated excitation from 0. If the catch on flying start-up voltage tracking is already completed, the excitation can be automatically adjusted even if the excitation current is not increased to the "normal operation excitation current".

Low frequency oscillation suppression function

Function description

The motor can have mechanical resonance when operating at a certain frequency, the mechanical resonance can be avoided by using the function, and the function is only effective under **U/F Control**.

According to the low frequency oscillation suppression function, extracting pulsation component of the torque current through the detected three-phase output current and voltage angle, and through low-pass filtration, the cut-off frequency is **[Current Oscillation Filter]**. The torque pulsation component after filtering is multiplied with **[Current Oscillation Filter]**, which is taken as the compensation of the output voltage, the torque pulsation component will be reduced, and thus the oscillation suppression effect is achieved.

For related parameters below see **Settings Panel -> Advanced Settings -> VF Advanced**, page 134.

Related parameters

Related parameters of low frequency oscillation suppression function

Parameter name	Setting	Factory setting	Unit	Remarks
[Current Oscillation Damping]	[Enable] [Disable]	[Disable]	-	Under U/F Control , low frequency current oscillation suppression enables.
[Current Oscillation Filter]	0.2...10000	6.28	rad/s	Cut-off frequency of motor current first-order digital lowpass filter.
[Current Oscillation Coeff.]	0...20	0.05	-	In case of current oscillation suppression, compensation coefficient of output voltage.
[Current Oscillation Min f]	0...120	0.5	Hz	The lower hysteresis limit of the effective switching frequency of VF current oscillation compensation, when the operation frequency is smaller than the modified frequency, and current oscillation suppression is enabled, the current oscillation suppression function will be started.
[Current Oscillation Max f]	0...120	20	Hz	The upper hysteresis limit of the effective switching of VF current oscillation compensation, when the operation frequency is greater than the modified frequency, or current oscillation suppression is disabled, the current oscillation suppression function is invalid.

Stator voltage drop compensation

Function description

Under **U/F Control** mode and the low frequency operation state, the stator voltage drop shall not be neglected as the output voltage is relatively small. The start torque and the low frequency torque can be increased by the stator voltage drop compensation function, and the function is only valid under **U/ F Control** of asynchronous motor.

According to the stator voltage drop compensation function, by detecting the three-phase output current and voltage angle, the torque current component is obtained, multiplying the torque current component with stator resistance as output voltage compensation, along with the increase of the torque current component, the output voltage can be increased, and the start torque and the low frequency torque can be increased.

NOTE: the three-phase output voltage and output current shall be in corresponding phase sequence

Related parameters

Related parameters of stator voltage drop compensation function

Parameter name	Setting	Factory setting	Unit	Remarks
[Stator Voltage Compensation]	[Enable] [Disable]	[Disable]	-	The start torque and the low frequency torque can be increased by the stator voltage drop compensation function

Generator power limitation

Function description

Under **U/F Control** mode, in the deceleration process of the two- quadrant drive, the problem of power module over-voltage can happen when the set deceleration time is too short, the deceleration time can be adjusted by the function of generator power limitation to prevent the over-voltage error in the deceleration process, and the function is only valid under **U/F Control**.

According to the **[U/f Max Power Generator Mode]** in the deceleration process, generator power closed loop is enabled when it is detected that the output generator power is greater than the **[U/f Max Power Generator Mode]** in real time, and the generator power limitation can be achieved by prolonging the deceleration time.

Related parameters

For related parameters below **Settings Panel -> Advanced Settings -> VF Advanced**, page 134.

Related parameters of U/f Max Power Generator Mode function

Parameter name	Setting	Factory setting	Unit	Remarks
[U/f Max Power Generator Mode]	0...200000	0	kW	Set value of generator power limitation under U/F Control

Current limitation

Function description

Under **U/F Control mode**, for fan pump type load, the output current can be restricted by the current limitation in the acceleration operation or steady operation process, and the function is only valid under **U/F Control**.

According to the current limitation function, in the acceleration operation or steady operation process:

- when the output current is greater than the upper limit of the "hysteresis threshold", deceleration begins, and the light overload flag takes effect.
- when the output current is greater than the lower limit of "hysteresis threshold" and smaller than the upper limit of the "hysteresis threshold", keep the present rotation speed, and bring the light over-load flag into effect.
- when the light over-load mark is valid and the output current is smaller than the lower limit of the "hysteresis threshold", keep the present rotation speed, recover the normal operation after the time delay of **[Light Overload Protection]**, and start acceleration operation or keep the present rotation speed to operate stably.

According to the current limitation function, in the acceleration operation or steady operation process:

- when the output current is greater than **[Light Overload Protection] + [Light Overload Hysteresis]**, deceleration begins, and the light overload flag takes effect.
- when the output current is greater than **[Light Overload Protection] - [Light Overload Hysteresis]** and smaller than **[Light Overload Protection] + [Light Overload Hysteresis]**, keep the present rotation speed, and bring the light over-load flag into effect.

- when the light over-load mark is valid and the output current is smaller than **[Light Overload Protection] - [Light Overload Hysteresis]**, keep the present rotation speed, recover the normal operation after the time delay of **[Light Overload Protection]**, and start acceleration operation or keep the present rotation speed to operate stably.

Related parameters

Related parameters of current limitation

Parameter name	Description	Unit
[Light Overload Protection]	In the acceleration operation or steady operation process, when the output current is greater than [Light over-load current ratio], the light over-load flag is valid.	% rated motor current
[Light Overload Filter Const]	Cut-off frequency of motor current first-order digital low- pass filter.	rad/s
[Light Overload Hysteresis]	Light over-load function is in a hysteresis mode, when the output current is greater than [Light Overload Protection] - [Light Overload Hysteresis]; when the output is smaller than [Light Overload Protection] + [Light Overload Hysteresis], normal operation is recovered; or else it will keep the present rotation speed to operate.	% rated motor current
[Light overload recovery time]	When the output current is smaller than [Light Overload Protection] + [Light Overload Hysteresis], light overload is relieved, and normal operation is recovered.	s

Vector control switch to U/F control mode

Function description

Under **U/F Control** mode, start up till switching frequency point under the **vector control** mode, and then switch to operate under **U/F Control** mode. During start-up using vector control, the starting torque and lowspeed load-bearing capability can be increased, and current oscillation caused by mechanical resonance can be avoided, and the function is applicable to soft start and the like.

Condition of start-up using vector control: the **[Motor Control Law]** is set as **[U/F Control]**, and the **[U/f - Start Mode]** is set as **[Vector]**.

U/F control vector start function logic can be static starting and catch on flying start-up as follows:

- Catch on flying start-up

When the motor is in the free rotation state and the rotation speed is greater than the **[U/f-Start Mode-Freq Point]**, perform catch on flying start-up under the vector control mode to the present rotation speed, and operate at the present rotation speed. After the time delay of the **[U/f-Start-Mod.Stabilize-Time]**, switch the vector control mode to U/F control mode, and perform speed adjustment control according to the [Frequency Reference] and U/F curve. When the motor is in the free rotation state and the rotation speed is smaller than the **[U/f-Start Mode-Freq Point]**, there are two situations according to [Frequency Reference] and **[U/f-Start Mode-Freq Point]**:

- When **[Frequency Reference]** is greater than the **[U/f-Start Mode-Freq Point]**, perform catch on flying start-up under the vector control mode, operate to **[U/f-Start Mode-Freq Point]**, after the time delay of **[U/f-Start-Mod.Stabilize-Time]**, switch to the U/F control mode, and subsequently perform speed adjustment control according to [Frequency Reference] and U/F curve.
- When **[Frequency Reference]** is smaller than **[U/f-Start Mode-Freq Point]**, perform catch on flying start-up under the vector control mode, operate to **[Frequency Reference]**, and operate under the vector control mode. On the basis, if the modified **[Frequency Reference]** is greater than the **[U/f-Start Mode-Freq Point]**, perform the same process.

- Static starting

When the motor is in the static state, there are two situations according to **[Frequency Reference]** and **[U/f-Start Mode-Freq Point]**:

- When the **[Frequency Reference]** is greater than **[U/f-Start Mode-Freq Point]**, start under the vector control mode, operate to **[U/f-Start Mode-Freq Point]**, after the time delay of **[U/f-Start-Mod.Stabilize-Time]**, switch to the U/F control mode, and further perform speed adjustment control according to **[Frequency Reference]** and U/F curve.
- When **[Frequency Reference]** is smaller than **[U/f-Start Mode-Freq Point]**, start under the vector control mode, operate to **[Frequency Reference]**, and operate under the vector control mode. On the basis, if the modified **[Frequency Reference]** is greater than the **[U/f-Start Mode-Freq Point]**, perform the same process.

Related parameters

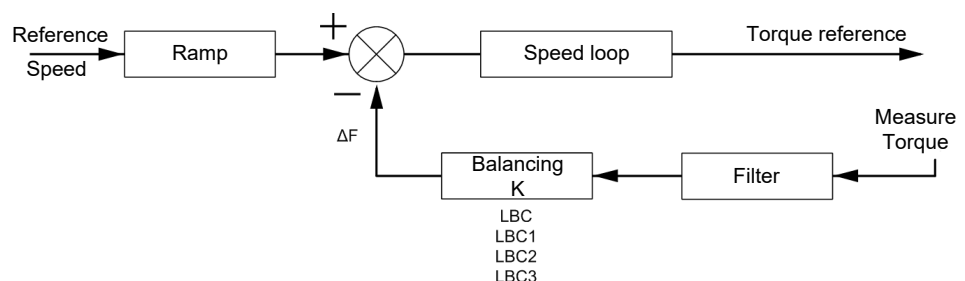
Related parameters of current limitation

Parameter name	Description	Unit
[U/f - Start Mode]	Under U/F control mode, there are two starting modes of [Normal] and [Vector] .	-
[U/f-Start Mode-Freq Point]	Frequency point that Vector Control mode is switched into U/F control mode.	Hz
[U/f-Start-Mod.Stabilize-Time]	Start to the switching frequency point under the Vector Control mode, after the time delay of [U/f-Start-Mod.Stabilize-Time] , switch into the U/F control mode.	s
[Frequency reference]	Reference frequency of drive, available on the Toolbar , page 35.	Hz

Droop control

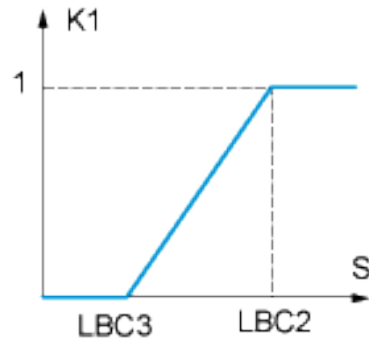
Function description

Conveyor system which is driven by multiple motors and controlled by VFD is usually facing the problem of individual drive over voltage or over current error. And losing synchronization is usually the reason causing these errors. The idea of speed droop control is to use the drive output torque as the control factor, adding an offset to the frequency set point. Usually the over voltage error occurs because the motor is driven by other drive and it is running at generator mode. In this case the output of other motor will increase a lot. Droop control will automatically reduce the frequency set point based on the output torque of drive, so the load distribution could be balanced internal inside the conveyor system. All drives do not require having internal communication or connection. Only to make sure the drives in the system are configured by the same parameter and received the start command at the same time. The schematic of load sharing - droop control is shown as following.

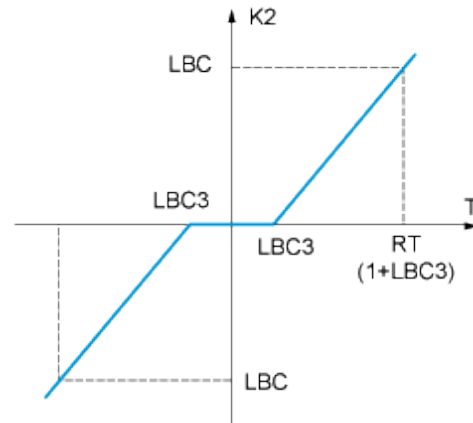


In above figure, LBC is the **[Load Sharing Correction Freq]**, LBC1 is the **[Load Sharing Start f Factor]**, LBC2 is the **[Load Sharing End f Factor]**, LBC3 is the **[Load Sharing Start Torque]**, and Filter is a low pass filter with cut-off frequency **[Load Sharing Torque Filter]**.

$\Delta f = K * LPF(\text{Measure Torque})$. The meaning of LPF (Measure Reference) is the Measure Torque filtered by a low pass filter. $K = K1 * K2$, K1 and K2 calculation are shown in following figures.



S: Speed



T: Torque

RT: Rated Torque

Related parameters

Related parameters of droop control.

Parameter name	Factory setting	Description	Unit
[Load Sharing]	[Disable]	Power balance function enable.	-
[Load Sharing Correction Freq]	1	Maximum value limit of correction speed	Hz
[Load Sharing Start f Factor]	0	Effective minimum motor rotation speed of Droop control	Hz
[Load Sharing End f Factor]	6	Effective maximum motor rotation speed of Droop control	Hz
[Load Sharing Start Torque]	5	Effective minimum load torque of Droop control	% Rated Torque
[Load Sharing Torque Filter]	10	Cut-off frequency of torque feedback estimation value lowpass filter	rad/s

Droop Control Commissioning Steps

Precondition of Speed Droop Control

Step	Action
1	U/F Control mode commissioning should be done before speed droop control commissioning.
2	Compatibility of HMI software and master controller software should be confirmed.
3	The U/F Control mode should provide sufficient starting torque to the conveyor system.
4	Motor auto-tuning should be done successfully, and establish correct motor model.
5	All drives in the conveyor system should receive the start/stop command at the same time and should be configured as the same speed ramp setting.
6	Motor Control Law should be set as vector control, and motor individual vector control commissioning should be done correctly.

HMI parameter setting

Step	Action
1	Set droop control parameter as motor information.

Motor Individual Droop Control Test

Step	Action
1	Activate droop function and start the drive with load, observe the actual running frequency, there should be a speed offset.
2	Test the same at all drives in the system, and droop function should work correctly at all drives.

System Droop Function Test

Step	Action
1	Make sure all drives in the system receive start command at the same time and with the same speed ramp setting.
2	Run the system with all drives and observe the performance of droop function.

Drop Restart

Function description

The drop restart refers to that the drive can be automatically restarted after high voltage drop of the drive and the high voltage is recovered immediately. The effective voltage value of the input line is smaller than the effective minimum input line voltage (0.6 times of rated effective input line voltage), it is judged as system drop.

If the drop time is shorter than the **[Auto-Restart Timeout]**, the **[Auto-Restart Delay Time]** is delayed after high voltage power-on of the drive, and the drive is restarted automatically.

If the set motor's complete stopping time is longer than the drop time, the drive is restarted and catch on flying start-up is performed; if the set motor's complete stopping time is shorter than the drop time, the drive is restarted and normal starting is performed.

If the drop time is longer than the allowable drop time, the **[Auto-Restart Delay Time]** is delayed after high voltage power-on of the drive, and the drive enters into the standby state and cannot be restarted automatically.

Generally, the **[Power On Self Diagnosis Time]** is longer than the **[Auto-Restart Delay Time]**, and the main purpose is to ensure that the bus capacitor can be fully charged after power on.

Related parameters

Related parameter setting of drop restart

Parameter name	Meaning	Unit
[Power On Self Diagnosis Time]	After drive input high voltage power-on, system self-check is delayed.	Generally it can be default
[Auto-Restart Timeout]	After drive input high voltage drop, within the set time, when the high voltage is recovered, the drive is in the operation state before high voltage drop, [Motor Control Law] is set as [Vector control] , or [U/f - Start Mode] is set as [Vector] , the drive automatically recognizes the motor rotation speed, and recover operation. If the drive is in the standby state before high voltage drop, or the set time is exceeded, the drive enters into the standby state.	
[Auto-Restart Delay Time]	The time delay for waiting the system to be stable from high voltage drop to recovery till the drive recovers to operate.	

Synchronous Motor Automatic excitation

Function description

When the **[Motor Type]** is set to **[Synchronous motor]**, the automatic excitation function is used, by automatically adjusting the excitation current, the output power factor is kept within the set threshold.

According to the automatic excitation function, when the output power factor exceeds **[U/f Power Factor Setpoint] ± [U/f PF Regulation Thresh 2]**, take **[U/f Auto-Excitation Step 2]** as the step length to adjust the excitation current; when the output power factor exceeds **[U/f Power Factor Setpoint] ± [U/f PF Regulation Thresh 1]**, take **[U/f Auto-Excitation Step 1]** as the step length to adjust the excitation current; when the output power factor is kept within the **[U/f Power Factor Setpoint] ± [U/f PF Regulation Thresh 1]**, the excitation current will not be adjusted.

The automatic excitation function supports analog output excitation adjustment and switch excitation adjustment, and the cycle of the excitation adjustment is related to the parameter **[Excit Curr Ramp Time]** and **[Excit Curr Ramp Pause Time]**. In the analog output excitation adjustment mode, the shortest interval of the two excitation adjustments is **[Excit Curr Ramp Time] + [Excit Curr Ramp Pause Time]**; in the switch excitation adjustment mode, within the **[Excit Curr Ramp Time]**, keep the excitation switching state and clear the excitation switching state till the **[Excit Curr Ramp Time] + [Excit Curr Ramp Pause Time]**.

Related parameters

Related parameters of synchronous motor automatic excitation

Parameter name	Meaning	Unit
[Excit Curr Ramp Time]	Excitation adjustment time takes [Excit Curr Ramp Time] + [Excit Curr Ramp Pause Time] as cycle.	s
[Excit Curr Ramp Pause Time]	Excitation adjustment time takes [Excit Curr Ramp Time] + [Excit Curr Ramp Pause Time] as cycle.	s
[Min. Excitation Current]	Minimum excitation limit. Rated excitation	Rated excitation
[Max. Excitation Current]	Minimum excitation limit. Rated excitation	Rated excitation
[Pre-start Excit Current]	Excitation current in system standby mode.	Rated excitation

Related parameters of automatic excitation under U/F control mode

Parameter name	Meaning	Unit
[U/f Auto-Excit Regulation]	Under the U/F control mode, the automatic excitation function is enabled.	-
[U/f Auto-Excit Start Freq]	Only when the operation frequency is greater than the excitation adjustment frequency, the automatic excitation function is enabled.	Hz
[U/f Power Factor Setpoint]	Perform automatic excitation adjustment, and output power factor target value.	-
[U/f PF Regulation Thresh 1]	When the output power factor exceeds [U/f Power Factor Setpoint] ± [U/f PF Regulation Thresh 1] , take [U/f Auto-Excitation Step 1] as the step length, and adjust excitation current;	-
[U/f Auto-Excitation Step 1]	When the output power factor exceeds [U/f Power Factor Setpoint] ± [U/f PF Regulation Thresh 1] , take [U/f Auto-Excitation Step 1] as the step length, and adjust excitation current	Rated excitation
[U/f PF Regulation Thresh 2]	When output power factor exceeds [U/f Power Factor Setpoint]± [U/f PF Regulation Thresh 2] , take [U/f Auto-Excitation Step 2] as the step length, and adjust excitation current.	-
[U/f Auto-Excitation Step 2]	When output power factor exceeds [U/f Power Factor Setpoint]± [U/f PF Regulation Thresh 2] , take [U/f Auto-Excitation Step 2] as the step length, and adjust excitation current.	Rated excitation
[U/f Manual Excit Current]	The exciting current value when the motor normal operation under U/F control.	Rated excitation

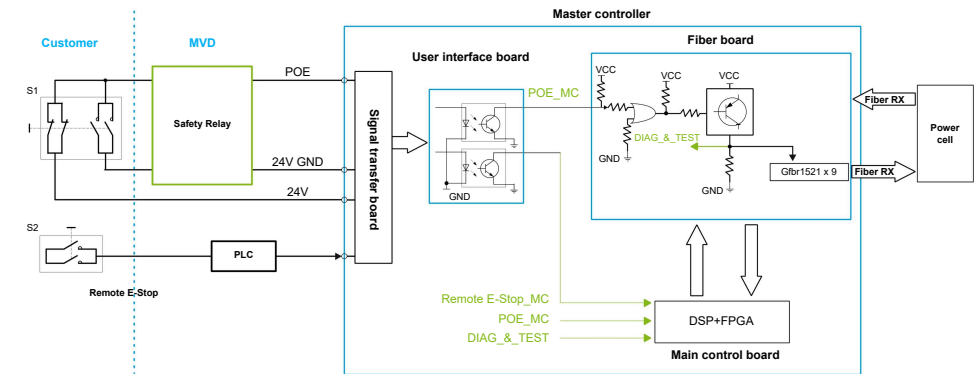
Related parameters of automatic excitation under vector control mode

Parameter name	Meaning	Unit
[VC Auto-Excitation]	Under the vector control mode, the automatic excitation function is enabled.	-
[VC Auto Excit Start Freq]	Only when the operation frequency is greater than the excitation adjustment frequency, the automatic excitation function can be enabled.	Hz
[VC Power Factor Setpoint]	Perform automatic excitation adjustment, and output power factor target value.	-
[VC PF Regulation Thresh 1]	When the output power factor exceeds [VC Power Factor Setpoint] ± [VC PF Regulation Thresh 1] , take [VC Auto-Excitation Step 1] as the step length, and adjust excitation current.	-
[VC Auto-Excitation Step 1]	When the output power factor exceeds [VC Power Factor Setpoint] ± [VC PF Regulation Thresh 1] , take [VC Auto-Excitation Step 1] as the step length, and adjust excitation current.	Rated excitation
[VC PF Regulation Thresh 2]	When the output power factor exceeds [VC Power Factor Setpoint]± [VC PF Regulation Thresh 2] , take [VC Auto-Excitation Step 2] as the step length, and adjust excitation current.	-
[VC Auto-Excitation Step 2]	When the output power factor exceeds [VC Power Factor Setpoint]± [VC PF Regulation Thresh 2] , take [VC Auto-Excitation Step 2] as the step length, and adjust excitation current.	Rated excitation
[VC Auto-Excit Min Current]	The exciting current value when the motor normal operation under Vector control	Rated excitation

POE function

Function description

No matter there is high voltage at the drive input or not, the drive output pulse can be immediately blocked as long as POE signal is valid (low level), the interface reads the POE state and transmits an emergent stop command to PLC, if the detected output voltage is 0, the interface displays **Output blocked**; or else the interface displays **Output blocking is in process**. To ensure safety of the drive output, the user can operate the drive output device only when the interface displays Output blocked, and the POE logic function is as shown in figure below. In order to ensure the MVD drive output safety, no matter main circuit breaker open or close, the MVD drive's output will be locked if the POE is activated.



S1 is used to activate the POE function, which is hardware (HW) loop2 to achieve freewheel stop. Push state (POE button S1 is pushed) is to activate POE function. The POE button S1 is NC type.

S2 is remote emergency stop switch, which is the HW loop1 to achieve freewheel stop.

Feedback signal - DIAG_&_TEST: indicates the POE state. If it is high, the POE is deactivated. Otherwise, POE is activated. POE_MC is the signal which is directly detected by DSP.

If the POE activation, the power supply of the sending fibers in fiber boards have been shut off. And when the fiber sending driver's power off, the Power Cell will be protected by itself.

Hardware truth table

High	High	Enable
POE input	Feedback signal	Fiber output
Low	Low	Disable
No signal input	Low	Disable

Software Design

The input over-voltage and under-voltage protections of the drive system are developed to ensure the Power Cell safety when POE has been activated.

The motor residual voltage detection is developed to ensure that the feedback signal can be more reliable.

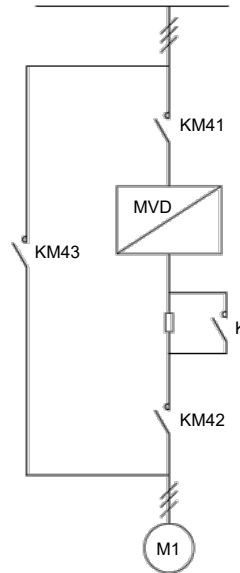
When DSP detects the XPD7 (POE_MC), master controller will shut off the all PWM outputs.

If the state of the XPD7 (POE_MC) signal and Diag_&_TEST is non-correspondence, the main circuit breaker of the drive will be opened.

POE function takes priority over any run command.

Synchronous switching debugging description

As synchronous switching device of soft starter, the drive can check the voltages and phases of the motor and the grid during switching, when they are strictly consistent, the motor power will be supplied by the grid and the drive at the same time, and subsequently the drive is withdrawn. In this way, the whole start process has no current impact, and it is the most ideal start mode. When the user's motor needs to be switched to variable frequency from working frequency, power can be supplied from the drive and the working frequency at the same time, the working frequency is cut off subsequently, and the drive operates independently to adjust the speed. Then the situation of motor power breakdown can be avoided, and load disturbance can be prevented. The main circuit diagram of synchronous switching is as shown in figure below.



Main circuit diagram of synchronous switching

Logic of master controller DSP

Step	Action
1	Synchronous switching instruction is level triggered, it is valid at low level inside the master controller, and is valid at high level when being input to the port of the master controller box. The synchronous switching instruction input to the master controller box is valid at constant high level (digital input).
2	In standby or no synchronous switching instruction, the synchronization coefficient, synchronization angle and synchronization enabling flag set by the interface are taken; when synchronous switching is performed, synchronization coefficient, synchronization angle and excitation current of light load or heavy load shall be taken according to the present state.
3	After variable frequency is started, the user transmits the switching instruction, then the given frequency of the drive is automatically set as 50 Hz. NOTE: The drive cannot be directly started by the switching instruction, and if necessary, it can be started by PLC (see switching working frequency to variable frequency).
4	In the operation state, the output voltage ability of the drive is higher than the input voltage ability, then synchronous switching function is enabled, the synchronous switching flag is set as 1, and the master controller can automatically enable synchronization.
5	Judge the switching direction. If the drive is in the operation state and the operation frequency is greater than 5 Hz, the detected output current of the drive is 8 % greater than the rated current, then it is judged as switching from variable frequency to working frequency, or else judged as switching from working frequency to variable frequency.

6	The master controller executes output synchronization. If the synchronization phase-locked timer counting exceeds 30 s, and the synchronization angle and amplitude of the output voltage are within the error range, a switch-on instruction is transmitted; or else the switching operation will not be performed if there is no switchon instruction, and the switching operation will be continued if the switch-on instruction is already executed.
7	After the switch-on instruction is transmitted and the time delay exceeds 0.5 s, the drive switch-on state and the working frequency switch-on state are set as 1 at the same time. In combined operation of working frequency and variable frequency, heavy load parameter is switched into light load parameter in case of switching from variable frequency to working frequency, and in case of switching from working frequency to variable frequency, light load parameter is switched into heavy load parameter.

PLC logic description

PLC logic of switching from variable frequency to working frequency	
Step	Action
1	After PLC receives the switching instruction from the user, when the operation frequency of the drive is higher than 49 Hz, and the KM42 is in the switch-on state and the KM43 is in the switch-off state, the switching instruction from the user is effective, and PLC transmits the synchronous switching request to the master controller.
2	After the master controller transmits the switch-on permission, PLC judges that if the KM43 is in the switch-off state, and there is no KM43 switch-off instruction, PLC transmits the KM43 switch-on instruction, and it is confirmed that KM43 is switched on 0.5 s after the PLC switch-on confirmation time.
3	When the PLC confirms that KM43 is in the switch-on state or there is KM42 switch-off instruction, PLC transmits the emergent stop instruction to the master controller, and then the drive stops emergently.
4	When the PLC reads that the drive is not in the operation state (the confirmation time is about 1 s), and KM43 is in the switch-on state or there is KM42 switch-off instruction, then KM42 switch-off is performed.
5	PLC confirms KM43 is already switched on and KM42 is switched off, then KM41 is switched off. The process of switching from variable frequency to working frequency is completed.

PLC logic of switching from working frequency to variable frequency	
Step	Action
1	PLC receives the switching instruction from the user, the system is in the standby state, KM43 is in the switchon state, KM41 is in the switch-on state, KM42 is in the switch-off state, and then the user's instruction of the switching from working frequency to variable frequency gets valid.
2	The user's switching instruction is effective, after the standby time delay of 8 s, PLC detects that the drive enters into the standby state, and starts the drive and transmits the synchronous switching request to the master controller.
3	After the master controller transmits the switch-on permission, and there is no KM42 switch-off instruction, no heavy error latch bit or no emergent main power supply cutoff, PLC transmits the KM42 switch-on instruction.
4	PLC confirms KM42 is switched on (the switch-on confirmation time is 0.5 s), or there is KM43 switch-off instruction, PLC transmits the KM43 switch-off instruction. The process of switching from working frequency to variable frequency is completed.

Special PLC logic

According to on-site user requirements, the electric reactor can be always serially connected with the output end of the drive or is serially connected only in switching.

When the electric reactor is serially connected only in switching, PLC shall be specially processed:

Switching from variable frequency to working frequency: after the master controller receives the synchronous switching request, the flag bit is set; the drive stops emergently after time delay of 2 s, KM41 and KM42 are not switched off, K is switched off, and the electric reactor is serially connected; and the drive starts after the standby time delay of 6 s. After the synchronous switching request of the user is withdrawn, K is switched on, and the electric reactor is bypassed.

Switching from working frequency to variable frequency: after the synchronous switching request is received, the flag bit is set; KM43 is not switched off, K is switched off, and the electric reactor is serially connected; KM1 is switched on; after drive standby, PLC starts the drive after the time delay of 6 s, and the electric reactor is bypassed through the catch on flying start-up function of the drive.

After the PLC transmits the synchronous switching request, if the output frequency is greater than or equal to 49.5 Hz, and the master controller box does not transmit the synchronous switching permission within 60 s, the master controller box phase lock does not succeed, and PLC cancels the synchronous switching request and transmits the synchronous switching request again after the time delay of 40 ms. If the process lasts for more than 10 min, PLC cancels the synchronous switching request, the switching is not successful, and synchronous switching can be executed only the synchronous switching request is input to the PLC again.

Excitation control of synchronous motor switching

The excitation cabinet has two control modes of local control and remote control, and PLC and the excitation cabinet select the modes through the switching node.

Local control mode: generally, the excitation cabinet has three control modes, i.e. constant voltage, constant current and constant power factor, in case of constant power factor mode, the excitation cabinet needs to acquire the voltage and current of the working frequency of the input side so as to calculate the power factor.

Remote control mode: the drive controls the excitation intensity of the excitation cabinet in analog giving or digital giving mode, if the excitation cabinet is in opened-loop control, the voltage of the excitation cabinet is controlled to be constant; if the excitation cabinet is in closed-loop control, and the current of the excitation cabinet is controlled to be constant. Synchronous switching excitation control is as shown in the figure below (Switching excitation control).

Switching from variable frequency to working frequency: the excitation cabinet is in the remote control mode firstly, in the Step 3 of PLC logic of switching from variable frequency to working frequency, i.e. when the drive stops emergently, PLC switches control of excitation cabinet into local control mode.

Switching from working frequency to variable frequency: the excitation cabinet is in the local control mode firstly, in the Step 4 of PLC logic of switching from working frequency to variable frequency, i.e. the moment that PLC switches off KM43, PLC switches control of the excitation cabinet into the remote control mode.

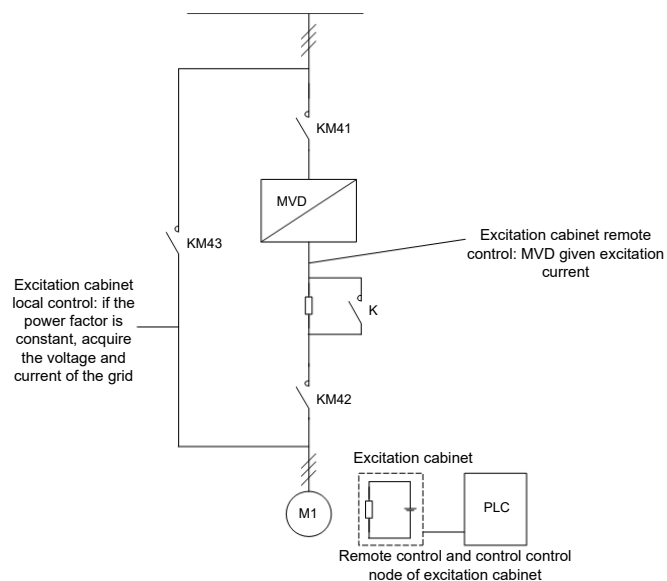


Figure: Switching excitation control

Control System Commissioning

Preparation Before Commissioning

⚠️⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Safety Information** chapter before performing any procedure in this chapter.

Failure to follow these instructions will result in death or serious injury.

Verify control wires before supplying power to control system, and make medium voltage switch to test position before turning power-on.

Control Power Supply

Step	Action
1	Verify the quantity of control power, the voltage, capacity, and its reliability as per "technical protocol". Anode/cathode must be verified for DC control power.
2	Insert plug of UPS to socket and make sure that there is no short circuit, close AC control power switch, HMI power switch in turn, close UPS output switch
3	After supplying power to control system, PLC, HMI, main controller, and fan of main controller box should work normally.

Parameter Settings

Check set-up of transformer temperature protection

Step	Action
1	Enter interface Settings Panel -> PLC Parameter -> PLC Parameter Control and verify the following parameters.
2	[Transformer Thermal Warning] is set to 95 °C
3	[Transformer Thermal Error] is set to 110 °C.

Basic Parameter set-up

Step	Action
1	Enter interface Settings Panel -> Speed Parameter -> Basic Parameter and verify the following parameters:
2	[Starting Frequency] is set to 0.5 Hz
3	[Minimum Frequency] is set to 0.5 Hz
4	[Maximum Frequency] is set to 50 Hz (depending on nominal frequency of the motor)
5	[U/f - Reference Voltage] is set to 6000 V (in line with input voltage)
6	[U/f - Reference Frequency] is set to 50 Hz (in line with motor's rated frequency)
7	[Torque Boost [%] of Unom] is set to 0 (5%)
8	[Skip Frequency 1 Lower Limit] , [Skip Frequency 1 Upper Limit] , [Skip Frequency 2 Lower Limit] and [Skip Frequency 2 Upper Limit] are set to 0 Hz.

Speed ramp set-up

Step	Action
1	This function must be combined with site status and make good use of acceleration time and deceleration time.

Control parameter set-up

Step	Action
1	Enter interface Settings Panel -> Control Parameter -> Control Parameter and verify the following parameters:
2	[Max. PoC Bypass Nb] is set to 0.
3	[PWM Regulation Coefficient] keeps default setting value to 1.
4	[Simulation Mode] is set to [Disable] .
5	[Overcurrent Threshold] is 1130 A, 2 times that of the rated motor peak current, in A.

Nominal value

Step	Action
1	Enter interface Settings Panel -> Motor/Drive Data -> Nominal value :
2	Write motor parameters according to the motor nameplate.
3	Write ATV6100 parameters according to the drive nameplate.

Function Parameter

Step	Action
1	Enter interface Settings Panel -> System tool -> Function :
2	Set [f-ref] , It can be selected as [Analog] or [HMI] according to the site status.
3	[Upper PC control] is set to [Disabled] , set [Enable] when there is an upper PC provided.
4	[System bypass setting] is [Disabled] , it can be [Enabled] when an automatic bypass cabinet is provided.

Analog Measuring Range

Analog value input set-up

Step	Action
1	Enter interface Settings Panel -> System tool -> PLC AI:
2	Select CH1-Signal. Ref to Current Source.
3	[Source Range] is 4...20 mA,
4	[Scale Range] 0...10 Hz,
5	Min Ref. Frequency is 0.5 Hz,
6	Max Ref. Frequency is 50 Hz (60 Hz),
7	Min Input Value is -1 mA.
8	CH2-PID Feedback to current source.
9	[Source Range] is 4...20 mA.
10	[Scale Range] is 0-sensor maximal measuring range.
11	Min Input Value is -1 mA.

Analog output set-up

Step	Action
1	Enter interface Settings Panel -> System tool -> PLC AO :
2	Select [Output Channel0] on the [Channel] .
3	Select [Running Frequency] on the [Output Data] .
4	Set the [Type of Source] to [Current Source] .
5	[Source Range] is set to 4...20 mA
6	[Scale Range] is set from 0 to the motor's rated speed.
7	Select [Output Channel1] on the [Channel] .
8	Select [Output current] on the [Output Data] .
9	Set the [Type of Source] to [Current Source] .
10	[Source Range] is set to 4...20 mA
11	[Scale Range] is set from 0 to the motor's rated current.
12	If the ATV6100 is in [Vector Control] , page 95 mode, other parameters must be set.

Control System Commissioning

Step	Action
1	After supplying power to the control system, HMI enters the main interface automatically. Main interface displays Master Controller Ready... and Mains voltage not ready , no other status displayed.
2	Turn the Panel/Remote Control switch to Remote Control mode , remote mode is displayed on the HMI.
3	Turn the Panel/Remote Control switch to Panel Control mode , remote mode signal disappear, local mode will be displayed on HMI.
4	Open power cell cabinet door or transformer cabinet door. HMI displays door not closed alert or produces flashing and sound. Indicator of door interlock signal is on.
5	Close the door, door not closed information will disappear on interface and site control system
6	Switch Off the control power supply. Alertor produces flashing and sound, HMI displays Control power abnormal alarm and Alarm .
7	Switch On the control power supply. Alarm message on HMI disappears.
8	If the ATV6100 supplied with a single power source, personnel must undertake a power source switch commissioning for a single power source: 1. Switch Off AC power supply, HMI displays Control power abnormal alarm ; 2. Switch On AC power supply, the Control power abnormal alarm message will disappear.
9	Turn the Panel/Remote Control switch to Remote Control mode , remote mode is displayed on the HMI. Turn the Panel/Remote Control switch to Panel Local mode , remote mode signal disappear, Panel mode will be displayed on HMI.

Commissioning with Simulation Medium Voltage

Step	Action
1	Enter interface Settings Panel → Control Parameter → Control Parameter .
2	Change [Simulation Mode] to [Enable] , commissioning with simulation medium voltage. HMI displays System ready .
3	Turn the Panel/Remote Control switch to Panel Control mode .

Step	Action
4	Enter interface System Tool → Function .
5	Set [f-ref] to [Display] .
6	Set [PID Mode] to [Not Active] . There are Panel Mode , Not Active , and HMI on the main Panel, Start button is valid.
7	Click and set Frequency Reference on the main interface to 30 HZ.
8	Click Start button, System ready changes to Running status. ATV6100 starts to run in simulation status. Observe running frequency increasing as per the acceleration time setting, at this time, ATV6100 Motor speed signal must act accordingly. Set reference frequency to 50 Hz, output frequency must follow.
9	Click Stop button, Running changes to Stopping status. Observe running frequency decrease to 0 according to deceleration time. Stopping changes to System ready status.
10	Turn the Panel/Remote Control switch to Remote Control mode . Enter interface System Tool → Function . Set [f-ref] to [Analog] , set [PID Mode] to [Not Active] . There are Remote Mode, Open Loop, Analog on main interface.
11	Set output frequency (such as 30 Hz) by analog signal. HMI displays 30 Hz on Frequency Reference . Send remote start command, ATV6100 starts to run in simulation status. System ready changes to Running status. Observe the output frequency (Motor Fre on the interface), it must increase or decrease according to actual speed ramp settings, at this time. Motor speed must act accordingly. Set Frequency Reference to 50 Hz, output frequency must follow. Send remote stop command, observe output frequency decline to 0 according to deceleration time. HMI displays system ready. Running changes to System ready , Motor speed displays 0.
12	After commissioning, enter Settings Panel → Control Parameter → Control Parameter , change [Simulation Mode] to [Disable] .

NOTICE

UNEXPECTED EQUIPMENT OPERATION

If **[Simulation Mode]** parameter is not changed to **[Disable]** after simulation test, there will be no output voltage after power-on.

Failure to follow these instructions can result in equipment damage.

Interlock with Upstream Breaker

Step	Action
1	Make upstream breaker on test position. Press Mains Voltage OFF button on the door, send close command from Distributed Control System (DCS) to upstream breaker and it cannot be closed.
2	Release Mains Voltage OFF button, send the close command to upstream breaker and then it can be closed. Press Mains Voltage OFF button on door and upstream breaker will trip off.
3	When the upstream breaker is closed, the electromagnetic lock of bypass cabinet (optional) will be without power, personnel will be unable to operate isolator switch. When the upstream breaker is open, the electromagnetic lock of the bypass cabinet is powered up and personnel can operate isolator switch.

Commissioning with Medium Voltage

Inspection Before Supplying Medium Voltage

Step	Action
1	Before supplying make sure that power cables connecting is correct (input and output cable are not reversed) <ul style="list-style-type: none"> • Check validity of interlock with upstream breaker • Confirm upstream breaker, cable, withstand voltage of dry transformer are qualified [System bypass setting] must be set to [Disable] temporarily for ATV6100 with auto bypass cabinet (optional, purchase separately)
2	Confirm that the grid voltage level, frequency, and fluctuation are meet requirements.
3	Check that there are no missing items remaining inside the cabinet such as tools, wires and so on. Then lock the cabinet doors.
4	Supply control power to ATV6100.

Testing with Medium Voltage

Step	Action
1	Switch off the ATV6100 output when running a medium voltage test. Set the upstream breaker to the working position. After preparation, close the fan switches on the top of transformer & power cell cabinet in turn, then close the upstream breaker.

⚠ WARNING

INCOMPATIBLE LINE VOLTAGE

Ensure that the mains voltage corresponds to the input voltage of the ATV6100 before switching on the product

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Step	Action
2	After supplying medium voltage, power-on indicator on bypass cabinet (optional) must be illuminated. Check that the red and green indicators of the power cells must be illuminated from observation window
3	Confirm that the fans are operating correctly and that the fan rotation direction is correct.
4	After testing, click stop button on HMI.
5	After the output frequency has dropped to 0, switch off medium voltage and set it to the test position.
6	Close the exit isolator switch QS2 (contactor KM2) in the bypass cabinet, and then resupply medium voltage again.
7	Turn the Panel/Remote Control switch to Remote Control mode, set [f-ref] to [Analog] mode in interface, set frequency command and start ATV6100. Observe whether motor works normally (such as direction of rotation, temperature rise, vibration). Once tested, stop ATV6100 and switch off upstream breaker.

Running with Load Connected

When running the drive system with a load, it is necessary to observe the output current on HMI and also to check the feedback on the site control system. Check that the values on both are the same and if these are not the consistency of the measuring range.

Procedure

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Parameter Debugging for Vector Control

ATV6100 Asynchronous Motor

Preliminary Recommendations

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Safety Information** chapter before performing any procedure in this chapter.

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Debugging steps for asynchronous motor VVVF control

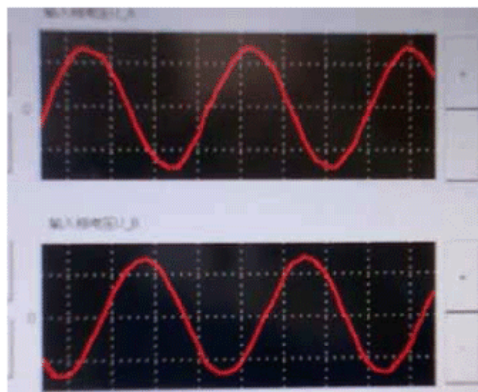
Operation	Remarks
1. Fully install monitoring software for HMI	
2. Check wiring	
3. Logically debug without high voltage	
4. Set setting coefficient of voltage and current samplings	<p>According to divider resistance values, fill in input current transformer (CT) model, output current hall model, and sampling resistance calculation setting coefficient into the corresponding columns in the table Settings Panel → Advanced Settings → Sampling Scalar.</p> <p>The Sampling parameter setting formula are shown as following.</p> <p>$I_a \text{ scaler} = I_b \text{ scaler} = KCT.$</p> <p>$U_{ab} \text{ scaler} = U_{bc} \text{ scaler} = (R_L + R_{Hinput}) / R_L.$</p> <p>$I_u \text{ scaler} = I_v \text{ scaler} = - K_{Hall} / R_{Load}.$</p> <p>$U_{uv} \text{ scaler} = U_{vw} \text{ scaler} = - (R_L + R_{Houtput}) / R_L.$</p> <p>Where KCT is the input current transformer conversion ratio; $R_L = 5 \text{ kohm}$; R_{Hinput} is high voltage resistance on input voltage divider board; K_{Hall} is the attenuation ratio of current hall; R_{Load} is the Hall load resistance; $R_{Houtput}$ is high voltage resistance on output voltage divider board.</p> <p>NOTE:</p> <ul style="list-style-type: none"> The drives with different voltage and power have different sampling scalars. Settings of sampling scalars have been completed in the factory before the drive's delivery, so the user does not need to modify them. After modification of the sampling scalars, it is necessary to perform zero-offset correction again, and fill in the offset correction values obtained into the corresponding columns in the table Offset parameters see below.
5. Fill in rated parameters of motor and drive into the column Settings Panel → Motor/Drive Data → Nominal value according to actual conditions.	<p>NOTE: Fill in the ratings of voltage that the drive can actually output into the parameter [Drive Nominal Output Voltage].</p> <p>For example, for the 10 kV systems in the form of 8+1 backup, they should be set as $9/8 * 10 \text{ kV} = 11.25 \text{ kV}$.</p>
6. Perform Offset Correction under the condition of no high voltage	
7. Correctly set parameters	Set Settings Panel → Speed Parameter → Basic Parameter parameters according to actual conditions. Verify that the parameter [Simulation Mode] is set as [Disable] and other parameters use the default values. See Control Parameter → Control Parameter .
8. The drive operates at no-load with high voltage.	Record the input voltage, output voltage V and output frequency f every 5 Hz. Observe the three-phase symmetry of output voltage and the sinusoidal waveform from the interface. Observe the phase sequence of input voltage and output voltage, and adjust the sequence of detection lines.
9. Calculate drive output V/f and verify it meets the requirement	In combination with input voltage factor, V/f ratio should be close to [U/f - Reference Voltage] and [U/f - Reference Frequency] . As the output voltage rises with the frequency, the linear scale is increased until the output reaches reference voltage value.

Operation	Remarks
	<ul style="list-style-type: none"> • In case V/f ratio is abnormal small. <ul style="list-style-type: none"> ◦ Possible cause 1: some power modules output abnormally. Solution: Fully reinstall the latest version of monitoring software for HMI, and provide DSP version auto-adaptation function. ◦ Possible cause 2: Hardware-in-Loop (HIL) of output voltage detection lines is abnormal. Solution: Check line connection. • In case V/f ratio is abnormal large, over 1.2 times than that. <ul style="list-style-type: none"> ◦ Possible cause: The monitoring software version does not match with the DSP master control software version. Solution: Fully reinstall the latest version of monitoring software for HMI, and provide DSP version auto-adaptation function. • Asymmetry of three-phase input/output. <ul style="list-style-type: none"> ◦ Check the connection of detection lines. ◦ Verify the output voltage and current and their phase sequence are all OK for further debugging.
10. The drives operate with no-load motor	<ul style="list-style-type: none"> • The motor is not coupled with given frequency at 10Hz. Observe whether the motor current is large after starting. If yes, the possible causes are as follows: <ul style="list-style-type: none"> ◦ Check the connection of master controller hardware and lines to exclude virtual connection ◦ The motor is abnormal. Verify the phase sequence of output voltage and current. Since the phase sequence of output voltage has been correctly verified, it is only required to confirm the phase relations between three-phase output currents as well as current and voltage with the same phase. • Start motor, and observe whether rotating reverse during the starting process. Test 5 times and record the number of the reverse times. If the motor reverse happens, please increase the parameter [ASM Flux Comp Coeff.], page 95. The increased step is 10% of the initial value. Test 5 times and record the number of the reverse times with every value until there is no reverse.
11. The drives start with no-load motor in the form of VF catch on flying	<p>In the way that [Motor Control Law] of the drives is set as [U/F Control] and [U/f - Start Mode] is set as [Normal], if the stopping frequency is more than 1Hz, and the duration from the moment last stopping begins is shorter than the time set in the parameter of [U/f-Start-Mod.Stabilize-Time], the drives starts from the frequency at which they stop. Search the motor's current rotating speed, and follow up whether the given frequency properly operates after the speed is found.</p> <p>If the stopping frequency is less than 1Hz, or the stopping time is more than U/f-Start-Mod.Stabilize-Time, the drives start from [Starting frequency]. If the [Starting frequency] is more than 5Hz, they start in the form of VF catch on flying from the [Starting frequency]. Or, they normally start from the [Starting frequency].</p> <p>NOTE: If the starting in the form of VF catch on flying is enabled, restart can be permitted only two seconds after the last stopping.</p> <p>After the drives stably operate at 20~40Hz, try sudden stop under different frequencies for several times, and then start them in the form of catch on flying. Observe the operation frequency and motor current during the process of catch on flying start-up.</p> <p>NOTE: After each adjustment of phase sequence or sampling setting coefficient, perform Offset Correction under the condition of no high voltage.</p>

Debugging steps for vector control of asynchronous motor

To debug the vector control of asynchronous motor, the following items should be debugged based on the above debugging steps for VVVF control.	
Operation	Remarks
VVVF operates with high voltage	
Observe input voltage	Observe whether the effective value of input voltage displayed on the interface is correct. Use a multimeter to measure the line voltages between each of DSP master control unit signal adjusting boards VA1, VB1 and VC1, and observe whether the drive input voltage displayed on the interface is correct according to voltage division ratio. If not, verify whether the sampling setting coefficient of output voltage is correctly set.
Observe output voltage	Set [Motor Control Law] as [U/F Control] and [U/f - Start Mode] as [Normal] . Also, set appropriate reference voltage and reference frequency, then start the drives to run. Observe whether the effective value of output voltage displayed on the interface is correct. Use a multimeter to measure the line voltages between each of DSP master control unit signal adjusting boards VU2, VV2 and VW2, and observe whether the drive output voltage displayed on the interface is correct according to voltage division ratio. If not, verify whether the sampling setting coefficient of output voltage is correctly set.
Verify the phase sequence of output detection lines	Observe waveform display: ualc (calculated value of stator α -axis voltage) should be 90 degrees ahead of ubec (calculated value of stator β -axis voltage); ualc shares the same phase with output phase voltage U _U ; and among output phase voltages U _U , U _V and U _W , the former is 120 degrees ahead of the latter.
	Whether ualc and ubec respectively share the same phase with VSAL_REF (reference voltage α -axis component) and VSBE_REF (reference voltage β -axis component).

To debug the vector control of asynchronous motor, the following items should be debugged based on the above debugging steps for VVVF control.	
Operation	Remarks
	Monitor ISA (stator α -axis current) that should be 90 degrees ahead of ISB (stator β -axis current). Among output three-phase voltages I_U, I_V and I_W, the former is 120 degrees ahead of the latter, and I_U is nearly 90 degrees behind U_U.
	About how to judge the phase-lead and phase-lag of the two waveforms. Judge the phase relation between Waveform A and Waveform B: if the zero crossing point (ZCP) of Waveform B is located within the positive half cycle of Waveform A, we can say that Waveform B lags behind Waveform A.



Schematic diagram of the waveform phase in the upper that is 120 degrees ahead of that in the lower

NOTE: The equipment has been adjusted in output voltage and current phase before factory setting, and only requires verification after it arrives at the user site.

NOTE: After each adjustment of phase sequence or sampling setting coefficient, perform **Offset Correction** under the condition of no high voltage.

Parameter settings of automatic measurement motor drive

Verify the parameters below Parameter **Settings Panel** → **Advanced Settings** → **Vector Control**.

Name	Parameter Settings	Unit
[ASM Rs Measurement I1]	Generally take 30 % of rated motor current	A
[ASM Rs Measurement I2]	Generally take 70 % of rated motor current	A
[ASM Rs Locked Rotor Current]	Generally take 70 % of rated	A

NOTE:

- Verify the parameter settings of:
 - **[Motor Control Law]** is set to **[U/F control]** and,
 - **[U/f - Start Mode]** is set to **[Normal]**
- The rated speed of the motor should be filled in with the synchronous speed of the motor.

Estimate motor parameters through motor nameplate value

Operate **[ASM Estimation]** in the menu **[Auto tuning]**, page 144. Before test, remove the option Auto-checking to enable measured result to be directly filled into the measured value of stator and rotor parameters (estimated value of six parameters in the column **Advanced Settings** → **Tuning Result**. Upon completion of test, enter the column **Advanced Settings** → **Tuning Result**

- Set the estimated value of five parameters at the bottom;
 - **[ASM Rs - Measurement], [ASM Rr - Measurement], [ASM Ls - Measurement], [ASM Lr - Measurement]** and **[ASM Lm - Measurement]** into the five parameters at the top.
 - **[ASM Rs - Stator Resistance], [ASM Rr - Rotor Resistance], [ASM Ls - Stator Inductance], [ASM Lr - Rotor Inductance]** and **[ASM Lm - Main Inductance]**

Fill in **[Reference Flux]** into the column **Advanced Settings** → **Vector Control**.

Start measurement

Before test, remove the option **Auto-checking** to enable measured result to be directly filled into the measured value of stator and rotor parameters (measured value of five parameters in the column **Advanced Settings** → **Tuning Result**

If the phase sequence and the parameter settings are correct, the drives can complete parameters test normally. The rotation test time is related to the acceleration and deceleration time settings of Asynchronous motor. To ensure the test can be completed normally, it is unsuitable to set the acceleration and deceleration time too short.

NOTE: The measurements are divided into **[ASM Static]** and **[ASM Rotational]**, which can be selected according to actual field conditions. If conditions permit, it is recommended to use **[ASM Rotational]**. In the event of **[ASM Rotational]**, the time required to measure parameters depends on the acceleration and deceleration time settings of Asynchronous motor, which generally does not exceed the sum of 0~Fmax acceleration and 0~Fdeceleration time. If exceeded, exit the measurement screen to check whether there are any errors detected.

NOTE: Before the automatic measurement for motor rotation parameter is performed, verify the motor has been disconnected from couplings with load

- Stator and rotor parameter settings
Upon completion of test, enter the column **Advanced Settings** → **Tuning Result** and set the measured value of five parameters into the five parameters at the top.

Possible problems during the parameter test and their solutions

- Give the alarm of overcurrent at the beginning of test
 - Output phase sequence is incorrect.
 - Under a premise of correct output phase sequence, the test can also be done again in the way that the plus-minus signs of output voltage, current sampling setting coefficient, and their corresponding Offset Correction value. In such a way, it generally should be solved. If not, try the following method.
 - The initial parameter values of motor stator and rotor are inappropriate: the stator/rotor inductance is slightly larger than their mutual inductance in a reference to the parameter of the motor with the same power level. It is recommended to retain the parameters of successfully applied motors at different power levels.
 - The overcurrent protection value is set too small.
- The test steps can be completed, but the check found that the stator/rotor resistance is 0
 - The initial parameter values of motor stator and rotor are inappropriate: the stator/rotor inductance is slightly larger than their mutual inductance in a reference to the parameter of the motor with the same power level. It is recommended to retain the parameters of successfully applied motors at different power levels.
 - Replace the signal adjusting board or master control board, and receive test again after zero-drift.

NOTE: The drives run with no-load asynchronous motor under vector control

Parameter Settings of Vector Control

Before the operation under vector control starts, the following parameters should be set in addition to verifying the parameter settings mentioned in the above steps.

See to **Settings Panel** → **Advanced Settings** → **Vector Control** .

Parameter	Parameter Settings	Default Value	Unit	Remarks
[Reference Flux]	Set as "Flux linkage given estimated value"	15	Wb	Obtained by the estimation of asynchronous motor stator/motor parameters.
[Maximum Torque Limit]	Generally take 1.2 times rated torque. In case of heavyload starting, it can be set as 1.5 times rated torque.	2000	N·m	Rated torque is: $T_n = \frac{W}{2\pi \frac{rpm}{60}}$
[Current Loop Control Coeff.]	In general, no adjustment is required, and the factory default is OK.	1200	—	—
[Current Loop Adaption]	Select [Disable]	[Disable]	—	If the current waveform harmonic content of motor at high speed is higher, the parameter [Current Loop Adaption] in the column [Vector Control] can be set as [Enable].
[Torque Current Pos. Limit]	For systems without special requirements for starting torque, 100% of motor rated current peak can generally be taken; for systems with high requirements for starting torque, they can be set as rated current peak with corresponding multiple according to the multiple of starting torque.	42	A	
[Torque Current Neg. Limit]	For products without energy feedback (2Q products), it is generally set as -0.5 % of the rated current peak; when the motor is tested under no-load conditions, it should be set as -2 % of the rated current peak. For products with energy feedback (4Q products), it should be set as -10 0% of the rated current peak.	-10	A	—
[Speed Regulation Coeff. Kp]	In general, no adjustment is required, and the factory default is OK.	6	—	—
[Speed Regulation Coeff. Ki]	In general, no adjustment is required, and the factory default is OK.	24	—	—
[Speed/Torque control select]	Select [Speed Ctrl]	[Speed Ctrl]	—	—
[Speed Encoder Activation]	Select [Without Encoder]	[Without Encoder]	—	1. As for asynchronous motor, speed sensorless selected for initial debugging is only valid when the vector control is adopted. 2. When the [Motor Type] type is [Synchronous Motor], this option is invalid.
[Number of Pulses]	Set according to actual conditions	5000	—	—
[Speed Tracking Time]	Set according to actual conditions	0.5	s	It means that in the mode of [Vector control] or [U/F Control] and rotation starting, when the drives start and run, keep the current speed first to steadily run for a while (called [Speed track time] herein), and then start to run at the stated speed track given frequency.

Parameter Settings of Vector Control for Asynchronous Motor

See to **Settings Panel** → **Advanced Settings** → **Vector Control**

Parameter	Parameter Settings	Default Value	Unit	Remarks
[ASM Fluxing Time]	In general, no adjustment is required, and the factory default is OK.	2	s	It refers to the time of motor excitation when the drives start and run in the mode of vector control, so that the motor can normally output the torque.
[ASM Flux Comp Coeff.]	0.9	0.9	—	If there is a reverse when the motor starts, it is possible to appropriately increase the value, with the maximum value not exceeding 2 in general.
[ASM Rotor Flux Filter Const]	In general, no adjustment is required, and the factory default is OK.	2	rad/s	—
[ASM Speed Est Filter Const]	In general, no adjustment is required, and the factory default is OK.	60	rad/s	—
[ASM Sync Speed Filter Const]	In general, no adjustment is required, and the factory default is OK.	732	rad/s	—

NOTE: Only under the conditions that the output phase sequence is correct after verification and the automatic test result of motor parameters is correct, the vector control can be used for starting and running. Or, there might be an alarm of overcurrent error.

If there is a photoelectric speed encoder, the parameter **[Speed Encoder Activation]** can be set as **[With Encoder]** as an option, and the right values can be set in **[Number of Pulses]**.

No-load running under vector control

The given frequency is set to 5 Hz to start the drive for running. Observe the **Frequency reference** and **Output current** from HMI at any time.

If the **Frequency reference** is not consistent with possible actual speed or the current is extremely large, the drives should be immediately stopped in a sudden. Try to adjust the parameter of rotor resistance, with its value range: 0.8... 1.2 times stator resistance.

After the drives can normally run under vector control, they perform sudden stop and catch on flying startup and run at multiple frequency sections to observe whether the motor speed can be immediately identified. If it still can not be identified two seconds later, they should be immediately stopped in a sudden and the rotor resistance should be adjusted.

The drives run with asynchronous motor coupling

After coupling, first utilize **[U/F Control]** mode for a long running to observe the symmetry and reliability of the three-phase output voltage and current waveforms, and spend a long time (3 minutes) on observing whether the motor rotor flux linkage smoothly runs, which nearly keeps a straight line without any ripple waves or fast disturbance. If all go well, perform the next running under speed sensorless vector control.

In general, after the drives successfully run with no-load asynchronous motor under vector control, they can successfully run with load.

If there remain any problems with load running, commonly such as overcurrent and overvoltage, the possible causes include:

- The parameter settings of rotor resistance are inappropriate.
- The hardware of master control system is unstable.
- The power modules are unstable, which is less likely.

The judgment of the above second and third problems: utilize [U/F Control] mode for a long running to observe the symmetry and reliability of the three-phase output voltage and current waveforms

Check phase sequence of input voltage and current

When the drive input current is greater than or equal to 15% of rated current, check the phase sequence of input voltage and current. The following should be met:

- For input phase voltages U_A, U_B and U_C, the former should be 120 degrees ahead of the latter.
- For input currents I_A, I_B and I_C, the former should be 120 degrees ahead of the latter.
- Input voltages U_A, U_B and U_C basically share the same phase with input currents I_A, I_B and I_C respectively, but slightly lead

If the line sequence is correct, the input power and power factor displayed on the interface are positive. If incorrect, please immediately contact debugging personnel of the unit.

NOTE:

- To ensure the personal safety of debugging personnel and equipment safety, when it is required to switch voltage detection signal line, please cut off the high input voltage of the system, and the operation continues only after the power unit has completed discharge.
- In case the drives drive the asynchronous motor with low voltage level, the parameters should be set in strict accordance with the instructions specified in **Settings Panel** → **Motor/Drive Data** → **Nominal value**, and then commissioning.
- When the drives have a larger difference from the asynchronous motor in power capacity (if the asynchronous motor capacity is smaller than half or more than half of the rated motor capacity of the drives), the automatic measurement of motor parameters might not obtain correct results, so that rotation start and vector control cannot be properly achieved. In such case, it is recommended to select the **[Motor Control Law]** to **[U/F control]** and **[U/f - Start Mode]** to **[Normal]**.
- At present, for the occasion that one drive drives multiple motors, it is not allowed to use **[Vector]** or **[Vector Control]**, but only select **[Motor Control Law]** to **[U/F control]** and **[U/f - Start Mode]** to **[Normal]**.

ATV6100 Synchronous Motor

Preliminary Recommendations

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Safety Information** chapter before performing any procedure in this chapter.

Failure to follow these instructions will result in death or serious injury.

At present, when the AC VSD series products based on new master controller drive sync motor, the motor can select two control modes including **[U/F Control]** and **[Vector Control]** with **[With Encoder]**.

In the mode of **[U/F Control]**, the DSP master control unit calculates the power factor of sync motor in real time according to the current output voltage and current, and gives the instructions of exciting current regulation according to the power factor target value set by the user.

In the mode of **[Vector Control]** with **[With Encoder]**, the requirements of sync motor power factor should be ensured and the control performance of DC speed adjusting can be reached.

The digital output interface of DSP bus adapter plate of the master control unit is provided with two signals including "Sync motor excitation increase" and "Sync motor excitation reduction", can expand two signals of relay dry contact to match with excitation cubicle, and is provided with given signals with accurate 4- 20 mA exciting current command to achieve closed-loop control of exciting current. Since the catch on flying start-up and synchronization switch of the sync motor needs more accurate excitation control, 4~20 mA analog given exciting current command of master control board terminal **is added**, in which the corresponding exciting current to 4 mA is 0, and 20 mA corresponds to 100 % rated exciting current.

Debugging steps for synchronous motor U/F Control

Operation	Remarks
1. Parameter setting and inspection	Parameters in Synchronous Motor are parameters specially set for sync motor excitation control, including U/F Control and setting parameters of two groups of excitation control, which generally use default value. Other parameter settings of U/F Control is the same as those of asynchronous motor U/F Control.
2. Disconnect the wiring of drive output to motor	Observe whether the effective value of input voltage displayed on the interface is correct. Use a multimeter to measure the line voltages between each of DSP master control unit signal adjusting boards VA1, VB1 and VC1, and observe whether the drive input voltage displayed on the interface is correct according to voltage division ratio. If not, verify whether the sampling setting coefficient of output voltage is correctly set.
3. Perform automatic Offset Correction before high voltage is applied.	Observe the three-phase input voltage waveform on waveform display interface, which should meet the requirements that A-phase voltage keeps ahead of B-phase voltage and B-phase voltage keeps ahead of C-phase voltage. If the phase sequence is incorrect, it is a must to adjust the line sequence of two out of three input voltage detection lines.
4. Observe input voltage after high voltage is applied	
5. Observe output voltage in no-load running of the drives	Set [Motor Control Law] as [U/F Control] and [U/f - Start Mode] as [Normal] . Also, set appropriate reference voltage and reference frequency, then start the drives to run. Observe whether the effective value of output voltage displayed on the interface is correct. Use a multimeter to measure the line voltages between each of DSP master control unit signal adjusting boards VU2, VV2 and VW2, and observe whether the drive output voltage displayed on the interface is correct according to voltage division ratio. If not, verify whether the sampling setting coefficient of output voltage is correctly set. Observe the three-phase output voltage waveform on monitoring interface, which should meet the requirements that U-phase voltage keeps ahead of V-phase voltage and V-phase voltage keeps ahead of W-phase voltage. If the phase sequence is incorrect, it is a must to adjust the line sequence of two out of three output voltage detection lines.
The further debugging can be performed only after the display and measured values are correct.	
6. Connect the drive output to sync motor, and verify the excitation cubicle is wired correctly.	

Operation	Remarks
<p>7. Observe output waveform in case of the motor starting and running at no load</p>	<p>Set [U/f Auto-Excit Regulation] to [Disable].</p> <p>Set the exciting current as 1/2 rated exciting current from the operation panel of excitation cubicle.</p> <p>Start the drives which run with motor. When the drives start to run, the drive control cabinet PLC gives excitation cubicle control command at the same time, allowing exciting current output.</p> <p>Continuously run under the three states of low speed (2 Hz), medium speed (35 Hz) and high speed (50 Hz). Repeatedly run from low speed to high speed and from high speed to lower speed for 30 minutes in a row.</p> <p>Observe that the three-phase output voltage and current waveforms during running and acceleration processes should be smooth and feature low distortion and equal amplitude.</p> <p>Also, the output current displayed on the interface should be consistent with that indicated by standard measuring meter within a certain error range.</p>
<p>8. Check the phase sequence of output detection line</p>	<p>Observe waveform display: ualc (calculated value of stator α-axis voltage) should be 90 degrees ahead of ubec (calculated value of stator β-axis voltage); ualc shares the same phase with output phase voltage U_U; and among output phase voltages U_U, U_V and U_W, the former is 120 degrees ahead of the latter.</p> <ul style="list-style-type: none"> Whether ualc and ubec respectively share the same phase with VSAL_REF (reference voltage α-axis component) and VSBE_REF (reference voltage β-axis component). Monitor ISA (stator α-axis current) that should be 90 degrees ahead of ISB (stator β-axis current). Among output three-phase voltages I_U, I_V and I_W, the former is 120 degrees ahead of the latter, and I_U is nearly 90 degrees behind U_U. <p>Oscilloscope, the current output power factor should be positive real number less than 1 can be seen as well.</p> <p>NOTE: In general, the equipment has been adjusted in output voltage and current phase sequence before leaving the factory, and only requires verification after it arrives at the user site. After the plus-minus signs of line sequence or sampling setting coefficient are adjusted, it is required to perform Offset Correction, page 92.</p>
<p>9. Automatic adjustment test of power factor</p>	<p>The parameter [U/f Auto-Excit Start Freq] is set to 10 Hz, namely, only when the running frequency is more than 10 Hz, automatic excitation control can be performed.</p> <ul style="list-style-type: none"> The parameter [U/f PF Regulation Thresh 1] is set to 0.2 or 0.1. The parameter [U/f Power Factor Setpoint] is set to 0.5. The parameter [U/f Auto-Excit Regulation] set as [Enable]. <p>Under the condition of sync motor without load, it is required to set the target power factor lower, so that the automatic adjustment effect can be more obvious. If the power factor error is increasingly larger with the adjustment, the possible causes are as follows:</p> <ul style="list-style-type: none"> excitation increase and excitation reduction relay dry contacts are inversely connected the phase sequence of the output voltage and current are detected incorrectly. <p>At the beginning of debugging, set a larger static excitation time and a smaller excitation regulation time to prevent too fast excitation regulation which can lead to out-of-control.</p> <p>Observe the output voltage and output current waveforms of the motor at various frequencies from the monitoring interface.</p>
<p>10. The drive output connects to sync motor, while the motor runs with load</p>	<p>Set appropriate power factor (e.g. 0.9), start the drive to run, and gradually increase motor load. Observe the output voltage and output current of the motor at various speed.</p>
<p>11. Check phase sequence of input voltage and current</p>	<p>When the drive input current is greater than or equal to 15 % of rated current, check the phase sequence of input voltage and current. The following should be met:</p> <ul style="list-style-type: none"> For input phase voltages U_A, U_B and U_C, the former should be 120 degrees ahead of the latter. For input currents I_A, I_B and I_C, the former should be 120 degrees ahead of the latter. Input voltages U_A, U_B and U_C basically share the same phase with input currents I_A, I_B and I_C respectively, but slightly lead.
<p>12. Set appropriate parameters according to the user requirements and start commissioning.</p>	
<p>13. Considerations</p>	<p>To debug the sync motor, it is a must to ensure that the phase sequences of output voltage and current are correct.</p> <ul style="list-style-type: none"> Turn the excitation cubicle to manual control, and do not turn on the automatic excitation adjustment. In case of initial start, 0.75 time the given exciting current can enable starting and running. When the running frequency reaches about 25 Hz, automatic excitation adjustment is allowed. <p>Observe whether the output power factor can be controlled to the set value. If the exciting current is increased or reduced all the time, the possible causes are as follows:</p> <ul style="list-style-type: none"> Excitation increase and excitation reduction signals are inversely connected The phase sequences of the output voltage and current are incorrect The output current and voltage waveforms are incorrect, such as phase error. Observe the output waveform from the interface.

VVVF control debugging

Perform VVVF control debugging according to the debugging steps specified in this Section, page 257. When the motor steadily runs at no load, constantly update "Angular speed encoder value" in the column "Debugging parameters" -> "Speed measurement", and observe whether the display value in the column is the same as the actual value. For example, when the motor runs at no load and 50 Hz under **[U/F Control]**, the value in the column should be about "314.16", and when the motor runs at no load and 25 Hz under **U/F Control**, the value in the column should be about "157.1". For other running frequencies, the display value varies in proportion. Observe the angular speed encoder value of five frequency points like 10 Hz, 20 Hz, 30 Hz, 40 Hz and 50 Hz. If they are all correct, go to the next debugging.

Rotor field-oriented control running under load

Related parameters are located in **Settings Panel** → **Advanced Settings**:

- **Tuning Result** functions and,
- **Vector Control** functions.
- **[Motor Control Law]** is set to **[Vector Control]** available in **Control Parameter** functions.

Upon completion of setting, rotor-oriented vector control no load running can be enabled. Set the given frequency to 5 Hz to start the drive for running. Observe the **Running frequency** and **Output current** from HMI at any time. After the drives can normally run under vector control, they perform sudden stop and catch on flying start-up and run at multiple frequency sections to observe whether the motor speed can be immediately identified.

NOTE: When starting for the first time, there is one rotor orientation process of about 30 s for the motor, during which the master controller runs but the motor cannot rotate.

Rotor-oriented vector control no load running

In general, after the drives successfully run with asynchronous motor no-load vector control, it should be able to successfully run under load. In the process of rotor oriented vector control, the value of the drive output voltage and motor power factor value at different loads must be recorded as the load increases.

Motor parameter self-detecting debugging

After the rotor oriented vector control no-load running is normal, the parameter self-detecting can be performed.

NOTE: During the parameter self-detecting, "exciting current automatic adjustment" cannot be enabled.

Before test, remove the option **Auto-checking** to enable measured result to be directly filled into the measured value of stator and rotor parameters (measured value of five parameters in the column **Settings Panel** → **Advanced Settings** → **Tuning Result**).

Related Parameter Settings of Synchronous Motor Parameter Self-detecting Vector Control, page 95.

Parameter	Parameter Settings	Default Value	Unit	Remarks
[SM Volt Loop Neg Amp Limit]	-2...0	-1	p.u.	Multiple of rated motor current

Definition of Related Parameters of Stator and Rotor of Synchronous Motor Advanced Settings, page 78.

Parameter	Meaning	Unit
[SM Stator Resistance]	Syn.motor stator resistance	p.u.
[SM D-axis Inductance]	Syn.motor d-axis inductance	p.u.
[SM Q-axis Inductance]	Syn.motor q-axis inductance	p.u.
[SM Stator Resistance Meas]	Syn.motor stator resistance measured value	p.u.
[SM D-axis Inductance Meas]	Syn.motor d-axis inductance measured value	p.u.
[SM Q-axis Inductance Meas]	Syn.motor q-axis inductance measured value	p.u.
[Flux Meas at 60% Excit Curr]	Syn.motor stator flux estimated value1 (Read only)	p.u.
[Flux Meas at 75% Excit Curr]	Syn.motor stator flux estimated value2 (Read only)	p.u.
[Flux Meas at 90% Excit Curr]	Syn.motor stator flux estimated value3 (Read only)	p.u.

The test time is related to the acceleration and deceleration time settings of motor. To ensure the test can be completed normally, it is unsuitable to set the acceleration and deceleration time too short.

NOTE: Before the automatic measurement for motor rotation parameter is performed, verify the motor has been disconnected from couplings with load.

NOTE: When the automatic measurement for motor rotation parameter is performed, the motor cannot be reversed.

Upon completion of test, enter the column **Settings Panel** → **Advanced Settings** → **Tuning Result** of Synchronous motor parameters and set the measured value of three parameters into the three parameters at the top

NOTE: Accurate to three decimal places.

Pre-Set Control methods

Preliminary Recommendations

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

Read and understand the instructions in **Safety Information** chapter before performing any procedure in this chapter.

Failure to follow these instructions will result in death or serious injury.

WARNING

UNEXPECTED EQUIPMENT OPERATION

Before the first power-up of the ATV6100, it is necessary to set the parameters for the motor and the drive.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Panel control, HMI f-ref, Open-loop running

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Local Control mode .
3	In the Settings Panel , click in the System Tool menu, then click to the Function sub-menu, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> • Set [f-ref] to [HMI] • Set [PID Mode] to [Not Active]
4	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.
5	The ATV6100 provides the Medium Voltage Closing Permitted
6	Switch on the incoming medium voltage switch of the ATV6100 and the System Standby message will be displayed.
7	Set the ATV6100's output frequency with the Accelerate, Decelerate or Frequency Reference Command button on the HMI touch screen.
8	Start the ATV6100 with the Start button on the HMI touch screen.
9	The actual frequency of the ATV6100 reaches the frequency setting according to the Acceleration/Deceleration time.
10	Stop the drive with the Stop or Freewheel Stop buttons on the HMI touch screen.

Panel control, HMI f-ref, PID Mode Active

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Local Control mode .
3	Connect the PID Feedback signal to X14:4, X14:5 of the ATV6100's PLC.
4	In the Settings Panel , click in the System Tool menu, then click to the Function sub-menu, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> • Set [f-ref] to [HMI]

Step	Action
	<ul style="list-style-type: none"> Set [PID Mode] to [Active]
5	Enter the PLC AI setting screen of System Tools from the HMI touch screen, then select whether the analog feedback signal is 0-10 V or 4-20 mA according to the wiring.
6	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.
7	Switch on the incoming medium voltage switch of the ATV6100 and the System Standby message will be displayed.
8	Set the Frequency Reference with the Increase , Decrease buttons on the HMI touch screen.
9	Start the ATV6100 with the Start button on the HMI touch screen.
10	Check the motor frequency follows the Frequency Reference.
11	Stop the drive with the Stop or Freewheel Stop buttons on the HMI touch screen.

Panel control, Analog f-ref, Open-loop running

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Local Control mode .
3	Connect the Reference Frequency signal to X14:1, X14:2 of the ATV6100's PLC.
4	In the Settings Panel , click in the System Tool menu, then click to the Function sub-menu, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> Set [f-ref] to [Analog] Set [PID Mode] to [Not Active]
5	Enter the PLC AI setting screen of System Tools from the HMI touch screen, then select whether to use 0-10 V analog voltage source given or 4-20 mA reference current command according to the system's wiring.
6	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.
7	Switch on the incoming medium voltage switch of the ATV6100 and the System Standby message will be displayed.
8	Set the ATV6100's output frequency with the Analog Command device, then the main screen will display the analog command frequency value.
9	Start the ATV6100 with the Start button on the HMI touch screen.
10	The actual frequency of the ATV6100 will reach the frequency setting according to the Acceleration/ Deceleration time.
11	Stop the drive with the Stop or Freewheel Stop buttons on the HMI touch screen.

Panel control, Analog f-ref, PID Mode Active

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Local Control mode .
3	Connect the PID Feedback signal to X14:4, X14:5 of the ATV6100's PLC; Connect the Reference Frequency signal to X14:1, X14:2 of the ATV6100's PLC.
4	In the Settings Panel , click in the System Tool menu, then click to the Function sub-menu, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> Set [f-ref] to [Analog]

Step	Action
	<ul style="list-style-type: none"> Set [PID Mode] to [Active]
5	Enter the PLC AI settings screen of System Tools from the HMI touch screen, then select whether the analog command signal is 0-10 V analog voltage source command or 4-20 mA reference current given and whether the analog feedback signal is 0-10 V analog voltage source or 4-20 mA reference current according to the system's wiring.
6	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.
7	Switch on the incoming medium voltage switch of the ATV6100 and the System Standby message will be displayed.
8	Set the expectation value for the controlled quantity directly with the Analog Command device, then the main screen will display the analog given frequency value.
9	Start the ATV6100 with the Start button on the HMI touch screen.
10	The output frequency is adjusted automatically in order for the controlled quantity's actual value to reach the expected value.
11	Stop the drive with the Stop or Freewheel Stop buttons on the HMI touch screen.

Remote control, HMI f-ref, Open-loop running

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Remote Control mode .
3	In the Settings Panel , click in the System Tool menu, then click to the Function sub-menu, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> Set [Upper PC control] to [Enable] Set [PID Mode] to [Not Active]
4	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.
5	Switch on the incoming medium voltage switch of the ATV6100 and the System Standby message will be displayed.
6	Set the ATV6100's output frequency with the [Accelerate] , Decelerate or Frequency Reference Command buttons on the HMI touch screen.
7	Start the ATV6100 with the remote start button.
8	The actual frequency of the ATV6100 reaches the frequency setting according to the Acceleration/Deceleration time.
9	Stop the drive with the remote Stop or Mains Voltage OFF button.

Remote control, HMI f-ref, PID Mode Active

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Remote Control mode .
3	Connect the PID Feedback signal to X14:4, X14:5 of the ATV6100's PLC.
4	In the Parameter Settings screen, click the External Control button, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> Set [Upper PC control] to [Enable] Set [PID Mode] to [Active]
5	Enter the PLC AI setting screen of System Tools from the HMI touch screen, then select whether the analog feedback signal is 0-10V analog voltage source or 4-20mA current source according to the system's wiring.
6	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.

Step	Action
7	Switch on the incomer medium voltage switch of the ATV6100 and the System Standby message will be displayed.
8	Set the expectation value for the controlled quantity with the Increase, Decrease on the HMI touch screen.
9	Start the ATV6100 with the remote start button.
10	The output frequency is adjusted automatically in order for the controlled quantity's actual value to approach its expectation value.
11	Stop the drive with the remote Stop or Mains Voltage OFF button.

Remote control, Analog f-ref, Open-loop running

Step	Action
1	Turn on the controlling power supply.
2	Turn the Remote/Local Control switch on the door to the Remote Control mode .
3	Connect the Reference Frequency signal to X14:1, X14:2 of the ATV6100's PLC.
4	In the Parameter Settings screen, click the External Control button, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> • Set [f-ref] to [Analog] • Set [PID Mode] to [Not Active]
5	Enter the PLC AI settings screen of System Tools on the HMI touch screen, then select whether to use 0-10 V analog voltage source given or 4-20 mA current source command according to the system's wiring.
6	If there are any red error messages on the HMI touch screen other than Mains voltage not ready , assess the issues and resolve them one by one.
7	Switch on the incomer medium voltage switch of the ATV6100 and the System Standby message will be displayed.
8	Set the ATV6100's output frequency with the remote analog signal, then the main screen will display the analog command frequency value.
9	Start the ATV6100 with the remote start button.
10	The actual frequency of the ATV6100 will reach the desired frequency setting according to the Acceleration/Deceleration time.
11	Stop the drive with the remote Stop or Mains Voltage OFF button.

Remote control, Analog f-ref, PID Mode Active

Step	Action
1	Turn on the controlling power supply.
2	Place the Remote/Local Control switch on the door to the Remote Control mode .
3	Connect the PID Feedback signal to X14:4, X14:5 of the ATV6100's PLC. Connect the Reference Frequency signal to X14:1, X14:2 of the ATV6100's PLC.
4	In the Parameter Settings screen, click the External Control button, then set the Function settings screen of the HMI monitoring program: <ul style="list-style-type: none"> • Set [f-ref] to [Analog] • Set [PID Mode] to [Active]
5	Enter the PLC AI settings screen of System Tools from the HMI touch screen, then select whether the analog command signal is 0-10V analog voltage source command or 4-20mA current source command and whether the analog feedback signal is 0-10V analog voltage source or 4- 20mA current source according to the system's wires.
6	If there are any red error messages on the HMI touch screen other than Mains voltage not ready, assess the issues and resolve them one by one.

Step	Action
7	Switch on the incomer medium voltage switch of the ATV6100 and the System Standby message will be displayed.
8	Set the expectation value for the controlled quantity directly with the analog command device, then the main screen will display the analog command frequency value.
9	Start the ATV6100 with the remote start button.
10	The output frequency is adjusted automatically in order for the controlled quantity's actual value to reach the expected value.
11	Stop the drive with the remote Stop or Mains Voltage OFF button.

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Error Codes

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Overview

Clearing the detected error




This table provides the steps to follow when intervention on MV drive system is required:

Step	Action
1	Before performing any action to the MV drive, make sure the incoming circuit breaker has tripped and drive is not energized with MV power.
2	Check the error indication on HMI to find out the error code. Collect necessary information for further analysis including the running log, parameter setting, and load/motor operation description.
3	Choose proper remedy action according to the error code and failure behavior analysis.
4	When power cell replacement is required, make sure the incoming circuit breaker is open and all other safety interlock has been applied. Confirm the energy inside capacitors has been discharged and the red indicator is off. Verify the power cell and all other parts inside cabinet are not live, and space heaters are not hot. Replace the power cell following the instruction and protect the optic fiber during the action.
5	Make parameter backup before modification in case recovery is required. Higher user authority is required for critical parameters. Refer to programming manual for detail description of parameters.
6	Reset the controller to clear the error code latched in memory. Reboot or shutdown the whole system power supply to validate system configuration modification. Always make sure that MV power is off before control system reboot or shutdown.
7	Confirm the error code has been cleared and all safety interlocks have been removed before restoring the MV power supply to drive.




After the cause has been removed, the error can be cleared by:

- Pressing the reset command button on HMI.
- Pressing the reset command button on the panel door if provided.
- Using remote reset command digital input or communication control word reset bit.
- Rebooting the control system.




[Power Cell Fiber Suspend (XR) Error]

	Probable Cause	<p>The communication between power cell and drive master controller is monitored when drive is energized with medium voltage power. When the status feedback from power cell is interrupted or the master controller is not able to establish the communication to receive the status feedback, power cell fiber suspend (XR) error would be detected. This error would trip the drive incoming circuit breaker immediately. Probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • Fiber optic cable disconnected or not connected properly, fiber optic cable damaged or bended badly. • Power cell control PCB not energized. • Power cell internal component malfunction, such as cell control PCB, rectifier assembly.
	Remedy	<ul style="list-style-type: none"> • Check fiber optic cable connection, and fiber optic cable integrity. • Check power cell input cable connections and fuse status. • Replace entire power cell by spare part.
	Clearing the Error Code	Manual reset command is required to clear this error.




[Power Cell Bypass Contactor Error]

	Probable Cause	<p>Bypass contactor status is monitored when bypass command is released from master controller. Power cell bypass contactor error would be generated if the bypass contactor is unable to close at this condition. Power cell bypass contactor error would trip the incoming circuit breaker immediately. Probable causes are provided below:</p> <ul style="list-style-type: none"> • Power cell internal component malfunction, such as cell control PCB, or bypass contactor control circuit. • Contactor malfunction.
	Remedy	Replace the entire power cell by spare part.
	Clearing the Error Code	Manual reset command is required to clear this error code.

[Power Cell Over Voltage]

 Probable Cause	<p>Power cell DC voltage exceeds 1300V would trigger power cell over voltage error immediately. Below factors may lead to this error:</p> <ul style="list-style-type: none"> • Parameter setting – speed ramp too short • Parameter setting – negative torque current limit setting too high • Application – catch on fly start • Application – initial energizing • Internal insulation breakdown • Mains voltage fluctuation • Power cell voltage measurement circuit malfunction
 Remedy	<ul style="list-style-type: none"> • Increase deceleration ramp setting. • Reduce negative torque current limit in vector control mode. • Enable drive catch on fly start function if required by application. • Increase power on self-diagnosis time if power cell over voltage error is detected right after energizing. • Check internal insulation condition between transformer secondary windings, and between power cell mounting rail if applicable. • Check main voltage fluctuation range and change the transformer tapping if necessary. • Replace the power cell by spare part.
 Clearing the Error Code	<p>Over voltage of power cell could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in the parameter setting. Bypassed power cell could not be reset online, it would be reset automatically when the mains supply is off.</p> <p>If power cell bypass function is not activated, this error would trip the drive incoming circuit breaker immediately. And manual reset command is required to clear this error.</p>

[Power Cell IGBT Drive Error]

 Probable Cause	<p>Power cell IGBT module desaturation status and IGBT drive circuit operation status is monitored by measuring the voltage drop when switching on. When voltage drop exceeds the protection value, IGBT drive error would be generated. Probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • Vector control parameter settings. • Sudden load variation. • Internal short circuit – power cell inverter circuit bridge arm short circuit. • External short circuit – output MV cable or motor winding short circuit. • Power cell internal component malfunction, such as cell control PCB, IGBT drive PCB, IGBT module.
 Remedy	<ul style="list-style-type: none"> • Perform auto-tuning properly and check vector control parameters. • Set motor control law to vector control and check control parameters. • Check power cable and motor cable connection for short circuit, poor connection, or insulation breakdown. • Replace power cell by spare part.
 Clearing the Error Code	<p>IGBT drive error of power cell could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in the parameter setting. Bypassed power cell could not be reset online, it could be reset automatically when the mains voltage is off.</p> <p>If power cell bypass function is not activated, this error would trip the drive incoming circuit breaker immediately. And manual reset command is required to clear this error.</p>

[Power Cell Inverter Overcurrent Error]

	Probable Cause	<p>Power cell output current is monitored to detect inverter over current error, typical triggering value is 200% of nominal output current peak. Below factors may lead to this error:</p> <ul style="list-style-type: none"> • Vector control parameter settings. • Sudden load variation. • Internal short circuit – power cell inverter circuit bridge arm short circuit. • External short circuit – output MV cable or motor winding short circuit. • Power cell internal component malfunction, such as cell control PCB, IGBT drive PCB, IGBT module.
	Remedy	<ul style="list-style-type: none"> • Perform auto-tuning properly and check vector control parameters. • Set motor control law to vector control and check control parameters. • Check power cable and motor cable connection for short circuit, poor connection or insulation breakdown. • Replace power cell by spare part.
	Clearing the Error Code	<p>Inverter overcurrent error of power cell could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in the parameter setting. Bypassed power cell could not be reset online, it could be reset automatically when the mains voltage is off. If power cell bypass function is not activated, this error would trip the drive incoming circuit breaker immediately. And manual reset command is required to clear this error.</p>




[Power Cell Standby IGBT Breakdown]

	Probable Cause	<p>Power cell IGBT module status is monitored before releasing start command, probable cause of this error:</p> <ul style="list-style-type: none"> • IGBT module damaged during previous operation, such as IGBT drive error or inverter over current error, or bypass contactor error. • Power cell internal component malfunction.
	Remedy	<p>Replace power cell by spare part.</p>
	Clearing the Error Code	<p>Power cell standby IGBT breakdown error could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in the parameter setting. Bypassed power cell could not be reset online. It could be reset automatically when the mains voltage is off. If power cell bypass function is not activated, this error would trip the drive incoming circuit breaker immediately. Manual reset command is required to clear this error.</p>




[Power cell Overheat Error]

	Probable Cause	<p>Negative temperature coefficient thermistor is installed inside power cell to monitor the temperature. The thermistor could be integrated inside IGBT module package or implanted on the heatsink near the IGBT module. Typical overheat protection value is around 95°C, and the protection value could be different among different type of power cells. Probable causes of this error are listed below:</p> <ul style="list-style-type: none"> • Drive cooling fan malfunction • Cabinet door dust filter mad blocked • High ambient temperature • Temperature measurement circuit malfunction
	Remedy	<ul style="list-style-type: none"> • Check cooling fan power supply, normal operation, and rotation direction. • Replace dust filter mads. • Check room cooling system operation, cooling capacity, and installation condition. • Replace power cell.
	Clearing the Error Code	<p>Power cell Overheat error could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in parameter setting. Bypassed power cell could not be reset online, it could be reset automatically when the mains voltage is off. If power cell bypass function is not activated, this error would trip the drive incoming circuit-breaker after a configurable filter timer. Manual reset command is required to clear this error in this condition.</p>

[Power Cell Phase Loss Error]

 Probable Cause	<p>Power cell 3-phase input power supply is monitored to detect phase loss error. Probable causes are list below:</p> <ul style="list-style-type: none"> • Incoming power supply abnormal. • Power cable disconnected or poorly connected. • Fuse blown or not installed. • Communication interrupted between power cell control PCB and power PCB. • Power cell voltage measurement circuit malfunction
 Remedy	<ul style="list-style-type: none"> • Check incoming power supply. • Check power cable connection and torque applied. • Replace damaged fuse or install missing fuse. • Check power cell control PCB and power PCB physical connection. • Replace power cell by spare part.
 Clearing the Error Code	<p>Power cell phase loss error could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in parameter setting. Bypassed power cell could not be reset online, it could be reset automatically when the mains voltage is off.</p> <p>If power cell bypass function is not activated, this error would trip the drive incoming circuit-breaker after a configurable filter timer. Manual reset command is required to clear this error in this condition .</p>

[Power Cell Under Voltage Error]

 Probable Cause	<p>Power cell DC bus voltage is monitored and when this voltage is lower than 630V DC, under voltage error would be generated after a configurable filter timer. Probable causes are listed below:</p> <ul style="list-style-type: none"> • Mains voltage dip or fluctuation • Voltage measurement circuit malfunction
 Remedy	<ul style="list-style-type: none"> • Activate low voltage ride through function and setup parameter properly. • Replace power cell by spare part.
 Clearing the Error Code	<p>Power cell under voltage error could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in parameter setting. Bypassed power cell could not be reset online, it could be reset automatically when the mains voltage is off.</p> <p>If power cell bypass function is not activated, this error would trip the drive incoming circuit-breaker after a configurable filter timer. Manual reset command is required to clear this error in this case.</p>




[Power Cell Slight Over Voltage Warning]

	Probable Cause	<p>Power cell slight over voltage warning is a pre-alert for power cell over voltage error. The triggering DC bus voltage is 1200V which is 100V less than power cell over voltage error protection value. Drive operation would not be interrupted by this warning. The probable causes of slight over voltage warning are the same as over voltage error:</p> <ul style="list-style-type: none"> • Parameter setting – speed ramp too short. • Parameter setting – negative torque current limit setting too high. • Application – catch on fly start. • Application – initial energizing. • Internal insulation breakdown. • Mains voltage fluctuation. • Power cell voltage measurement circuit malfunction.
	Remedy	<ul style="list-style-type: none"> • Increase deceleration ramp setting. • Reduce negative torque current limit in vector control mode. • Enable drive catch on fly start function if required by application. • Increase power on self-diagnosis time if power cell over voltage error is detected right after energizing. • Check internal insulation condition between transformer secondary windings, and between power cell mounting rail if applicable. • Check main voltage fluctuation range and change the transformer tapping if necessary. • Replace power cell by spare part.
	Clearing the Error Code	<p>Power cell slight over voltage warning would be reset automatically when the power cell DC bus voltage reduces to normal level.</p>




[Power Cell Temperature Sensor Disconnected]

	Probable Cause	<p>Power cell internal temperature sensor lead wire and its circuit connection is monitored, when open circuit is detected power cell temperature sensor disconnected error would be generated after a configurable filter timer. Probable causes are listed below:</p> <ul style="list-style-type: none"> • Power cell control PCB and power PCB communication interrupted. • Temperature measurement circuit malfunction.
	Remedy	<ul style="list-style-type: none"> • Check power cell control PCB and power PCB physical connection. • Replace entire power cell by spare part.
	Clearing the Error Code	<p>Power cell temperature sensor disconnected error could be bypassed if the power cell is equipped with bypass circuit and power cell bypass function is activated in parameter setting. Bypassed power cell could not be reset online, it could be reset automatically when the mains voltage is off.</p> <p>If power cell bypass function is not activated, this error would trip the drive incoming circuit-breaker after a configurable filter timer. Manual reset command is required to clear this error in this case.</p>

[Drive Overcurrent]

 Probable Cause	<p>Drive overcurrent is a hardware protection, the protection value is fixed by different current sampling resistance combination and IGBT module nominal current. Typically, the protection value is set higher than the 200% of power cell nominal current peak value and lower than 200% of IGBT nominal current peak. Additional software overcurrent protection is also provided by system. Probable causes of drive overcurrent are provided below:</p> <ul style="list-style-type: none"> • Parameter setting – insufficient auto-tuning. • Parameter setting – overcurrent protection setting. • Poor cable connection • Interference signal • Insulation breakdown • Power cell malfunction • Master controller malfunction (control PCB / signal regulating PCB) • Measuring circuit malfunction (Hall CT, DC power supply module)
 Remedy	<ul style="list-style-type: none"> • Perform proper auto-tuning and set drive in vector control mode for heavy duty application. • Check software overcurrent protection setting, typically the protection value should be 200% of the nominal motor current peak value. • Check internal copper bar and MV cable connections, and proper torque should be applied. • Check internal cable and power cell insulation condition. • Check system grounding connection, separate CT output cable away from MV cable and check other possible interference source. • Check output voltage waveform at open circuit condition, if severe distortion is observed, disconnect the power cell output copper bar and check power cell individual output waveform to identify the power cell with abnormal output. • Replace master controller PCB or signal regulating PCB. • Replace both output Hall CT and check the CT power supply module.
 Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>

[Drive Overload Error]

 Probable Cause	<p>Drive overload error would be triggered when the output current value exceeds the protection setting and presents longer than the filter time. It could be defined time overload protection or inversed time overload protection. Overload error would trip the incoming circuit breaker immediately and drive operation would be interrupted. Probable causes of drive overload error are provided below:</p> <ul style="list-style-type: none"> • Parameter setting – short acceleration time. • Application – rapid load changes or not at design working condition. • Master controller malfunction (control PCB / signal regulating PCB) • Current measurement circuit malfunction (Hall CT or its power supply module)
 Remedy	<ul style="list-style-type: none"> • Increase drive acceleration time setting. • Stabilized application or enable proper drive function to ride through the abnormal condition. • Replace master controller PCB or signal regulating PCB. • Replace output Hall CT and check CT Power supply module.
 Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>

[Drive Output Phase Loss Error]

	Probable Cause	<p>Drive output phase loss error protection could be enabled or disabled by parameter, and this protection is triggered by output current. When the output current is lower than the protection setting and not recovers in time, this protection would be activated. Probable causes are provided below:</p> <ul style="list-style-type: none"> • Output open circuit. • poor cable connection. • output current measurement circuit malfunction.
	Remedy	<ul style="list-style-type: none"> • Disable the protection when output open circuit running is required. • Check copper bar and MV cable connection and proper torque should be applied. • Replace malfunction component in the current measurement circuit such as the CT or signal regulating PCB.
	Clearing the Error Code	Manual reset command is required to clear this error.




[Drive Input Over Voltage Error]

	Probable Cause	<p>Drive input over voltage error protection could be enable or disabled by parameter. This protection detects the system input voltage, when it exceeds 115% of nominal and presents longer than the filter time, the input voltage error would be triggered. Probable causes are provided below:</p> <ul style="list-style-type: none"> • Input voltage fluctuation. • Incorrect sampling coefficient setting or amplitude factor setting. • Voltage measurement circuit malfunction.
	Remedy	<ul style="list-style-type: none"> • Check drive input voltage stability. • Verify voltage sampling coefficient setting and voltage amplitude factor, perform offset correction. • Replace voltage divider or signal regulating PCB.
	Clearing the Error Code	Manual reset command is required to clear this error.




[Power Cell Fiber Suspend (XE) Error]

	Probable Cause	<p>The communication between power cell and drive master controller is monitored when drive is energized. When drive master controller could communicate with power cell but the power cell feedback indicating no command received from master controller, power cell fiber suspend (XE) error would be detected. Power cell fiber suspend (XE) error would trip the incoming circuit breaker immediately, and drive operation would be interrupted. Probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • Fiber optic cable disconnected or not connected properly, fiber optic cable damaged or bended badly. • Optic fiber PCB malfunction.
	Remedy	<ul style="list-style-type: none"> • Check fiber optic cable connection, and fiber optic cable integrity. • Replace optic fiber PCB in master controller.
	Clearing the Error Code	Manual reset command is required to clear this error.




[Drive Control Power Lost Error]

 Probable Cause	<p>Drive external control power supply status is monitored by power source package, this external power supply ready signal is transferred to drive internal PLC as well as the internal battery low signal if power source package is equipped with battery. When the external power supply is off and internal battery low, drive control power lost error would be activated. Drive control power lost error would trip the incoming circuit breaker and drive operation would be interrupted. Probable causes are provided below:</p> <ul style="list-style-type: none"> • External power source off. • Power source package or battery circuit malfunction.
 Remedy	<ul style="list-style-type: none"> • Check external power supply. • Replace entire component such as power source package or internal battery.
 Clearing the Error Code	<p>Manual reset command is required to clear the error when the external power supply recovers.</p>

[Drive Cabinet Door Open Error]

 Probable Cause	<p>Cabinet door is equipped with limit switch. When the drive is energized and the cabinet door is open, drive cabinet door open error would be detected. Cabinet door open error would trip the incoming circuit breaker immediately and drive operation would be interrupted. Probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • Drive cabinet door shape changes or limit switch installation displacement. • Limit switch malfunction.
 Remedy	<ul style="list-style-type: none"> • Adjust cabinet door installation or limit switch installation. • Replace malfunction limit switch.
 Clearing the Error Code	<p>Manual reset command is required to clear the error after all the cabinet doors are closed.</p>

[Drive Transformer Overheat Error]

 Probable Cause	<p>Temperature probes have been placed in air gap between transformer primary coil and secondary coil of each phase. The heat generated by the transformer would increase the air temperature, so monitoring the air gap temperature may indicate the transformer coil temperature with certain compensation. The overheat warning triggering value is set as 95°C. The transformer overheat error protection value is set as 110°C, which should be higher than the warning triggering value. Transformer overheat error would be detected when the probe temperature reading exceeds the protection value and presents longer than the filter time. This error would trip the incoming circuit breaker immediately and drive operation would be interrupted. The probable causes are provided below:</p> <ul style="list-style-type: none"> • High ambient temperature. • Drive long term overload operation. • Drive cooling system malfunction. • Dust filter mads blocked. • Temperature controller malfunction.
 Remedy	<ul style="list-style-type: none"> • Check electrical room cooling system, to maintain the room temperature below 40°C. • Check drive load ratio and avoid overload running. • Check drive cooling system operation, make sure air flow is sufficient. If air duct is applied, make sure it is properly sealed and booster fan should be installed. • Replace dust filter pads. • Replace malfunction temperature controller.
 Clearing the Error Code	<p>Manual reset is required to clear the error when the transformer temperature is lower than the protection value.</p>




[Drive Transformer Overheat Warning]

	Probable Cause	<p>Temperature probes have been placed at air gap between transformer primary coil and secondary coil of each phase. The heat generated by the transformer would increase the air temperature, so monitoring the air gap temperature may indicate the transformer coil temperature with certain compensation. The overheat warning triggering value is set as 95°C. The probable causes are provided below:</p> <ul style="list-style-type: none"> • High ambient temperature. • Drive long term overload operation. • Drive cooling system malfunction. • Dust filter pads blocked. • Temperature controller malfunction.
	Remedy	<ul style="list-style-type: none"> • Check electrical room cooling system, to maintain the room temperature below 40°C. • Check drive load ratio and avoid overload running. • Check drive cooling system operation, make sure air flow is sufficient. If air duct is applied, make sure it is properly sealed and booster fan should be installed. • Replace dust filter mads. • Replace malfunction temperature controller
	Clearing the Error Code	<p>Transformer overheat warning could be reset automatically when the transformer air gap temperature is lower than the warning triggering value.</p>




[Drive Light Overload Warning]

	Probable Cause	<p>Drive overload warning would be triggered when the output current value exceeds the light overload protection setting and light overload hysteresis setting. When the output current exceeds light overload setting and below light overload setting + hysteresis value, light overload warning would be generated and drive could maintain current frequency, but output frequency could not increase to avoid current increasing. When output current exceeds light overload setting + hysteresis value, light overload warning would be generated, and drive would automatically reduce the output frequency as per the speed ramp setting to reduce the output current. Probable causes of light overload warning are provided below:</p> <ul style="list-style-type: none"> • Parameter setting – short acceleration time. • Application – rapid application changes or not in design working condition.
	Remedy	<ul style="list-style-type: none"> • Increase drive acceleration time setting and adjust light overload protection setting. • Stabilized application or enable proper drive function to ride through the abnormal condition.
	Clearing the Error Code	<p>Light overload warning could be reset automatically when the output current is lower than the light overload warning protection value subtracting light overload hysteresis value. And the output frequency would recover to previous set point value after the light overload recovery time setting.</p>

[Drive Output Grounding Warning]

 Probable Cause	<p>Drive output grounding error detection is based on the total 3 phase output voltage, which should be symmetric for most of the case. And when the total output voltage unbalance ratio exceeds protection value, output grounding warning would be detected. The warning behavior is controlled by drive output grounding error delay time setting. If this timer is set as maximum value, which is 1800 sec, drive output grounding status would remain warning only, drive operation would not be interrupted. This is the drive default setting. When the drive output grounding error delay time is set as other value, less than 1800 sec. Warning indication would still be generated when output grounding is detected, and this timer is out, output grounding error would be generated instead of warning, this error protection would trip the incoming circuit breaker and drive operation would be interrupted. Probable causes of drive output grounding are provided below:</p> <ul style="list-style-type: none"> • Motor or drive output cable insulation breakdown. • Drive output voltage divider malfunction. • Drive voltage measurement circuit malfunction.
 Remedy	<ul style="list-style-type: none"> • Check motor and output cable insulation and fix/replace malfunction part. • Replace drive voltage divider. • Replace drive signal regulating PCB or master controller PCB.
 Clearing the Error Code	<p>Drive grounding warning would be reset automatically when the output voltage becomes symmetric. But when output grounding error is generated by drive, manual reset is required to clear this error.</p>

[Drive Cooling Fan Overheat Warning]

 Probable Cause	<p>Thermostat switch is installed inside cooling fan motor, when the temperature of the cooling fan motor exceeds protection value, the contact of thermostat switch would flip to generate the warning signal to drive internal PLC. And according to the drive load ratio, drive behavior would be controlled automatically. When the load ratio is higher than 50%, cooling fan overheat would be considered as error. Drive incoming circuit breaker would be tripped immediately when fan overheat is detected in this condition and drive operation would be interrupted. When the load ratio is lower than 50%, cooling fan overheat would be considered as warning. Drive operation would not be interrupted in this condition. Probable causes of cooling fan overheat warning are provided below:</p> <ul style="list-style-type: none"> • High ambient temperature • Poor connection at cooling fan terminal or internal terminal. • Cooling fan motor malfunction
 Remedy	<ul style="list-style-type: none"> • Check electrical room cooling system, make sure ambient temperature lower than 40 °C. • Check cooling fan wiring connection and internal cooling fan overheat warning signal connection. • Replace malfunction cooling fan
 Clearing the Error Code	<p>Cooling fan overheat warning would be reset automatically when the cooling fan motor temperature reduces below protection value. And when cooling fan overheat error is generated, manual reset command is required to clear this error after the cooling fan motor temperature reduces below protection value.</p>

[Drive Cooling Fan NOT Ready Warning]

	Probable Cause	<p>Motor circuit breaker is equipped for each cooling fan motor, and protection value is set by the hardware regulator according to the power consumption. All these motor circuit breakers should be switched on before drive starting. The motor circuit breaker would trip when the cooling fan current exceeds the protection value, and the motor circuit breaker auxiliary contact would send this signal to drive internal PLC. According to the drive load ratio, drive behavior would be controlled automatically. When the load ratio is higher than 50%, cooling fan NOT ready would be considered as error. Drive incoming circuit breaker would be tripped immediately when cooling fan NOT ready is detected in this condition and drive operation would be interrupted. When the load ratio is lower than 50%, cooling fan NOT ready would be considered as warning. Drive operation would not be interrupted in this condition. Probable causes of cooling fan NOT ready warning/error are provided below:</p> <ul style="list-style-type: none"> • Cooling fan motor circuit breaker switched off. • Dust filter mads blocked. • Improper overload setting on the motor circuit breaker. • Motor circuit breaker or auxiliary contact malfunction.
	Remedy	<ul style="list-style-type: none"> • Check cooling fan motor circuit breaker and switch on all of them. • Replace dust filter mads. • Check motor circuit breaker overload setting by the regulator position. • Replace motor circuit breaker or the auxiliary contact module.
	Clearing the Error Code	<p>Cooling fan NOT ready warning could be reset by manually switching on the tripped cooling fan motor circuit breaker after fixing the overload issue. And if cooling fan NOT ready error is generated, manual reset command is required to clear this error.</p>




[Drive Cooling Fan Contactor Warning/Error]

	Probable Cause	<p>Drive cooling fan operation is controlled internal contactor. And the contactor status is monitored by drive internal PLC. When cooling fan start command is released by PLC and PLC could not receive the contactor close status feedback, drive cooling fan contact warning /error would be generated. According to the drive load ratio, drive behavior would be controlled automatically. When drive load ratio is higher than 50%, no contactor feedback would be considered as error. Drive incoming circuit breaker would be tripped and drive operation would be interrupted. When drive load ratio is lower than 50%, no contactor feedback would be considered as warning. Drive operation would not be interrupted. Probable causes are provided below:</p> <ul style="list-style-type: none"> • Cooling fan contactor control circuit malfunction. • Contactor malfunction.
	Remedy	<ul style="list-style-type: none"> • Check cooling fan control circuit and cooling fan starting logic. • Replace malfunction contactor.
	Clearing the Error Code	<p>Drive cooling fan contact warning could be reset automatically when contactor close status is received by PLC. When drive cooling fan contactor error is generated, manual reset command is required to clear the error code.</p>




[Drive Cooling Fan Power Warning/Error]

	Probable Cause	<p>Drive cooling fan power supply is monitored by a 3-phase control relay. When power supply phase loss or wrong sequence is detected by the phase control relay, the output healthy signal from phase control relay would be gone and drive cooling fan power warning/error would be detected. According to the drive load ratio, behavior would be controlled automatically. If the drive load ratio is more than 50%, phase control relay output signal would be considered as error. Drive incoming circuit breaker would be tripped immediately and drive operation would be interrupted. If drive load ratio is less than 50%, phase control relay output signal would be considered as warning. Drive operation would not be interrupted. Probable causes are provided below:</p> <ul style="list-style-type: none"> • Cooling fan power phase loss or incorrect phase sequence. • Phase control relay malfunction.
	Remedy	<ul style="list-style-type: none"> • Check cooling fan power supply 3 phase voltage and sequence. • Replace malfunction phase control relay.
	Clearing the Error Code	<p>Drive cooling fan power warning could be reset automatically when the phase control relay output signal is received by PLC. If drive cooling fan power error is generated, manual reset command is required to clear this error code.</p>




[Drive Analog Reference Signal Lost Warning]

 Probable Cause	<p>When drive frequency reference mode is selected as analog signal control, drive internal PLC analog input channel 1 status would be monitored. When the analog input signal is lower than the 0% scale setting, drive analog reference signal lost warning would be generated. According to the behavior setting, drive could maintain previous running frequency before analog signal lost or follow the pre-set value. Probable causes of analog reference signal lost are provided below:</p> <ul style="list-style-type: none"> • PLC analog channel 1 poor connection or wrong polarity. • Improper customized setting for analog channel 1.
 Remedy	<ul style="list-style-type: none"> • Check wiring connection and polarity of the analog signal. • Check analog scale setting according to customer physical input value. And check channel configuration parameters.
 Clearing the Error Code	<p>Drive analog reference signal lost warning would be reset automatically when the PLC analog input channel 1 current value is higher than 0% scale setting.</p>

[Drive Analog Feedback Signal Lost Warning/Error]

 Probable Cause	<p>PLC analog channel 2 would be used as actual process feedback in PID regulation mode. If this analog signal is lower than the PLC analog channel 2 0% scale setting, drive would generate analog feedback signal lost status. And if PID regulation mode is not activated, drive analog feedback signal lost would be considered as warning, drive operation would not be interrupted. And if PID mode is activated, drive analog feedback signal lost would be considered as error, the coming circuit breaker would be tripped immediately, and drive operation would be interrupted. Probable causes are provided below:</p> <ul style="list-style-type: none"> • PLC analog channel 2 poor connection or wrong polarity. • Improper customized setting for analog channel 2.
 Remedy	<ul style="list-style-type: none"> • Check wiring connection and polarity of the analog signal. • Check analog scale setting according to customer physical input value. And check channel configuration parameters.
 Clearing the Error Code	<p>Drive analog feedback signal lost warning would be reset automatically when the PLC analog input channel 2 current value is higher than 0% scale setting. And when drive analog feedback signal lost error is generated, manual reset command is required to clear this error after the channel 2 current value is higher than 0% scale setting.</p>

[Drive Fieldbus Communication Interrupted Warning]

 Probable Cause	<p>When drive is configured at fieldbus communication control mode, a heartbeat signal from customer automation system is monitored as detection of fieldbus communication healthy status. And drive behavior could be selected from HMI parameter, to ignore the warning, or to indicate the warning and maintain operation, or to stop the drive. Drive incoming circuit breaker would not be tripped but the behavior could be different according to the drive behavior parameter. Probable causes of this warning are provided below:</p> <ul style="list-style-type: none"> • Communication cable disconnection. • Fieldbus communication configuration parameters setting issue. • Gateway hardware malfunction.
 Remedy	<ul style="list-style-type: none"> • Check communication cable connection. • Configure fieldbus communication parameter properly, such as communication address, protocol selected, etc. • Replace malfunction gateway hardware.
 Clearing the Error Code	<p>Drive fieldbus communication interrupted warning could be ignored or automatically reset when the communication becomes healthy.</p>

[Drive Control Power Lost Warning]

	Probable Cause	<p>Drive external control power supply status is monitored by power source package, this external power supply ready signal is transferred to drive internal PLC as well as the internal battery low signal. When the external power supply is off and internal battery is in operation, drive control power lost warning would be activated. Probable causes are provided below:</p> <ul style="list-style-type: none"> • External power supply off. • Power source package malfunction.
	Remedy	<ul style="list-style-type: none"> • Check external power supply status. • Replace malfunction hardware.
	Clearing the Error Code	<p>Drive control power lost warning could be reset automatically when the external power supply recovers.</p>




[MV Pre-Charge Switch Close Error]

	Probable Cause	<p>A 2sec timer would be activated after PLC sends pre-charge switch close command to resistor bypass contactor. If the contactor closed status feedback is not received when the timer is up, pre-charge switch close error would be generated. Probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • Pre-charge switch control cable disconnected or not connected properly. • The vacuum contactor or auxiliary contact malfunction.
	Remedy	<ul style="list-style-type: none"> • Check pre-charge switch control cable connections. • Check contactor and auxiliary contact, replace if necessary.
	Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>




[MV Pre-Charge Switch Open Error]

	Probable Cause	<p>A 2sec timer would be activated after PLC sends pre-charge switch open command to resistor bypass contactor. If the contactor open status feedback is not received when the timer is up, pre-charge switch open error would be generated. Probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • Pre-charge switch control cable disconnected or not connected properly. • The vacuum contactor or auxiliary contact malfunction.
	Remedy	<ul style="list-style-type: none"> • Check pre-charge switch control cable connections. • Check contactor and auxiliary contact, replace if necessary.
	Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>




[MV Mains Voltage Inconformity Trip]

 Probable Cause	<p>Drive energized status is detected by MVCB closed status feedback and actual voltage measurement, when these two signals conflict with each other, mains voltage inconformity error would be generated after a filter timer. When the inrush current limit resistor bypass contactor open, the filter timer is 750 ms, and when the inrush current limit resistor bypass contactor closed, the filter timer is 61 s. The probable causes of this error are provided below:</p> <ul style="list-style-type: none"> • MVCB in test position, or MV bus no energized. • Parameter setting – master controller DO channel not assigned properly. • Drive voltage detection circuit malfunction. • MVCB status feedback signal disconnected or poorly connected.
 Remedy	<ul style="list-style-type: none"> • Check MVCB position and make sure MV bus is energized. • Check master controller DO3 channel definition as “MV Power ON” • Check HMI voltage reading to make sure the master controller voltage measurement works normally, replace hardware to fix the issue such as voltage divider, signal regulating PCB, master controller PCB, etc. • Check MVCB status feedback signal wire connection.
 Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>

[Total POC Phase Loss Error]

 Probable Cause	<p>The purpose of this monitoring function is to detect an abnormal mains supply of the power cell.</p> <ul style="list-style-type: none"> • Power-cell fuse open. • Power cell rectifier not working properly. • Transformer second winding short circuit.
 Remedy	<p>Replace dedicated power cell.</p>
 Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>

[Main Input Phase Loss Error]

 Probable Cause	<p>The purpose of this protection is to detect an abnormal mains supply of the medium voltage.</p> <ul style="list-style-type: none"> • Drive incorrectly supplied or a tripped fused. • One phase is unavailable. • 3-phase Drive used on a single-phase supply mains. • Unbalanced load. • Transformer second winding short circuit.
 Remedy	<ul style="list-style-type: none"> • Verify the power connection and the fuses. • Use a 3-phase supply mains. • Disable the detected error by [Mains Phase Loss Error response] = [0] if single phase supply mains or DC bus supply is used.
 Clearing the Error Code	<ul style="list-style-type: none"> • Manual reset command is required to clear this error.

[Frequency Regulation Out of Control]

Usually when drive is unable to follow the customer reference frequency setting, it could be the frequency reference mode setting is inconsistent with customer expectation. Typical frequency reference mode could be by drive HMI, by analog signal, or by fieldbus communication. A table is provided below to show the drive configuration for typical reference mode.

f-ref source	f-ref mode setting	Fieldbus Control (%MW1003:x6)
Drive HMI	HMI	N/A
Analog Signal	Analog	Not activated (%MW1003:x6=0)
Fieldbus Communication	Analog	Activated (%MW1003:x6=1)

Other features or function may link to this frequency regulation issue are provided below:

- Drive PLC function lock feature.
- Drive skip frequency function.
- PID regulation function.
- Analog signal channel configuration.
- Light overload protection, or torque limitation.
- Load sharing mode configuration.
- Power cell bypass operation.



Probable Cause

- Drive PLC function lock would change the frequency reference mode automatically according to the local/remote mode selection. Configure the function lock parameter properly if this feature is activated.
- Reference frequency could not be set within the skip frequency range. Check if the skip frequency setting covers the expected drive operation frequency.
- When drive PID regulation function is enabled, the output frequency is controlled by drive internal PID regulator, based on target reference value and actual feedback value. The frequency could not be controlled directly. If direct frequency control is required, PID regulation function should be disabled.
- When analog reference mode is selected, PLC analog channel configuration should be set properly according to the type of signal source, measurement range setting, and scale range setting. And if master controller input analog channel is used, this channel should be set properly as well, including the channel definition and scale setting.
- When light overload warning is activated, drive would not increase the output frequency to avoid output current increasing further. But output frequency reducing is still available in this case. And when output torque exceeds the torque limitation setting in vector control mode, the drive output frequency would reduce rapidly to limit the output torque. And drive out frequency would automatically recover when output current/torque returns below the limitation.
- When load sharing function is activated, it is normal that there is output frequency deviation between the reference value and actual running frequency. This deviation value would vary according to the actual operation speed and individual torque output. The purpose of this deviation value is to make the output frequency synchronized among the multi motor speed synchronization control application.
- When power cell error detected and got bypassed, drive output frequency could be reduced automatically to adapt with the output voltage limitation. Drive may not be able to reach full speed in this condition.






Remedy






Clearing the Error Code

[Controller NOT Ready]

 Probable Cause	<p>Master controller would perform self-diagnosis after power on. When no error is detected after test, master controller ready status would be generated, by a relay contact signal. This status would be sent to PLC digital input by master controller. When master controller does not pass this test or the relay is not closed properly, PLC could not receive the status and it would generate controller NOT ready status. Probable causes are provided below:</p> <ul style="list-style-type: none"> • Master controller does not pass initial self-diagnosis. • Interface PCB hardware malfunction or poor connection.
 Remedy	<ul style="list-style-type: none"> • Reset master controller or replace master controller PCB. • Replace interface PCB and check the wire connection.
 Clearing the Error Code	

[Drive Control System Internal Communication Interrupted]

 Probable Cause	<p>The drive control system is composed by 3 parts, the master controller, internal PLC, and HMI. When internal communication interrupted among the system, HMI would provide a series of indication for different situations, such as master controller linking, master controller no respond, and PLC no respond.</p> <p>Master controller linking and master controller no respond usually indicates the communication interrupted between master controller and HMI. It could be a firmware compatibility issue, or poor connection between master control communication port PCB and HMI, or HMI communication port hardware issue.</p> <p>PLC no respond usually indicates the communication interrupted between PLC and HMI. It could be HMI communication port hardware issue or poor hardware connection.</p>
 Remedy	<p>Check the firmware version of master controller and HMI and check the master controller type setting from HMI. The firmware version should be compatible and master controller type should be consistent with the master controller hardware.</p> <p>Check communication cable connection at master controller communication port PCB, including the DB25 port inside the master controller. And the communication port PCB should be securely connected to the DSP transfer PCB.</p> <p>Replace HMI hardware.</p>
 Clearing the Error Code	

[Drive Cannot Start]

	Probable Cause	<p>Drive provides interlock signal with incoming circuit breaker. When drive is ready to be energized, a close permit signal is released to circuit breaker. Customer close command becomes valid at this condition. Usually this requires drive controller ready, no error latched in memory, and mains voltage off bottom released.</p> <p>After closing circuit breaker, master controller would communicate with all power cells. When all power cells feedback is normal, and drive cooling fans are running, fieldbus communication is healthy, and remote free wheel stop command is not released, drive should enter system ready status. In this status, drive should be started when command received.</p> <p>And when drive is in system ready status, the command mode should be configured properly. Usually, it could be from HMI start button at local control mode, or from terminal digital contact signal at remote control mode, or from fieldbus communication command word at remote fieldbus communication mode.</p>
	Remedy	<p>Monitor PLC logic online to check if drive releases circuit close permit signal or if drive is in system ready status.</p> <p>Check the command mode configuration, which should be aligned with selected control mode.</p>
	Clearing the Error Code	




[Arc Monitoring Unit Error]

	Probable Cause	<p>An Arc Monitoring Unit is a specialized device used to detect and monitor arc flash in electrical systems.</p>
	Remedy	
	Clearing the Error Code	<p>The error could be removed by product reset function.</p>




[Motor Stall Error]

	Probable Cause	<ul style="list-style-type: none"> The stall monitoring function is used to prevent the motor rotor from becoming blocked. If the VSD output current exceeds the value set in [Stall Monitoring Current] and the VSD output frequency falls below the value set in [Stall Monitoring Frequency] for a duration longer than [Stall Monitoring Time], a [Motor Stall Error] will be triggered. As a result, the “QF1 Trip” signal will be activated, and the product will execute output emergency stop command simultaneously.
	Remedy	<ul style="list-style-type: none"> Check whether the motor rotor is blocked. Verify that the function parameters are properly configured for the application. <p>Relevant configuration parameters include:</p> <ul style="list-style-type: none"> Stall monitoring current Stall monitoring frequency Stall monitoring time
	Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[LV Pre-charge Cycling Monitoring Is Active]

 Probable Cause	<ul style="list-style-type: none"> • This message is intended to remind the user that cycling monitoring is active. Any energizing request will be ignored, even if the product has not been successfully pre-charged. • The function is designed to prevent overheating damage to the pre-charge resistors caused by frequent execution of the pre-charge sequence. • When the low-voltage pre-charge is initiated by closing contactor KM91, cycling monitoring becomes active and remains so until the [LV Precharge Sequence Cycle Time] has elapsed.
 Remedy	<ul style="list-style-type: none"> • The reminder message will disappear after the [LV Precharge Sequence Cycle Time] has elapsed. • A new cycle of the pre-charge sequence can be initiated only when cycling monitoring is inactive. • The value of [LV Precharge Sequence Cycle Time] must be kept at the factory setting. Any modification must be approved by the SE expert service team. •
 Clearing the Error Code	<p>The error can be cleared using the product reset function</p>




[KM91 Close Error]

 Probable Cause	<ul style="list-style-type: none"> • This error may occur while the low-voltage pre-charge sequence is in progress. • When the KM91 close command is issued by the product control system, the error logic will be triggered if the KM91 closed feedback is not received within the [KM91 Close CMD To Closed Time].
 Remedy	<ul style="list-style-type: none"> • The wiring of the contactor control signals should be checked. • The performance of the contactor should be verified.
 Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[Two Level PWR Supply Error]

 Probable Cause	<ul style="list-style-type: none"> • This error may occur while the low-voltage pre-charge sequence is in progress. • When QF92 is closed while KM92 remains open, the product is pre-charged by the low-voltage power supply through two-level pre-charge resistors. • The measured voltage on the primary side of the mains transformer is expected to exceed the value defined by [MV Threshold with 2-Level Pre-Charge Resistors] within the time defined by [QF92 Closed To MV RDY Time]; otherwise, the error logic will be triggered.
 Remedy	<ul style="list-style-type: none"> • The wiring of the control signals for QF91, KM91, and QF92 should be checked. • The performance of QF91, KM91, and QF92 should be verified. • The low-voltage power supply should be checked.
 Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[QF92 Close Error]

	Probable Cause	<ul style="list-style-type: none"> This error may occur while the low-voltage pre-charge sequence is in progress. When the KM92 close command is issued by the product control system, the error logic will be triggered if the QF92 closed feedback is not received within the [LV QF92 CB Closing Filter time].
	Remedy	<ul style="list-style-type: none"> The wiring of the contactor control signals should be checked. The performance of the contactor should be verified.
	Clearing the Error Code	The error can be cleared using the product reset function.




[One Level PWR Supply Error]

	Probable Cause	<ul style="list-style-type: none"> This error may occur while the low-voltage pre-charge sequence is in progress. When QF92 is closed while KM91 is already closed, the product is pre-charged by the low-voltage power supply through one-level pre-charge resistors. The measured voltage on the primary side of the mains transformer is expected to exceed the [Product Mains Voltage Ready Threshold] within the time defined by [KM91 Closed To MV RDY Time]; otherwise, the error logic will be triggered.
	Remedy	<ul style="list-style-type: none"> The wiring of the control signals for QF91, KM91, and QF92 should be checked. The performance of QF91, KM91, and QF92 should be verified. The low-voltage power supply should be checked.
	Clearing the Error Code	The error can be cleared using the product reset function.




[QF1 Close Error]

	Probable Cause	<ul style="list-style-type: none"> This error may occur while the low-voltage pre-charge sequence is in progress. When the QF1 close command is issued by the product control system, the error logic will be triggered if the QF1 closed feedback is not received within the time defined by [QF1 Close CMD to QF1 Closed Time].
	Remedy	<ul style="list-style-type: none"> The wiring of the control signals for QF1 should be checked. The performance of QF1 should be verified. Check that the setting of [QF1 Close CMD to QF1 Closed Time] is appropriate for the application.
	Clearing the Error Code	The error can be cleared using the product reset function.




[KM91 Open Error]

	Probable Cause	<ul style="list-style-type: none"> This error may occur while the low-voltage pre-charge sequence is in progress. When the KM91 open command is issued by the product control system, the error logic will be triggered if the KM91 opened feedback is not received within the time defined by [KM91 Open CMD to Opened Time].
	Remedy	<ul style="list-style-type: none"> The wiring of the control signals for the contactor should be checked. The performance of the contactor should be verified.
	Clearing the Error Code	The error can be cleared using the product reset function.




[QF92 Open Error]

 Probable Cause	<ul style="list-style-type: none"> This error may occur while the low-voltage pre-charge sequence is in progress. When the QF92 open command is issued by the product control system, the error logic will be triggered if the QF92 opened feedback is not received within the time defined by [LV QF92 CB Opening Filter time].
 Remedy	<ul style="list-style-type: none"> The wiring of the control signals for QF1 should be checked. The performance of QF1 should be verified. Check that the setting of [QF1 Close CMD to QF1 Closed Time] is appropriate for the application.
 Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[QF91 Open Error]

 Probable Cause	<ul style="list-style-type: none"> This error may occur while the low-voltage pre-charge sequence is in progress. When the QF91 open command is issued by the product control system, the error logic will be triggered if the low-voltage power supply is not disconnected within the time defined by [QF91 Open CMD to LV Pwr Off Time].
 Remedy	<ul style="list-style-type: none"> The wiring of the control signals for QF91 should be checked. The wiring of the detection circuits for the low-voltage power supply should be checked.
 Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[PoC DC Bus Discharged Error]

 Probable Cause	<ul style="list-style-type: none"> This error may occur after the low-voltage pre-charge sequence has been successfully completed. If an unexpected mains voltage power loss occurs while QF1 remains closed for more than 60 seconds, the error logic will be triggered.
 Remedy	<ul style="list-style-type: none"> The low-voltage pre-charge sequence must be executed before powering on the product with medium voltage.
 Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[MV Pre-charge Contactor Error]

 Probable Cause	<ul style="list-style-type: none"> This error may occur after selecting the medium-voltage pre-charge sequence. If there is a non-synchronization between the pre-charge bypass contactor command and its feedback status lasting longer than the time defined by [Precharge Contactor Transition Time], the error logic will be triggered. <p>NOTE: Non-synchronization of the pre-charge bypass contactor is considered TRUE if either of the following conditions is detected:</p> <ul style="list-style-type: none"> Condition 1: Active close command with an open feedback status Condition 2: Active open command with a closed feedback status
 Remedy	<ul style="list-style-type: none"> The control signals of the bypass contactor should be checked. The medium-voltage pre-charge sequence must be executed before running the product.
 Clearing the Error Code	<p>The error can be cleared using the product reset function.</p>




[External Device 1 Overheat Warning]

	Probable Cause	If the measured temperature of External Device 1 exceeds the [External Device 1 Overheat Warning Threshold] , the warning logic will be executed.
	Remedy	<ul style="list-style-type: none"> • The warning will disappear when the measured temperature of External Device 1 falls below the [External Device 1 Overheat Warning Threshold]. • Check whether the setting of the [External Device 1 Overheat Warning Threshold] is appropriate for the application.
	Clearing the Error Code	




[External Device 1 Overheat Error]

	Probable Cause	If measured temperature of External Device 1 were over [External Device 1 Overheat error threshold] , error logic would be executed.
	Remedy	Check whether the setting of the [External Device 1 Overheat Error Threshold] is appropriate for the application.
	Clearing the Error Code	The error can be reset using the product reset function.




[External Device 2 Overheat Warning]

	Probable Cause	If the measured temperature of External Device 2 exceeds the [External Device 2 Overheat Warning Threshold] , the warning logic will be executed.
	Remedy	<ul style="list-style-type: none"> • The warning will disappear when the measured temperature of External Device 2 falls below the [External Device 2 Overheat Warning Threshold]. • Check whether the setting of the [External Device 2 Overheat Warning Threshold] is appropriate for the application.
	Clearing the Error Code	




[External Device 2 Overheat Error]

	Probable Cause	If measured temperature of External Device 2 were over [External Device 2 Overheat error threshold] , error logic would be executed.
	Remedy	Check whether the setting of the [External Device 2 Overheat Error Threshold] is appropriate for the application.
	Clearing the Error Code	The error can be reset using the product reset function.




[External Device 3 Overheat Warning]

 Probable Cause	If the measured temperature of External Device 3 exceeds the [External Device 3 Overheat Warning Threshold] , the warning logic will be executed.
 Remedy	<ul style="list-style-type: none"> The warning will disappear when the measured temperature of External Device 3 falls below the [External Device 3 Overheat Warning Threshold]. Check whether the setting of the [External Device 3 Overheat Warning Threshold] is appropriate for the application.
 Clearing the Error Code	




[External Device 3 Overheat Error]

 Probable Cause	If measured temperature of External Device 3 were over [External Device 3 Overheat error threshold] , error logic would be executed.
 Remedy	Check whether the setting of the [External Device 3 Overheat Error Threshold] is appropriate for the application.
 Clearing the Error Code	The error can be reset using the product reset function.

[External Device 4 Overheat Warning]

 Probable Cause	If the measured temperature of External Device 4 exceeds the [External Device 4 Overheat Warning Threshold] , the warning logic will be executed.
 Remedy	<ul style="list-style-type: none"> The warning will disappear when the measured temperature of External Device 4 falls below the [External Device 4 Overheat Warning Threshold]. Check whether the setting of the [External Device 4 Overheat Warning Threshold] is appropriate for the application.
 Clearing the Error Code	

[External Device 4 Overheat Error]

 Probable Cause	If measured temperature of External Device 4 were over [External Device 4 Overheat error threshold] , error logic would be executed.
 Remedy	Check whether the setting of the [External Device 4 Overheat Error Threshold] is appropriate for the application.
 Clearing the Error Code	The error can be reset using the product reset function.




[Vibration Sensor 1 Link Loss Warning]

	Probable Cause	<ul style="list-style-type: none"> The warning may occur if the "Analog Monitor Assignment Function 1" is activated. The warning logic will be executed if [Analog Monitor Physical 1] (AM1O) < AMxX - "1 mA". AM1O value could be READ by fieldbus address MW3212. <p>NOTE: Example of Alx loss detection with threshold AMxX - "1 mA" (equivalent to 5.0% of AI range):</p> <ul style="list-style-type: none"> AMxY = 100% for 20 mA 0 mA: AMxX = 0.0% 4 mA: AMxX = 20.0% Threshold AMxX - 5.0% → Level = 3 mA 10 mA: AMxX = 50.0% Threshold AMxX - 5.0% → Level = 9 mA 2 mA: AMxX = 10.0% Threshold AMxX - 5.0% → Level = 2 mA 1 mA: AMxX = 5.0% Threshold AMxX - 5.0% → Level = 0 mA (No detection)
	Remedy	<ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Physical 1] (AM1O) > AMxX - 1 mA. Check the wiring circuits from the sensor to the product terminals. Check whether the setting of [AMxF_AIxMonitorFilterTime] is appropriate for the application.
	Clearing the Error Code	




[Vibration Sensor 2 Link Loss Warning]

	Probable Cause	<ul style="list-style-type: none"> The warning may occur if the "Analog Monitor Assignment Function 2" is activated. The warning logic will be executed if [Analog Monitor Physical 2] (AM2O) < AMxX - "1 mA". AM2O value could be READ by fieldbus address MW3213 <p>NOTE: Example of Alx loss detection with threshold AMxX - "1 mA" (equivalent to 5.0% of AI range):</p> <ul style="list-style-type: none"> AMxY = 100% for 20 mA 0 mA: AMxX = 0.0% 4 mA: AMxX = 20.0% Threshold AMxX - 5.0% → Level = 3 mA 10 mA: AMxX = 50.0% Threshold AMxX - 5.0% → Level = 9 mA 2 mA: AMxX = 10.0% Threshold AMxX - 5.0% → Level = 2 mA 1 mA: AMxX = 5.0% Threshold AMxX - 5.0% → Level = 0 mA (No detection)
	Remedy	<ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Physical 2] (AM1O) > AMxX - 1 mA. Check the wiring circuits from the sensor to the product terminals. Check whether the setting of [AMxF_AIxMonitorFilterTime] is appropriate for the application.
	Clearing the Error Code	

[Vibration Sensor 3 Link Loss Warning]

 Probable Cause	<ul style="list-style-type: none"> The warning may occur if the “Analog Monitor Assignment Function 3” is activated. The warning logic will be executed if [Analog Monitor Physical 3] (AM3O) < AMxX – “1 mA”. AM3O value could be READ by fieldbus address MW3214. <p>NOTE: Example of Alx loss detection with threshold AMxX – “1 mA” (equivalent to 5.0% of AI range):</p> <ul style="list-style-type: none"> AMxY = 100% for 20 mA 0 mA: AMxX = 0.0% 4 mA: AMxX = 20.0% Threshold AMxX – 5.0% → Level = 3 mA 10 mA: AMxX = 50.0% Threshold AMxX – 5.0% → Level = 9 mA 2 mA: AMxX = 10.0% Threshold AMxX – 5.0% → Level = 2 mA 1 mA: AMxX = 5.0% Threshold AMxX – 5.0% → Level = 0 mA (No detection)
 Remedy	<ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Physical 3] (AM1O) > AMxX - 1 mA. Check the wiring circuits from the sensor to the product terminals. Check whether the setting of [AMxF_AlxMonitorFilterTime] is appropriate for the application.
 Clearing the Error Code	

[Vibration Sensor 4 Link Loss Warning]

 Probable Cause	<ul style="list-style-type: none"> The warning may occur if the “Analog Monitor Assignment Function 4” is activated. The warning logic will be executed if [Analog Monitor Physical 4] (AM4O) < AMxX – “1 mA”. AM4O value could be READ by fieldbus address MW3215. <p>NOTE: Example of Alx loss detection with threshold AMxX – “1 mA” (equivalent to 5.0% of AI range):</p> <ul style="list-style-type: none"> AMxY = 100% for 20 mA 0 mA: AMxX = 0.0% 4 mA: AMxX = 20.0% Threshold AMxX – 5.0% → Level = 3 mA 10 mA: AMxX = 50.0% Threshold AMxX – 5.0% → Level = 9 mA 2 mA: AMxX = 10.0% Threshold AMxX – 5.0% → Level = 2 mA 1 mA: AMxX = 5.0% Threshold AMxX – 5.0% → Level = 0 mA (No detection)
 Remedy	<ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Physical 4] (AM1O) > AMxX - 1 mA. Check the wiring circuits from the sensor to the product terminals. Check whether the setting of [AMxF_AlxMonitorFilterTime] is appropriate for the application.
 Clearing the Error Code	



[Vibration 1 High Warning]

	Probable Cause	<ul style="list-style-type: none"> The warning may occur if the “Analog Monitor Assignment Function 1” is activated. The warning will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The warning logic will be executed if [Analog Monitor Process 1] (AM1P) is outside the warning low-high range for the warning delay time. AM1P value could be READ by fieldbus address MW3216..
	Remedy	<p>NOTE:</p> <ul style="list-style-type: none"> The warning high threshold refers to [AMxU_AlxMonitorWarningLevelHigh]. The warning low threshold refers to [AMxV_AlxMonitorWarningLevelLow]. The warning delay time refers to [AMxW_AlxMonitorDelayWarning]. <ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Process 1] (AM1P) is inside the warning low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior]. Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxU_AlxMonitorWarningLevelHigh], [AMxV_AlxMonitorWarningLevelLow], and [AMxW_AlxMonitorDelayWarning].
	Clearing the Error Code	




[Vibration 2 High Warning]

	Probable Cause	<ul style="list-style-type: none"> The warning may occur if the “Analog Monitor Assignment Function 2” is activated. The warning will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The warning logic will be executed if [Analog Monitor Process 2] (AM2P) is outside the warning low-high range for the warning delay time. AM2P value could be READ by fieldbus address MW3217.
	Remedy	<p>NOTE:</p> <ul style="list-style-type: none"> The warning high threshold refers to [AMxU_AlxMonitorWarningLevelHigh]. The warning low threshold refers to [AMxV_AlxMonitorWarningLevelLow]. The warning delay time refers to [AMxW_AlxMonitorDelayWarning]. <ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Process 2] (AM2P) is inside the warning low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior]. Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxU_AlxMonitorWarningLevelHigh], [AMxV_AlxMonitorWarningLevelLow], and [AMxW_AlxMonitorDelayWarning].
	Clearing the Error Code	

[Vibration 3 High Warning]

 Probable Cause	<ul style="list-style-type: none"> The warning may occur if the “Analog Monitor Assignment Function 3” is activated. The warning will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The warning logic will be executed if [Analog Monitor Process 3] (AM3P) is outside the warning low-high range for the warning delay time. AM3P value could be READ by fieldbus address MW3218. <p>NOTE:</p> <ul style="list-style-type: none"> The warning high threshold refers to [AMxU_AlxMonitorWarningLevelHigh]. The warning low threshold refers to [AMxV_AlxMonitorWarningLevelLow]. The warning delay time refers to [AMxW_AlxMonitorDelayWarning].
 Remedy	<ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Process 3] (AM3P) is inside the warning low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior]. Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxU_AlxMonitorWarningLevelHigh], [AMxV_AlxMonitorWarningLevelLow], and [AMxW_AlxMonitorDelayWarning].
 Clearing the Error Code	

[Vibration 4 High Warning]

 Probable Cause	<ul style="list-style-type: none"> The warning may occur if the “Analog Monitor Assignment Function 4” is activated. The warning will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The warning logic will be executed if [Analog Monitor Process 4] (AM4P) is outside the warning low-high range for the warning delay time. AM4P value could be READ by fieldbus address MW3219. <p>NOTE:</p> <ul style="list-style-type: none"> The warning high threshold refers to [AMxU_AlxMonitorWarningLevelHigh]. The warning low threshold refers to [AMxV_AlxMonitorWarningLevelLow]. The warning delay time refers to [AMxW_AlxMonitorDelayWarning].
 Remedy	<ul style="list-style-type: none"> The warning will disappear if [Analog Monitor Process 4] (AM4P) is inside the warning low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior]. Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxU_AlxMonitorWarningLevelHigh], [AMxV_AlxMonitorWarningLevelLow], and [AMxW_AlxMonitorDelayWarning].
 Clearing the Error Code	

[Vibration 1 High Error]

	Probable Cause	<ul style="list-style-type: none"> The error may occur if the “Analog Monitor Assignment Function 1” is activated. The error will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The error logic will be executed if [Analog Monitor Process 1] (AM1P) is outside the error low-high range for the error delay time. AM1P value could be READ by fieldbus address MW3216. <p>NOTE:</p> <ul style="list-style-type: none"> The error high threshold refers to [AMxR_AlxMonitorProcessTripLevelHigh]. The error low threshold refers to [AMxS_AlxMonitorProcessTripLevelLow]. The error delay time refers to [AMxT_AlxMonitorProcessTripTimeOut].
	Remedy	<p>Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxR_AlxMonitorProcessTripLevelHigh], [AMxS_AlxMonitorProcessTripLevelLow], and [AMxT_AlxMonitorProcessTripTimeOut].</p>
	Clearing the Error Code	<p>The error can be reset using the product reset function if [Analog Monitor Process 1] (AM1P) is inside the error low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior].</p>




[Vibration 2 High Error]

	Probable Cause	<ul style="list-style-type: none"> The error may occur if the “Analog Monitor Assignment Function 2” is activated. The error will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The error logic will be executed if [Analog Monitor Process 2] (AM2P) is outside the error low-high range for the error delay time. AM2O value could be READ by fieldbus address MW3213. <p>NOTE:</p> <ul style="list-style-type: none"> The error high threshold refers to [AMxR_AlxMonitorProcessTripLevelHigh]. The error low threshold refers to [AMxS_AlxMonitorProcessTripLevelLow]. The error delay time refers to [AMxT_AlxMonitorProcessTripTimeOut].
	Remedy	<p>Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxR_AlxMonitorProcessTripLevelHigh], [AMxS_AlxMonitorProcessTripLevelLow], and [AMxT_AlxMonitorProcessTripTimeOut].</p>
	Clearing the Error Code	<p>The error can be reset using the product reset function if [Analog Monitor Process 2] (AM2P) is inside the error low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior].</p>




[Vibration 3 High Error]

	Probable Cause	<ul style="list-style-type: none"> The error may occur if the “Analog Monitor Assignment Function 3” is activated. The error will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The error logic will be executed if [Analog Monitor Process 3] (AM3P) is outside the error low-high range for the error delay time. AM3O value could be READ by fieldbus address MW3214. <p>NOTE:</p> <ul style="list-style-type: none"> The error high threshold refers to [AMxR_AlxMonitorProcessTripLevelHigh]. The error low threshold refers to [AMxS_AlxMonitorProcessTripLevelLow]. The error delay time refers to [AMxT_AlxMonitorProcessTripTimeOut].
	Remedy	<p>Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxR_AlxMonitorProcessTripLevelHigh], [AMxS_AlxMonitorProcessTripLevelLow], and [AMxT_AlxMonitorProcessTripTimeOut].</p>
	Clearing the Error Code	<p>The error can be reset using the product reset function if [Analog Monitor Process 3] (AM3P) is inside the error low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior].</p>




[Vibration 4 High Error]

 Probable Cause	<ul style="list-style-type: none"> The error may occur if the “Analog Monitor Assignment Function 4” is activated. The error will be monitored if the field condition matches the monitor condition set by [AMxB_AlxMonitorBehavior]. The error logic will be executed if [Analog Monitor Process 4] (AM4P) is outside the error low-high range for the error delay time. AM4O value could be READ by fieldbus address MW3215. <p>NOTE:</p> <ul style="list-style-type: none"> The error high threshold refers to [AMxR_AlxMonitorProcessTripLevelHigh]. The error low threshold refers to [AMxS_AlxMonitorProcessTripLevelLow]. The error delay time refers to [AMxT_AlxMonitorProcessTripTimeOut].
 Remedy	<p>The error can be reset using the product reset function if [Analog Monitor Process 4] (AM4P) is inside the error low-high range or the field condition does not match the monitor condition set by [AMxB_AlxMonitorBehavior].</p>
 Clearing the Error Code	<p>Check whether the configuration parameter settings for the function are appropriate for the application, including [AMxR_AlxMonitorProcessTripLevelHigh], [AMxS_AlxMonitorProcessTripLevelLow], and [AMxT_AlxMonitorProcessTripTimeOut].</p>




[Heater NOT Ready Warning]

 Probable Cause	<ul style="list-style-type: none"> The function is used to monitor whether all breakers supplying power to space heaters installed in the PoC cabinet and transformer cabinet are ON. If any one of the breakers is switched OFF, the warning control logic will be executed.
 Remedy	<ul style="list-style-type: none"> The warning is expected to disappear if all the breakers are switched ON. If the warning remains active even when all the breakers are switched ON, the control circuits—from the 24VDC supply to the dedicated PLC digital input channel should be checked.
 Clearing the Error Code	




[Anti-restart is Active]

 Probable Cause	<ul style="list-style-type: none"> This information is intended to remind the user that cycling monitoring is active; any VSD start command will be ignored. The function is used to prevent the VSD from restarting too frequently.
 Remedy	<ul style="list-style-type: none"> The reminder information will disappear after the [Cyclic Start Window Time] has elapsed.
 Clearing the Error Code	




[QF1 SwitchON Cycling Monitoring is Active]

 Probable Cause	<ul style="list-style-type: none"> This information is intended to remind the user that cycling monitoring is active. One of the conditions for switching on the dedicated digital output channel, QF1_EnableToClose, is that cycling monitoring must be inactive.
 Remedy	<ul style="list-style-type: none"> Cycling monitoring becomes inactive when the QF1 Switch on Cycling Window Time has elapsed.
 Clearing the Error Code	

[Transformer Temp. Rise Warning]

 Probable Cause	<p>The winding temperature of the transformer or cabinet transformer has reached the threshold level. Possible causes include:</p> <ul style="list-style-type: none"> • Cooling fans are not working. • Door filter mats are blocked. • High ambient temperature in the electrical room. • Cooling fans are rotating in the wrong direction. • The transformer is overloaded. • The threshold level set in the HMI is incorrect. • The temperature fiber box is providing inaccurate measurements. • The fiber box is not working.
 Remedy	<ul style="list-style-type: none"> • Verify that the transformer temperature threshold [Transf Thermal Warning Level] does not exceed the defined warning threshold. • Verify all cooling fans are working properly and rotating in the correct direction. • Verify that door filter mats are free of dust and that proper airflow is ensured. • Verify that the external cooling circuit (e.g., air conditioning) in the electrical room is functioning correctly. • Verify that environmental conditions in the electrical room comply with the specified requirements. • Verify that the measurement circuit is functioning properly, including: <ul style="list-style-type: none"> ◦ PT100 sensor on the transformer cabinet door ◦ Fiber sensors on transformer windings ◦ PLC (Programmable Logic Controller) ◦ Wiring connections ◦ Fiber box
 Clearing the Error Code	

[Transformer Temp. Rise Trip]

 Probable Cause	<p>The winding temperature of the transformer or cabinet transformer has reached the threshold level. Possible causes include:</p> <ul style="list-style-type: none"> • Cooling fans are not working. • Door filter mats are blocked. • High ambient temperature in the electrical room. • Cooling fans are rotating in the wrong direction. • The transformer is overloaded. • The threshold level set in the HMI is incorrect. • The temperature fiber box is providing inaccurate measurements. • The fiber box is not working.
 Remedy	<ul style="list-style-type: none"> • Verify that the transformer temperature threshold [Transf Thermal Trip Level] does not exceed the defined error threshold. • Verify that all cooling fans are operating correctly and rotating in the proper direction. • Verify that door filter mats are clean and allow sufficient airflow. • Verify that the external cooling circuit (e.g., air conditioning) in the electrical room is functioning properly. • Verify that the environmental conditions in the electrical room comply with the specified requirements. • Verify that the temperature measurement circuit is functioning correctly, including: <ul style="list-style-type: none"> ◦ PT100 sensor on the transformer cabinet door ◦ Fiber sensors on transformer windings ◦ PLC (Programmable Logic Controller) ◦ Wiring connections ◦ Fiber box
 Clearing the Error Code	

[Transformer Thermal Warning]



Probable Cause

The winding temperature of the transformer has reached the threshold level. Possible causes include:

- Cooling fans are not working.
- Door filter mats are blocked.
- High ambient temperature in the electrical room.
- Cooling fans are rotating in the wrong direction.
- The transformer is overloaded.
- The threshold level set in the HMI is incorrect.
- The temperature fiber box is providing inaccurate measurements.
- The fiber box is not working.






Remedy

- Verify that the transformer temperature thresholds (Transf Thermal Warning Level / Transf High Ambient Temperature) do not exceed the defined warning threshold.
- Verify that all cooling fans are operating correctly and rotating in the proper direction.
- Verify that door filter mats are clean and allow for adequate airflow.
- Verify that the external cooling system (e.g., air conditioning) in the electrical room is functioning properly.
- Verify that the environmental conditions in the electrical room comply with the specified requirements.
- Verify that the temperature measurement circuit is functioning correctly, including:
 - PT100 sensor on the transformer cabinet door
 - Fiber sensors on transformer windings
 - PLC (Programmable Logic Controller)
 - Wiring connections
 - Fiber box






Clearing the Error Code




[Transformer Thermal Trip]

 Probable Cause	<p>The winding temperature of the transformer has reached the threshold level. Possible causes include:</p> <ul style="list-style-type: none"> • Cooling fans are not working. • Door filter mats are blocked. • High ambient temperature in the electrical room. • Cooling fans are rotating in the wrong direction. • The transformer is overloaded. • The threshold level set in the HMI is incorrect. • The temperature fiber box is providing inaccurate measurements. • The fiber box is not working.
 Remedy	<ul style="list-style-type: none"> • Verify that the transformer temperature thresholds (Transf Thermal Warning Level / Transf Max Ambient Temperature) do not exceed the defined error threshold. • Verify that all cooling fans are functioning properly and rotating in the correct direction. • Verify that door filter mats are clean and allow for adequate airflow. • Verify that the external cooling system (e.g., air conditioning) in the electrical room is operating correctly. • Verify that the environmental conditions in the electrical room comply with the specified standards. • Verify that the temperature measurement circuit is functioning correctly, including: <ul style="list-style-type: none"> ◦ PT100 sensor on the transformer cabinet door ◦ Fiber sensors on transformer windings ◦ PLC (Programmable Logic Controller) ◦ Wiring connections ◦ Fiber box
 Clearing the Error Code	

[Fiber Optic Com Interruption]

 Probable Cause	<p>The RS485 communication of the fiber optic temperature sensor box is interrupted.</p>
 Remedy	<p>Check whether the RS485 communication cable of the fiber optic temperature sensor box is properly connected.</p>
 Clearing the Error Code	

[Fiber optic Temp. Error]

 Probable Cause	<p>The fiber optic temperature sensor box may be damaged, or the temperature-sensing fiber is either damaged or not properly connected.</p>
 Remedy	<p>Inspect the fiber optic temperature sensor box, the fiber, and their connections.</p>
 Clearing the Error Code	

[PoC Cabinet Overheat Warning]

	<p>Probable Cause</p>	<p>If measured temperature of air inlet of Power Cells Cabinet exceeds the [Transformer Cabinet Overheat Warning Threshold], the warning logic would be executed.</p> <p>Probable causes as follows:</p> <ul style="list-style-type: none"> • Cooling fans not working. • Cooling fans rotates in the wrong direction. • Door filter mats blocked. • The threshold level set in the HMI is wrong. • The sensor, installed in Power Cells Cabinet, don't work properly.
	<p>Remedy</p>	<ul style="list-style-type: none"> • Verify all cooling fans are working properly and rotate in the right direction. • Verify door filter mats are free of dust and the required airflow is ensured. • Verify that the external cooling circuit (AC) in the electrical room is working properly. • Verify compliance to the environmental conditions in the electrical room according to the specification. • Verify that the measurement circuit is working properly
	<p>Clearing the Error Code</p>	




[PoC Cabinet Overheat Error]

	<p>Probable Cause</p>	<p>If measured temperature of air inlet of Power Cells Cabinet exceeds the [PoC Cabinet Overheat Warning Threshold], the error logic would be executed.</p> <p>Probable causes as follows:</p> <ul style="list-style-type: none"> • Cooling fans not working. • Cooling fans rotates in the wrong direction. • Door filter mats blocked. • The threshold level set in the HMI is wrong. • The sensor, installed in Power Cells Cabinet, don't work properly
	<p>Remedy</p>	<ul style="list-style-type: none"> • Verify all cooling fans are working properly and rotate in the right direction. • Verify door filter mats are free of dust and the required airflow is ensured. • Verify that the external cooling circuit (AC) in the electrical room is working properly. • Verify compliance to the environmental conditions in the electrical room according to the specification. • Verify that the measurement circuit is working properly
	<p>Clearing the Error Code</p>	




[Motor Winding OverHeat Warning]

	<p>Probable Cause</p>	<p>If measured temperature of any one of motor winding exceeds the [Motor Winding Overheat Warning Threshold], the warning logic would be executed.</p>
	<p>Remedy</p>	<ul style="list-style-type: none"> • The warning would be disappeared when measured temperature of all the motor winding were below [Motor Winding Overheat Warning Threshold]. • Check whether the setting of [Motor Winding Overheat Warning Threshold] were proper for the application. • Check the wire connection from PT100, installed inside the motor winding, to corresponding product terminals
	<p>Clearing the Error Code</p>	




[Motor Winding Overheat Error Threshold]

 Probable Cause	<p>If measured temperature of any one of motor winding exceeds the [Motor Winding Overheat Error Threshold], the error logic would be executed.</p>
 Remedy	<ul style="list-style-type: none"> • The error would be disappeared when measured temperature of all the motor winding were below [Motor Winding Overheat Error Threshold]. • Check whether the setting of [Motor Winding Overheat Error Threshold] were proper for the application. • Check the wire connection from PT100, installed inside the motor winding, to corresponding product terminals
 Clearing the Error Code	




[Motor Bearing Overheat Warning Threshold]

 Probable Cause	<p>If measured temperature of any one of motor bearing exceeds the [Motor Bearing Overheat Warning Threshold], the warning logic would be executed.</p>
 Remedy	<ul style="list-style-type: none"> • The warning would be disappeared when measured temperature of all the motor bearing were below [Motor Bearing Overheat Warning Threshold]. • Check whether the setting of [Motor Winding Overheat Warning Threshold] were proper for the application. • Check the wire connection from PT100, installed inside the motor winding, to corresponding product terminals.
 Clearing the Error Code	




[Motor Bearing Overheat Error Threshold]

 Probable Cause	<p>If measured temperature of any one of motor bearing were over [Motor Bearing Overheat Error Threshold], error logic would be executed.</p>
 Remedy	<ul style="list-style-type: none"> • The error would be disappeared when measured temperature of all the motor bearing were below [Motor Bearing Overheat Error Threshold]. • Check whether the setting of [Motor Bearing Overheat Error Threshold] were proper for the application. • Check the wire connection from PT100, installed inside the motor winding, to corresponding product terminals.
 Clearing the Error Code	




[Drive Mains Voltage Down Error]

 Probable Cause	<p>Input voltage is monitored by each Power cell independently. This error is triggered when more than half of the power cells detect a voltage drop. Possible causes include:</p> <ul style="list-style-type: none"> • Mains voltage too low • Transient voltage dips
 Remedy	<ul style="list-style-type: none"> • Check the mains voltage level
 Clearing the Error Code	<p>Manual reset command is required to clear this error.</p>




[Drive Low Voltage Ride Through Timeout Error]

 Probable Cause	When the parameter [Voltage Ride Through (VRT)] is enabled, the error is triggered if the mains voltage drops below the threshold defined by [LVRT Level 1] and remains below this level for a duration exceeding the value set in [LVRT Level 1 Time] .
 Remedy	<ul style="list-style-type: none"> • Verify the mains voltage. • Check the settings of the Voltage Ride Through function: [Voltage Ride Through (VRT)], [LVRT Level 1], and [LVRT Level 1 Time].
 Clearing the Error Code	Manual reset command is required to clear this error.




[Overcurrent]

 Probable Cause	<ul style="list-style-type: none"> • Incorrect motor parameters. • Inertia or load too high. • Mechanical locking.
 Remedy	<ul style="list-style-type: none"> • Check the parameter [Overcurrent Threshold]. • Verify the motor parameters. • Verify the sizing of the motor, drive, and load. • Verify the state of the mechanism.
 Clearing the Error Code	Manual reset command is required to clear this error.




[Encoder Interface Warn]

 Probable Cause	Encoder Interface board would monitor output signals(A+, A-, B+, B-) of the incremental encoder ; If any one of the signals were lost, lasting for warning time, warn NC contact of Encoder Interface board would be activated; VSD would monitor the activation of NC contactor, and then corresponding warn logic would be executed.
 Remedy	<ul style="list-style-type: none"> • According to electrical drawing, check control circuits, including Encoder interface board and the encode, Encoder interface board and inside PLC. • Check the performance of the incremental encoder.
 Clearing the Error Code	




[Encoder Interface Error]

 Probable Cause	Encoder Interface board would monitor output signals(A+, A-, B+, B-) of the incremental encoder ; If any one of the signals were lost, lasting for error time, error NC contact of Encoder Interface board would be activated; VSD would monitor the activation of NC contactor, and then corresponding error logic would be executed .
 Remedy	<ul style="list-style-type: none"> • According to electrical drawing, check control circuits, including Encoder interface board and the encode, Encoder interface board and inside PLC. • Check the performance of the incremental encoder.
 Clearing the Error Code	




[VSD Warning From HMIP]

 Probable Cause	If HMI detected the activation of any warning, managed by itself, HMI would inform inside PLC through HMI-PLC communication interface.
 Remedy	According to warning message, shown on HMI panel, the user could know the root cause
 Clearing the Error Code	

[VSD Error from HMIP]

 Probable Cause	If HMI detected the activation of any error, managed by itself, HMI would inform inside PLC through HMI-PLC communication interface.
 Remedy	According to error message, shown on HMI panel, the user could know the root cause
 Clearing the Error Code	

[PLC Inside Internal Error]

 Probable Cause	The error would be reported when inside PLC detected its hardware issue by its diagnostic function.
 Remedy	<p>The user could know the root cause by reading monitoring parameter MW3303 through fieldbus communication interface</p> <p>The definition of [Processor & TM3 module status register] (MW3303):</p> <ul style="list-style-type: none"> • Bit0 = 1 : reserved for Communication timeout PLC - Control • Bit1 = 1 : CF03 Fault: PLC controller is NOK • Bit2 = 1 : CF03 Fault: PLC TM3 module is NOK • Bit3 = 1 : CF03 Fault: PLC Embedded IO is NOK • Bit4 = 1 : CF03 Fault: PLC serial line 1 is over current • Bit5 = 1 : CF03 Fault: RTCBatteryNOK • Bit6 = 1 : CF03 Fault: ParametersConfigurationNOK
 Clearing the Error Code	

Appendix

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Appendix A: ATV6100 PLC Communication Address Table

What's in This Chapter

ATV6100 PLC Communication Address Table 302

ATV6100 PLC Communication Address Table

Communication Address	Length (Word)	Data Direction		PLC Internal Address	Definition		Comment
		Fieldbus	VSD				
1000	2	OUT	IN	% MF1000	Reference command on HMI		When %MW1003.6=1 and Command is "analog" in HMI "Function" page ,directly input expected frequency (unit Hz), for example, we want VSD running at 39.68 Hz, input 39.68.
1002	1	OUT	IN	% MW1002	0	1 = Forward Start	Only when %MW1004.2=1 and % MW1003.6=1 ,the drive can receive the control commands sent by DCS.
					1	1 = Reverse Start	
					2	1 = Freewheel stop	
					3	1 = Stop	
					4	1 = Reset	
					5	Reserved	
					6	Reserved	
					7	Reserved	
					8	Reserved	
					9	Reserved	
					10	Reserved	
					11	Reserved	
					12	Reserved	
					13	Reserved	
					14	Reserved	
15	Reserved						
1003	1	OUT	IN	% MW1003	0	0 = Open-Loop, 1 = Closed-Loop	%MW1003 is the control word sent by DCS to the VSD. NOTE: When changing open/ closed loop option, the associated parameters should be changed accordingly.
					1	Reserved	
					2	Reserved	
					3	Reserved	
					4	Reserved	
					5	Reserved	
					6	1 = Fieldbus control enabled	
					7	1 = Fieldbus control disabled	
					8	0 = Reference frequency value in Hz 1 = Reference frequency value in rpm	
					9	Reserved	
					10	Reserved	
					11	Reserved	

Communication Address	Length (Word)	Data Direction		PLC Internal Address	Definition		Comment
		Fieldbus	VSD				
					12	Reserved	
					13	Reserved	
					14	Hearthheat : need to constantly change(0 and 1)	
					15	Reserved	
1004	1	IN	OUT	%MW1004	0	1 = Standby	%MW1004 is the state word of VSD
					1	1 = VSD running	
					2	1 = Remote control	
					3	1 = Local control	
					4	Reserved	
					5	Reserved	
					6	1 = Detected error	
					7	1 = Warning	
					8	1 = Motor Winding OverHeat warning	
					9	1 = Motor Bearing OverHeat warning	
					10	Reserved	
					11	1 = VSD mains voltage off	
					12	1 = VSD locked in freewheel stop	
					13	1 = PoC Cabinet Overheat error	
					14	1 = Fieldbus link loss	
15	1 = Fan contactor in opened status warning						
1005	1	IN	OUT	%MW1005	0	1 = Transformer overheat warning	%MW1005 is the state word of VSD
					1	1 = Motor stall error	
					2	1 = Fieldbus Comm Link Loss warning	
					3	1 = Auxiliary supply not ready warning	
					4	1 = Master controller warning	
					5	1 = VSD warning from HMIP	
					6	1 = Mains voltage not ready	
					7	Reserved	
					8	1 = Transformer overheat trip	
					9	1 = Door not closed	
					10	1 = Master controller detected error	
					11	1 = Fan contactor not closed detected error	
					12	1 = Master controller not ready	
					13	1 = VSD Error from HMIP	
					14	1 = Fan power not ready detected error	

Communi- cation Address	Length (Word)	Data Direction		PLC Internal Address	Definition		Comment
		Fieldbus	VSD				
					15	1 = Mains voltage interrupted	
1006	1	IN	OUT	% MW1006	0	1 = Heater not ready warning	%MW1006 is the state word of VSD
					1	1 = Battery undervoltage warning	
					2	1 = Power of cooling fans not ready	
					3	1 = Cooling fans not Ready warning	
					4	1 = Power of cooling fans not ready warning	
					5	1 = Cooling fans not ready error	
					6	1 = Control power not ready warning	
					7	1 = LV Surge Arrestor is tripped	
					8	1 = Analog reference signal missing	
					9	1 = Analog feedback signal loss warning	
					10	1 = Analog feedback signal loss error	
					11	1 = FreewheelStop by Fieldbus Comm Link Loss	
					12	1 = Motor Winding overheat error	
					13	1 = Motor Bearing overheat error	
					14	1 = PoC Cabinet Overheat warning	
	15	1 = Mains voltage interrupted during VSD RUNNING warning					
1007	1	IN	OUT	% MW1007	0	1 = External device 1 overheat warning	Linked with MW11:X5
					1	1 = External device 1 overheat error	Linked with MW11:X6
					2	1 = External device 2 overheat warning	Linked with MW11:X7
					3	1 = External device 2 overheat error	Linked with MW11:X8
					4	1 = External device 3 overheat warning	Linked with MW11:X9
					5	1 = External device 3 overheat error	Linked with MW11:X10
					6	1 = QF1 is closed	
					7	1 = Pre-Charge switch close error	Linked with MW11.0
					8	1 = Pre-Charge switch open error	Linked with MW11.1
					9	1 = Mains voltage inconformity trip	Linked with MW11.2
					10	1 = Anti-restart is active	Linked with MW11.3

Communication Address	Length (Word)	Data Direction		PLC Internal Address	Definition	Comment
		Fieldbus	VSD			
					11 1 = QF1 SwitchON cycling protection is active	Linked with MW11.4
					12 1 = External device 4 overheat warning	Linked with MW11:X11
					13 1 = reference frequency set by HMI interface	Linked with MW63.1
					14 0 = Open LOOP control; 1 = Close LOOP control;	Linked with MW63.0
					15 1 = External device 4 overheat error	Linked with MW11:X12
1008	1	IN	OUT	% MW1008	Input voltage	1000 means 1 kV
1009	1	IN	OUT	% MW1009	Output voltage	1000 means 1 kV
1010	1	IN	OUT	% MW1010	Input current	10 means 1 A
1011	1	IN	OUT	% MW1011	Output current	10 means 1 A
1012	1	IN	OUT	% MW1012	Reference frequency	100 means 1 Hz
1013	1	IN	OUT	% MW1013	Output frequency	100 means 1 Hz
1014	1	IN	OUT	% MW1014	Input power factor	1 means $\cos \varnothing=0001$ (lag)
1015	1	IN	OUT	% MW1015	Input active power	1 means 1 kW
1016	1	IN	OUT	% MW1016	Input reactive power	1 means 1 kVar
1026	1	IN	OUT	% MW1026	Power cell cabinet temperature	10 means 1°C, from VSD to DCS
1027	1	IN	OUT	% MW1027	Transformer temperature phase A	10 means 1°C, from VSD to DCS
1028	1	IN	OUT	% MW1028	Transformer temperature phase B	10 means 1°C, from VSD to DCS
1029	1	IN	OUT	% MW1029	Transformer temperature phase C	10 means 1°C, from VSD to DCS
3000	1	IN	OUT	% MW3000	PLC Inside Type	2 : M241 PLC
3001	1	IN	OUT	% MW3001	PLC Inside App Version	0x1201 : V1.2IE01
3002	1	IN	OUT	% MW3002	PLC Inside App Build	0x0100 : B01b00
3003	1	IN	OUT	% MW3003	PLC Inside Checksum	
3004	1	IN	OUT	% MW3004	PLC Inside FW Version	0x0502 : 5.2.
3005	1	IN	OUT	% MW3005	PLC Inside FW Build	0x0B18 : 11.24.
3006	1	IN	OUT	% MW3006	PLC Compatibility Control	0x0200
3007	1	IN	OUT	% MW3007	PLC I/O Module Identified	b0 = 1 : Available for KPC2 TM3AM6/G; b1 = 1 : Available for KPC3 TM3AQ4/G; b2 = 1 : Available for KPC4 TM3TI4/G; b3 = 1 : Available for KPC5 TM3TI4/G;

Communication Address	Length (Word)	Data Direction		PLC Internal Address	Definition	Comment
		Fieldbus	VSD			
						b4 = 1 : Available for KPC6 TM3T14/G; b5 = 1 : Available for KPC7 TM3D116/G; b6 = 1 : Available for KPC8 TM3DQ16T/G; b7 = 1 : Available for KPC9 TM3D116/G; b8 = 1 : Available for KPC10 TM3DQ16T/G; b9 = 1 : Available for KPC11 TM3T14/G; b10 = 1 : Available for KPC12 TM3T14/G; b11 = 1 : Available for KPC13 TM3A18/G; b12 = 1 : Available for KPC14 TM3T14/G; b13 = 1 : Available for KPC15 TM3A18/G;
3030	1	IN	OUT	% MW3030	Cabinet DI physical image(DI100... DI115)	ILCI.b0 : "DI100" logic inputs physical image ILCI.b15 : "DI115" logic inputs physical image
3032	1	IN	OUT	% MW3032	Cabinet DI physical image(DI116... DI123)	ILC1.b0 : "DI116" logic inputs physical image ILC1.b7 : "DI123" logic inputs physical image
3036	1	IN	OUT	% MW3036	Cabinet DO physical image(R100... R115)	OLCP.b0 : "R100" logic inputs physical image OLCP.b15 : "R115" logic inputs physical image
3037	1	IN	OUT	% MW3037	Cabinet DI physical image(DI700... DI715)	ILC2.b0 : "DI700" logic inputs physical image ILC2.b15 : "DI715" logic inputs physical image
3041	1	IN	OUT	% MW3041	Cabinet DO physical image(R800... R815)	OLCP.b0 : "R100" logic inputs physical image OLCP.b15 : "R115" logic inputs physical image
3200	1	IN	OUT	% MW3200	Motor winding temperature phase U1	10 means 1°C, from VSD to DCS
3201	1	IN	OUT	% MW3201	Motor winding temperature phase V1	10 means 1°C, from VSD to DCS
3202	1	IN	OUT	% MW3202	Motor winding temperature phase W1	10 means 1°C, from VSD to DCS
3203	1	IN	OUT	% MW3203	Motor winding temperature phase U2	10 means 1°C, from VSD to DCS
3204	1	IN	OUT	% MW3204	Motor winding temperature phase V2	10 means 1°C, from VSD to DCS
3205	1	IN	OUT	% MW3205	Motor winding temperature phase W2	10 means 1°C, from VSD to DCS
3206	1	IN	OUT	% MW3206	Motor bearing 1 temperature	10 means 1°C, from VSD to DCS

Communication Address	Length (Word)	Data Direction		PLC Internal Address	Definition	Comment
		Fieldbus	VSD			
3207	1	IN	OUT	% MW3207	Motor bearing 2 temperature	10 means 1°C, from VSD to DCS
3208	1	IN	OUT	% MW3208	External device 1 temperature	10 means 1°C, from VSD to DCS
3209	1	IN	OUT	% MW3209	External device 2 temperature	10 means 1°C, from VSD to DCS
3210	1	IN	OUT	% MW3210	External device 3 temperature	10 means 1°C, from VSD to DCS
3211	1	IN	OUT	% MW3211	External device 4 temperature	10 means 1°C, from VSD to DCS
3212	1	IN	OUT	% MW3212	Analog Monitor Physical 1(AM1O)	Unit : 0.001 mA;
3213	1	IN	OUT	% MW3213	Analog Monitor Physical 2(AM2O)	Unit : 0.001 mA;
3214	1	IN	OUT	% MW3214	Analog Monitor Physical 3(AM3O)	Unit : 0.001 mA;
3215	1	IN	OUT	% MW3215	Analog Monitor Physical 4(AM4O)	Unit : 0.001 mA;
3216	1	IN	OUT	% MW3216	Analog Monitor Process 1(AM1P)	Unit : user defined;
3217	1	IN	OUT	% MW3217	Analog Monitor Process 2(AM2P)	Unit : user defined;
3218	1	IN	OUT	% MW3218	Analog Monitor Process 3(AM3P)	Unit : user defined;
3219	1	IN	OUT	% MW3219	Analog Monitor Process 4(AM4P)	Unit : user defined;
3300	1	IN	OUT	% MW3300	Processor && TM3 module status register	Bit0 = 1 : reserved for Communication timeout PLC - Control Bit1 = 1 : CF03 Error: PLC controller is NOK Bit2 = 1 : CF03 Error: PLC TM3 module is NOK Bit3 = 1 : CF03 Error: PLC Embedded IO is NOK Bit4 = 1 : CF03 Error: PLC serial line 1 is over current Bit5 = 1 : CF03 Error: RTCBatteryNOK Bit6 = 1 : CF03 Error: ParametersConfigurationNOK

Communication Address	Length (Word)	Data Direction		PLC Internal Address	Definition	Comment
		Fieldbus	VSD			
3320	1	IN	OUT	% MW3320	NST Source Status Register	b0 : Remote NST Order; b1 : Local NST Order; b2 : 3 Wires Command Terminal; //remote stop terminal signal were active b3 : 3 Wires Command Cabinet; //local stop terminal signal were active b4 : 3 Wires Freewheel Command; //The command from HMI or Fieldbus interface b5 : Mains Power OFF Button Pressed; b6 : VSD Locked In Error; //linked to cabinet overal error code M1 b7 : Fieldbus Link Loss Trigger NST; b8 : MaC Detect Error; b9 : VFD Unavailable;
3303	1	IN	OUT	% MW3303	Processor && TM3 module status register (BWS3)	Bit0 = 1 : reserved for Communication timeout PLC - Control Bit1 = 1 : CF03 Error: PLC controller is NOK Bit2 = 1 : CF03 Error: PLC TM3 module is NOK Bit3 = 1 : CF03 Error: PLC Embedded IO is NOK Bit4 = 1 : CF03 Error: PLC serial line 1 is over current Bit5 = 1 : CF03 Error: RTCBatteryNOK Bit6 = 1 : CF03 Error: ParametersConfigurationNOK

Appendix B: ATV6100 PLC Channel Description

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KPC13_TM3AI8/G_AI	321

KPC1_TM241CE40T/U_DI

KPC1_TM241CE40T/U_DI				
No.	Channel No.	Channel definition	Signal type	Channel description
1	KPC1:I0.0 / PLC_I0_100	mode selector on remote	DI	1. Fixed 2. Function description: When Remote Control Mode is enabled, other controls are disabled, except for panel && local freewheel stop signal and local stop signal
2	KPC1:I0.1 / PLC_I0_101	mode selector on panel	DI	1. Fixed 2. Function description: When Panel Control Mode is enabled, all other operations are disabled, except for local && remote freewheel stop signal and local && remote stop signal
3	KPC1:I0.2 / PLC_I0_102	MV pre-charge switch is closed <i>LV Panel energize order</i>	DI	1. Configurable: [Precharge selection](VW740) = 2 - MV precharge; [MV contactor closed assignment](VW780) = 102-I0_102; [Precharge selection](VW740) = 1 - LV precharge; [LV panel energize order assignment](VW790) = 102-I0_102; 2. Function description: MV pre-charge switch is closed: 1=Closed; <i>LV Panel energize order, pulse signal;</i>
4	KPC1:I0.3 / PLC_I0_103	mains power off	DI	1. Fixed 2. Function description: This command trips the upstream circuit breaker and stops the drive immediately once it is been activated. Following the command, the drive cannot be started until the Mains Voltage OFF button is released. mains power off : 0=active
5	KPC1:I0.4 / PLC_I0_104	control unit ready	DI	1. Fixed 2. Function description: Dlx signal from MaC to PLC; The signal will be sent out when the master controller is in normal mode after power-on self-testing.
6	KPC1:I0.5 / PLC_I0_105	MAC detects high voltage ready	DI	1. Fixed 2. Function description: Dlx signal from from MaC to PLC; The signal will be sent out when the master controller detected MV were READY.
7	KPC1:I0.6 / PLC_I0_106	VSD warning	DI	1. Fixed 2. Function description: Dlx signal from from MaC to PLC; When a warning occurs, this signal will be sent out from the master controller.
8	KPC1:I0.7 / PLC_I0_107	VSD detected error	DI	1. Fixed

KPC1_TM241CE40T/U_DI				
No.	Channel No.	Channel definition	Signal type	Channel description
				2. Function description: Dlx signal from from MaC to PLC; When an error is detected, the signal will be sent out from master controller.
9	KPC1:I0.8 / PLC_I0_108	door is closed	DI	1. Fixed 2. Function description: Make sure that all doors are properly closed
10	KPC1:I0.9 / PLC_I0_109	MV pre-charge switch is opened <i>LV Remote energize order</i>	DI	1. Configurable: [Precharge selection](VW740) = 2 - MV precharge; [MV contactor opened assignment](VW782) = 109-I0_109; [Precharge selection](VW740) = 1 - LV precharge; [LV remote energize order assignment](VW792) = 109-I0_109; 2. Function description: MV pre-charge switch is opened : 1=Opened; <i>LV Remote energize order, pulse signal</i> ;
11	KPC1:I0.10 / PLC_I0_110	fan supply ready	DI	1. Fixed 2. Function description: This signal comes from the phase sequence control relay. It can give feedback on whether the fan power supply and its phase sequence are ready and correct. fan supply ready : 1=READY
12	KPC1:I0.11 / PLC_I0_111	control supply ready	DI	1. Fixed 2. Function description: This signal comes from the power supply unit , to indicate whether control power supply were ready or not. Control power supply ready : 1=READY
13	KPC1:I0.12 / PLC_I0_112	fan cooling ready	DI	1. Fixed 2. Function description: This signal comes from the auxiliary contact of the cooling fan motor starters. Each motor starter is integrated with an auxiliary contact to indicate its status, and this signal is the NO contact of all motor starters connecting in the series, which means that if any one of the cooling fans is not switched on, the signal will be open and indicate that a specific cooling fan is not working. It is one of the preconditions for system ready status, which means that if the cooling system is not fully functional, the drive cannot start, and that when the drive is running, if this contact opens, the system will generate a warning signal. fan cooling ready : 1=READY
14	KPC1:I0.13 / PLC_I0_113	fan contactor feedback	DI	1. Fixed 2. Function description: This signal can feedback whether the fan contactor is closed. fan contactor feedback : 1=Closed
15	KPC1:I0.14 / PLC_I0_114	auxiliary supply ready	DI	1. Fixed 2. Function description: This signal would indicate whether the auxiliary power supply of cubicle light, socket and heater were ready or not. auxiliary supply ready : 1=READY
16	KPC1:I0.15 / PLC_I0_115	QF1 is closed	DI	1. Configurable: [PLIC_QF1 feedback signal assignment](VW1040) = 115-I0_115; 2. Function description: "QF1 is closed" : 1=Closed
17	KPC1:I0.16 / PLC_I0_116	remote start	DI	1. Configurable: if [TCC_Type of remote control](VW920) = 1 - 3 wires control(Default) [remote start assignment](VW924) = 116 - I0_116; else if [TCC_Type of remote control](VW920) = 0 - 2 wires control [remote start assignment](VW924) = 116 - I0_116; 2. Function description:

KPC1_TM241CE40T/U_DI				
No.	Channel No.	Channel definition	Signal type	Channel description
				As for 3 wires control, "1" means active remote start signals; As for 2 wires control, "1" means active remote start signals; "0" means active remote stop signals; In Remote Control Mode, if the converter is ready to start or has received the remote start signal during shutdown process, the converter starts to speed up according to the pre-set acceleration interval until it reaches the reference frequency.
18	KPC1:I0.17 / PLC_I0_117	remote stop	DI	<p>1. Configurable: if [TCC_Type of remote control](VW920) = 1 - 3 wires control(Default) [remote stop assignment](VW926) = 117 - I0_117; [remote stop assignment](VW926) = 1117 - I0_117L (Default);</p> <p>2. Function description: 1117 - I0_117L(Default) means low level were active one; 117 - I0_117 means high level were active one. If high level were active one, remote freewheel stop signal must be functional forcibly. In Remote Control Mode, the converter will decelerate according to the preset deceleration interval until shutdown when the converter has received the remote stop signal.</p> <p>3. GNG Notes: If remote command channel were active, active remote stop signal would result in ramp stop of the product according to deceleration time; if active command channel weren't remote one, active remote stop signal would result in freewheel stop of the product.</p>
19	KPC1:I0.18 / PLC_I0_118	remote freewheel stop	DI	<p>1. Configurable: [remote freewheel stop assignment](VW928) = 1118-I0_118L;</p> <p>2. Function description: "1118-I0_118L" means low level were active one. As for remote freewheel stop signal, low level are always active one. While running after receiving the remote freewheel stop signal, the VSD directly blocks output: the load on the freewheel ceases.</p> <p>3. GNG Notes: No matter whether remote command channel were active one, active remote freewheel stop signal would result in freewheel stop of the product.</p>
20	KPC1:I0.19 / PLC_I0_119	remote reset	DI	<p>1. Configurable: [remote fault reset assignment](VW930) = 119-I0_119;</p> <p>2. Function description: remote reset signal are pulse signal. The remote reset signal is used for sending the system reset directive when the drive is shutdown. The system can be set to automatically stop when an error occurs. Once the error has been rectified, it is necessary to send the remote reset signal in order to unlock and restart the system.</p>
21	KPC1:I0.20 / PLC_I0_120	LV Surge Arrestor is tripped	DI	<p>1. Configurable: [LV Surge Arrestor tripped signal assignment](VW1060) = 1120-I0_120L;</p> <p>2. Function description: "1120-I0_120L" means low level were active one; "LV Surge Arrestor is tripped" : 0=warning; This signal can feedback whether the SPDs of fan power supply and auxiliary power supply are tripped or not.</p>
22	KPC1:I0.21 / PLC_I0_121	heater ready	DI	<p>1. Configurable: [Heater ready signal assignment] (VW1062) = 1121-I0_121L;</p> <p>2. Function description: "1121-I0_121L" means low level were active one; heater NOT ready : 0=warning; This signal comes from the circuit breaker of the heaters. If any one of the circuit breakers is not closed, it will generate a warning signal.</p>

KPC1_TM241CE40T/U_DI				
No.	Channel No.	Channel definition	Signal type	Channel description
23	KPC1:I0.22 / PLC_I0_122	Motor forward or reverse	DI	<p>1. Configurable: [motor rotation direction assignment] (VW950) = 122-I0_122;</p> <p>2. Function description: Signal definition : 0=Forward; 1=Reverse; This is the signal from customer to control motor forward or reverse. If they want the motor to forward, give low level signal; If they want the motor to reverse, give high level signal.</p>
24	KPC1:I0.23 / PLC_I0_123	Battery undervoltage	DI	<p>1. Configurable: [Battery undervoltage signal assignment] (VW1064) = 123-I0_123;</p> <p>2. Function description: Signal definition : 1=Under voltage; When the voltage of UPS is lower than the threshold value, this signal will be activated.</p>

KPC1_TM241CE40T/U_DO

KPC1_TM241CE40T/U_DO				
No.	Channel No.	Channel definition	Signal type	Channel description
1	KPC1:Q0. 0 / PLC_Q0_100	VSD start	DO	<p>1. Fixed</p> <p>2. Function description: DO signal comes from PLC to MaC; Start command to master controller. When the master controller receives it, the VSD starts up and begins running.</p>
2	KPC1:Q0. 1 / PLC_Q0_101	VSD stop	DO	<p>1. Fixed</p> <p>2. Function description: DO signal comes from PLC to MaC; Stop command to master controller. When the master controller receives it, the VSD is running and slows it down to a stop.</p>
3	KPC1:Q0. 2 / PLC_Q0_102	VSD emergency off	DO	<p>1. Fixed</p> <p>2. Function description: DO signal comes from PLC to MaC; Emergency off command to master controller. When the master controller receives it, the VSD will be stopped immediately.</p>
4	KPC1:Q0. 3 / PLC_Q0_103	Motor direction	DO	<p>1. Fixed</p> <p>2. Function description:: DO signal comes from PLC to MaC; Signal definition : 0=forward rotation; 1=reverse rotation; Motor forward or reverse to master controller. When the master controller receives low level, the motor will forward. When the master controller receives high level, the motor will reverse.</p>
5	KPC1:Q0. 4 / PLC_Q0_104	fan control CMD	DO	<p>1. Fixed</p> <p>2. Function description: Signal definition : 0=stop CMD; 1=start CMD; Start or stop command to fan. When this signal is high level, the fan starts up. When this signal is low level, the fan stops.</p>
6	KPC1:Q0. 5 / PLC_Q0_105	remote control mode	DO	<p>1. Fixed</p> <p>2. Function description: The signal is sent out when the VSD is in Remote Control Mode.</p>
7	KPC1:Q0. 6 / PLC_Q0_106	panel control mode	DO	<p>1. Fixed</p> <p>2. Function description:</p>

KPC1_TM241CE40T/U_DO				
No.	Channel No.	Channel definition	Signal type	Channel description
				The signal is sent out when the VSD is in Panel Control Mode.
8	KPC1:Q0. 7 / PLC_Q0_107	local control mode <i>LV QF91 Open CMD</i>	DO	1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; //Cabinet mode switch shall have local selection R107 assignment](VW800) = 5-Local control mode; [LocalModeDOAssignment](VW914) = 0-NO; [Precharge selection](VW740) = 1 - LV precharge; [R107 assignment](VW800) = 1-LV QF91 Open CMD; 2. Function description: local control mode: 0=Inactive; 1=Active <i>LV QF91 Open CMD</i> : 1=Close CMD; 0=Open CMD
9	KPC1:Q0. 8 / PLC_Q0_108	VSD ready	DO	1. Fixed 2. Function description: Customer interface This signal is sent out after all prerequisite starting conditions are met (mains voltage ready, no detected errors)
10	KPC1:Q0.9 / PLC_ Q0_109	VSD run	DO	1. Fixed 2. Function description: Customer interface; This signal is sent out when the VSD is running.
11	KPC1:Q0. 10 / PLC_Q0_110	VSD warning	DO	1. Fixed 2. Function description: Customer interface; This signal is sent out when VSD is warning. If VSD is in stop mode, it can start. If VSD is in running mode, it can keep operation. In case of being a detected error, you should take steps.
12	KPC1:Q0. 11 / PLC_Q0_111	VSD error	DO	1. Fixed 2. Function description: Customer interface; This indication will be activated when a major system error is detected, this signal will also trip the upstream circuit breaker to be switched off.
13	KPC1:Q0. 12 / PLC_Q0_112	QF1 enable to closed	DO	1. Fixed 2. Function description: Customer interface; Signal definition : 1=active; This signal is sent out when the mains controller is ready, no errors have been detected, and the cabinet stop button is off. The signal allows the mains breaker to be switched on.
14	KPC1:Q0. 13 / PLC_Q0_113	QF1 MVCB to trip	DO	1. Fixed 2. Function description: Customer interface; Signal definition : 0=active This signal is sent out when an error has been detected in the VSD, when the cabinet stop button is on and the mains voltage is off. The signal trips the mains breaker to be switched off.

KPC1_TM241CE40T/U_DO				
No.	Channel No.	Channel definition	Signal type	Channel description
15	KPC1:Q0. 14 / PLC_Q0_114	MV pre-charge bypass contactor CMD <i>LV KM91 pre-charge contactor CMD</i>	DO	1. Configurable: [Precharge selection](VW740) = 2 - MV precharge; [R114 assignment](VW802) = 3-MV bypass contactor CMD; [Precharge selection](VW740) = 1 - LV precharge; [R114 assignment](VW802) = 4-LV KM91 CMD; 2. Function description: pre-charge bypass contactor CMD: 1=Close CMD; 0=Open CMD; <i>LV KM91 pre-charge contactor CMD: 1=Close CMD; 0=Open CMD;</i>
16	KPC1:Q0. 15 / PLC_Q0_115	VSD unavailable <i>LV Energizng</i>	DO	1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; [R115 assignment](VW804) = 2-VSD unavailable; [Precharge selection](VW740) = 1 - LV precharge; [R115 assignment] = 6-LV Energizng; 2. Function description: VSD unavailable: 0=Inactive; 1=Active; <i>Energizng: 0=Inactive; 1=Active;</i>

KPC2_TM3AM6/G_AI && AO

KPC2_TM3AM6/G_AI && AO				
No.	Channel No.	Channel definition	Signal type	Channel description
1	KPC2:IW0 / PLC_IW0_200	Reference Frequency from DCS	AI	1. Fixed By HMI interface, System Tool/PLC AI, type of source, source range, scale range, and etc., could be configured. 2. Function description: Customer interface; 0~20mA AI channels; This channel is reserved for speed/frequency set point via analog signal, the channel will be activated when analog set point mode is selected and when the fieldbus communication control function is deactivated.
2	KPC2:IW1 / PLC_IW0_201	PID Feedback	AI	1. Fixed By HMI interface, System Tool/PLC AI, type of source, source range, scale range, and etc., could be configured. 2. Function description: Customer interface; 0~20mA AI channels; This channel is reserved for closed-loop control.
3	KPC2:IW2 / PLC_IW0_202	reversed	AI	1. Fixed By HMI interface, System Tool/PLC AI, type of source, source range, scale range, and etc., could be configured. 2. Function description: Customer interface; 0~20mA AI channels; Reserved for analog input channel;
4	KPC2:IW3 / PLC_IW0_203	reversed	AI	1. Fixed By HMI interface, System Tool/PLC AI, type of source, source range, scale range, and etc., could be configured. 2. Function description: Customer interface; 0~20mA AI channels; Reserved for analog input channel;

KPC2_TM3AM6/G_AI && AO				
No.	Channel No.	Channel definition	Signal type	Channel description
5	KPC2:QW0 / PLC_QW0_200	speed setting to MaC	AO	1. Fixed 2. Function description: 4~20mA AO channels; AOx signal from PLCI to MaC; This signal is from PLC to master controller. When the master controller receives it, the VSD will run to the set value.
6	KPC2:QW1 / PLC_QW0_201	reversed	AO	1. Fixed 2. Function description: 4~20mA AO channels; AOx signal from PLCI to MaC; Reserved channel for master controller.

KPC3_TM3AQ4/G_AO

KPC3_TM3AQ4/G_AO				
No.	Channel No.	Channel definition	Signal type	Channel description
1	KPC3:QW0 / PLC_QW1_300	motor speed	AO	1. Configurable: By HMI interface, System Tool/PLC AO, output dats, type of source, source range, scale range, and etc., could be configured 2. Function description: Customer interface; 0~20mA AO channels; VSD output frequency(default) is sent out through this channel.
2	KPC3:QW1 / PLC_QW1_301	motor current	AO	1. Configurable: By HMI interface, System Tool/PLC AO, output dats, type of source, source range, scale range, and etc., could be configured 2. Function description: Customer interface; 0~20mA AO channels; VSD output current(default) is sent out through this channel.
3	KPC3:QW2 / PLC_QW1_302	reserved	AO	1. Configurable: By HMI interface, System Tool/PLC AO, output dats, type of source, source range, scale range, and etc., could be configured 2. Function description: Customer interface; 0~20mA AO channels; Analog output reserved channel for VSD process data.
4	KPC3:QW3 / PLC_QW1_303	reserved	AO	1. Configurable: By HMI interface, System Tool/PLC AO, output dats, type of source, source range, scale range, and etc., could be configured 2. Function description: Customer interface; 0~20mA AO channels; Analog output reserved channel for VSD process data.

KPC4_TM3TI4/G_AI

KPC4_TM3TI4/G_AI				
No.	Channel No.	Channel definition	Signal type	Channel description
1	KPC4:IW0 / PLC_IW1_400	transformer L1 phase temperature	AI	<p>1. Configurable: [Transformer thermal monitoring](VW286) = 0 - TM3 module; [Thermal transf. winding U1 monitoring assign.](VW1232) = 400 - IW1_400;</p> <p>2. Function description: Signal definition : AI 3 wires PT100; Temperature of transformer near the iron core (phase L1);</p>
2	KPC4:IW1 / PLC_IW1_401	transformer L2 phase temperature	AI	<p>1. Configurable: [Transformer thermal monitoring](VW286) = 0 - TM3 module; Thermal transf. winding V1 monitoring assign.](VW1234) = 401 - IW1_401;</p> <p>2. Function description: Signal definition : AI 3 wires PT100; Temperature of transformer near the iron core (phase L2);</p>
3	KPC4:IW2 / PLC_IW1_402	transformer L3 phase temperature	AI	<p>1. Configurable: [Transformer thermal monitoring](VW286) = 0 - TM3 module; [Thermal transf. winding W1 monitoring assign.](VW1236) = 402 - IW1_402;</p> <p>2. Function description: Signal definition : AI 3 wires PT100; Temperature of transformer near the iron core (phase L3);</p>
4	KPC4:IW3 / PLC_IW1_403	PoC cabinet temperature	AI	<p>1. Configurable: [Transformer thermal monitoring](VW286) = 0 - TM3 module; [Thermal transf. cabinet monitoring assign.](VW1238) = 0 - NO; [Thermal PoC cabinet monitoring assign.](VW1240) = 403 - IW1_403;</p> <p>2. Function description: Signal definition : AI 3 wires PT100; Temperature of power cell cabinet near the air inlet;</p>

KPC5_TM3TI4/G_AI

KPC5_TM3TI4/G_AI				
No.	Channel No.	Channel definition	Signal type	Channel description
1	KPC5:IW0 / PLC_IW2_500	motor winding U1 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit0 = 1; [Thermal motor winding U1 monitoring assignment] (VW1248) = 500 - IW2_500;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor winding U1 temperature, measured by 3 wires PT100 sensor.</p>
2	KPC5:IW1 / PLC_IW2_501	motor winding V1 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit1 = 1; [Thermal motor winding V1 monitoring assignment] (VW1250) = 501 - IW2_501;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor winding V1 temperature, measured by 3 wires PT100 sensor.</p>

KPC5_TM3TI4/G_AI				
3	KPC5:IW2 / PLC_IW2_502	motor winding W1 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit2 = 1; [Thermal motor winding W1 monitoring assignment] (VW1252) = 502 - IW2_502;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor winding W1 temperature, measured by 3 wires PT100 sensor.</p>
4	KPC5:IW3 / PLC_IW2_503	motor winding U2 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit3 = 1; [Thermal motor winding U2 monitoring assignment] (VW1254) = 503 - IW2_503;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor winding U2 temperature, measured by 3 wires PT100 sensor.</p>

KPC6_TM3TI4/G_AI

KPC6_TM3TI4/G_AI				
1	KPC6:IW0 / PLC_IW3_600	motor winding V2 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit4 = 1; [Thermal motor winding V2 monitoring assignment] (VW1256) = 600 - IW3_600;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor winding V2 temperature, measured by 3 wires PT100 sensor.</p>
2	KPC6:IW1 / PLC_IW3_601	motor winding W2 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit5 = 1; [Thermal motor winding W2 monitoring assignment] (VW1258) = 601 - IW3_601;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor winding W2 temperature, measured by 3 wires PT100 sensor.</p>
3	KPC6:IW2 / PLC_IW3_602	motor bearing 1 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit6 = 1; [Thermal motor bearing 1 monitoring assignment] (VW1260) = 602 - IW3_602;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor bearing 1 temperature, measured by 3 wires PT100 sensor.</p>
4	KPC6:IW3 / PLC_IW3_603	motor bearing 2 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit7 = 1; [Thermal motor bearing 2 monitoring assignment] (VW1262) = 603 - IW3_603;</p> <p>2. Function description: Customer interface; Signal definition : AI 3 wires PT100; motor bearing 2 temperature, measured by 3 wires PT100 sensor.</p>

KPC7_TM3DI16/G_DI

KPC7_TM3DI16/G_DI				
ID	Address	Description	Type	Details
1	KPC7:I0.0 / PLC_I1_700	LV KM91 is closed	DI	<p>1. Configurable: [Precharge selection](VW740) = 1 - LV precharge; [LV KM91 closed assignment](VW794) = 700-I1_700;</p> <p>2. Function description: Signal definition : 0=Opened; 1=Closed; Dlx signal, coming from NO contact of contactor KM91.</p>
2	KPC7:I0.1 / PLC_I1_701	LV QF92 is closed	DI	<p>1. Configurable: [Precharge selection](VW740) = 1 - LV precharge; [LV QF92 closed assignment](VW796) = 701-I1_701;</p> <p>2. Function description: Signal definition : 0=Opened; 1=Closed; Dlx signal, coming from NO contact of circuit breaker QF92.</p>
3	KPC7:I0.2 / PLC_I1_702	pre-charge supply ready	DI	<p>1. Configurable: [Precharge selection](VW740) = 1 - LV precharge; [LV power supply ready assignment](VW798) = 702-I1_702;</p> <p>2. Function description: pre-charge supply ready: 1=READY</p>
4	KPC7:I0.3 / PLC_I1_703	mode selector on local	DI	<p>1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; //Cabinet mode switch shall have local selection [Local mode selector assignment](VW912) = 703-I1_703;</p> <p>2. Function description: Customer interface; Signal definition : 1=active.</p>
5	KPC7:I0.4 / PLC_I1_704	local start	DI	<p>1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; //Cabinet mode switch shall have local selection if [PL10_Cabinet Type of control](VW960) = 1 - 3 wires control [local start assignment](VW964) = 704-I1_704; else if [PL10_Cabinet Type of control](VW960) = 0 - 2 wires control [local start assignment](VW964) = 704-I1_704;</p> <p>2. Function description: Customer interface; Signal definition : 1=active; As for 3 wires control, "1" means active local start signals; As for 2 wires control, "1" means active local start signals; "0" means active local stop signals;</p>
6	KPC7:I0.5 / PLC_I1_705	local stop	DI	<p>1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; //Cabinet mode switch shall have local selection if [PL10_Cabinet Type of control](VW960) = 1 - 3 wires control [local stop assignment](VW966) = 705-I1_705; [local stop assignment](VW966) = 1705-I1_705L(default);</p> <p>2. Function description: Customer interface; Signal definition : 0=active(default); 1705-I1_705L(Default) means low level were active one; 705-I1_705 means high level were active one. If high level were active one, local freewheel stop signal must be functional forcibly.</p> <p>3. GNG Notes: If local command channel were active, active local stop signal would result in ramp stop of the product according to deceleration time; if active command channel weren't local one, active local stop signal would result in freewheel stop of the product.</p>
7	KPC7:I0.6 / PLC_I1_706	local freewheel stop	DI	<p>1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; //Cabinet mode switch shall have local selection [local freewheel stop assignment](VW968) = 1706-I1_706L(default);</p>

KPC7_TM3DI16/G_DI				
				<p>2. Function description: Customer interface; Signal definition : 0=active As for remote freewheel stop signal, low level are always active one.</p> <p>3. GNG Notes: No matter whether local command channel were active one, active local freewheel stop signal would result in freewheel stop of the product.</p>
8	KPC7:I0.7 / PLC_I1_707	local reset	DI	<p>1. Configurable: [PLS0_mode selector switch](VW910) = 1 - OLRP; //Cabinet mode switch shall have local selection [local fault reset assignment](VW970) = 707-I1_707;</p> <p>2. Function description: Customer interface; Signal definition : pulse signals.</p>
9	KPC7:I0.8 / PLC_I1_708	QF1 is fault	DI	<p>1. Configurable: [PLI1_QF1 Tripped signal assignment](VW1042) = 708-I1_708; [PLI1_QF1 Tripped signal assignment](VW1042) = 1708-I1_708L(default);</p> <p>2. Function description: Customer interface; Signal definition : 0=active(default) 1708-I1_708L(Default) means low level were active one; 708-I1_708 means high level were active one.</p>
10	KPC7:I0.9 / PLC_I1_709	Arc protection unit fault	DI	<p>1. Configurable: [Arc unit error signal assignment](VW1068) = 1709-I1_709L</p> <p>2. Function description: Customer interface; Signal definition : 0=active; 1709-I1_709L means low level were active one;</p>
11	KPC7:I0.10 / PLC_I1_710	Encoder interface warning	DI	<p>1. Configurable: [Encoder interaface warning assignment](VW1070) = 1710-I1_710L;</p> <p>2. Function description: Customer interface; Signal definition : 0=active; 1710-I1_710L means low level were active one;</p>
12	KPC7:I0.11 / PLC_I1_711	Encoder interface fault	DI	<p>1. Configurable: [Encoder interaface error assignment](VW1072) = 1711-I1_711L;</p> <p>2. Function description: Customer interface; Signal definition : 0=active; 1711-I1_711L means low level were active one;</p>
13	KPC7:I0.12 / PLC_I1_712	Reserved	DI	
14	KPC7:I0.13 / PLC_I1_713	Reserved	DI	
15	KPC7:I0.14 / PLC_I1_714	Reserved	DI	
16	KPC7:I0.15 / PLC_I1_715	Reserved	DI	

KPC8_TM3DQ16T/G_DO

KPC8_TM3DQ16T/G_DO				
1	KPC8:Q0. 0 / PLC_Q1_800	LV QF92 pre-charge breaker close CMD	DO	1. Configurable: [Precharge selection](VW740) = 1 - LV precharge; [LV QF92 CB close command assignment](VW806) = 800-Q1_800; 2. Function description: Signal definition : 1=Close CMD;
2	KPC8:Q0. 1 / PLC_Q1_801	LV QF92 pre-charge breaker open CMD	DO	1. Configurable: [Precharge selection](VW740) = 1 - LV precharge; [LV QF92 CB open command assignment](VW808) = 801-Q1_801; 2. Function description: Signal definition : 1=Open CMD;
3	KPC8:Q0. 2 / PLC_Q1_802	Error Group 1	DO	1. Configurable: [Error Group Selection](VW1100).b0 = 1 [Error Group 1 DOx assignment](VW1130) = 802-Q1_802; 2. Function description: Customer interface; Error Group 1: 1=Active;
4	KPC8:Q0. 3 / PLC_Q1_803	Error Group 2	DO	1. Configurable: [Error Group Selection](VW1100).b1 = 1 [Error Group 2 DOx assignment] = 803-Q1_803; 2. Function description: Customer interface; Error Group 2: 1=Active;
5	KPC8:Q0. 4 / PLC_Q1_804	VSD unavailable	DO	1. Configurable: [PLS0_mode selector switch](VW910) = 2 - OLRP; [OFF Mode DO Assignment](VW916) = 804-Q1_804; 2. Function description: Customer interface;
6	KPC8:Q0. 5 / PLC_Q1_805	Reserved	DO	
7	KPC8:Q0. 6 / PLC_Q1_806	Reserved	DO	
8	KPC8:Q0. 7 / PLC_Q1_807	Reserved	DO	
9	KPC8:Q0. 8 / PLC_Q1_808	Reserved	DO	
10	KPC8:Q0. 9 / PLC_Q1_809	Reserved	DO	
11	KPC8:Q0. 10 / PLC_Q1_810	Reserved	DO	
12	KPC8:Q0. 11 / PLC_Q1_811	Reserved	DO	
13	KPC8:Q0. 12 / PLC_Q1_812	Reserved	DO	
14	KPC8:Q0. 13 / PLC_Q1_813	Reserved	DO	
15	KPC8:Q0. 14 / PLC_Q1_814	Reserved	DO	
16	KPC8:Q0. 15 / PLC_Q1_815	Reserved	DO	

KPC11_TM3TI4/G_AI

KPC11_TM3TI4/G_AI				
0	KPC11:IW0 / PLC_IW4_1100	External device 1 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit8 = 1; [Thermal external device 1 monitoring assignment] (VW1264) = 1100 - IW4_1100;</p> <p>2. Function description: Customer interface; Signal definition: AI 3 wires PT100; External device 1 temperature, measured by 3 wires PT100 sensor.</p>
2	KPC11:IW1 / PLC_IW4_1101	External device 2 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit9 = 1; [Thermal external device 2 monitoring assignment] (VW1266) = 1101 - IW4_1101;</p> <p>2. Function description: Customer interface; Signal definition: AI 3 wires PT100; External device 2 temperature, measured by 3 wires PT100 sensor.</p>
3	KPC11:IW2 / PLC_IW4_1102	External device 3 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit10 = 1; [Thermal external device 3 monitoring assignment] (VW1268) = 1102 - IW4_1102;</p> <p>2. Function description: Customer interface; Signal definition: AI 3 wires PT100; External device 3 temperature, measured by 3 wires PT100 sensor.</p>
4	KPC11:IW3 / PLC_IW4_1103	External device 4 temperature	AI	<p>1. Configurable: [Motor available PT100 selection](VW700).bit11 = 1; [Thermal external device 4 monitoring assignment] (VW1270) = 1103 - IW4_1103;</p> <p>2. Function description: Customer interface; Signal definition: AI 3 wires PT100; External device 4 temperature, measured by 3 wires PT100 sensor.</p>

KPC13_TM3AI8/G_AI

KPC13_TM3AI8/G_AI				
1	KPC13:IW0 / PLC_IW6_1300	Vibration Sensor 1	AI	<p>1. Configurable: [AMxA_AlxMonitorAssignment](VW860).b0 = 1; The following configured parameters would be used to scale vibration sensor signal 1 [AMxX_AlxScalingInputMin](VW864); [AMxY_AlxScalingInputMax](VW866);</p> <p>2. Function description: Customer interface; Signal definition : AI 0~20mA;</p>
2	KPC13:IW1 / PLC_IW6_1301	Vibration Sensor 2	AI	<p>1. Configurable: [AMxA_AlxMonitorAssignment](VW860).b1 = 1; The following configured parameters would be used to scale vibration sensor signal 2 [AMxX_AlxScalingInputMin](VW864); [AMxY_AlxScalingInputMax](VW866);</p> <p>2. Function description: Customer interface; Signal definition : AI 0~20mA;</p>
3	KPC13:IW2 / PLC_IW6_1302	Vibration Sensor 3	AI	<p>1. Configurable: [AMxA_AlxMonitorAssignment](VW860).b2 = 1;</p>

KPC13_TM3AI8/G_AI				
				<p>The following configured parameters would be used to scale vibration sensor signal 3 [AMxX_AlxScalingInputMin](VW864); [AMxY_AlxScalingInputMax](VW866);</p> <p>2. Function description: Customer interface; Signal definition : AI 0~20mA;</p>
4	KPC13:IW3 / PLC_IW6_1303	Vibration Sensor 4	AI	<p>1. Configurable: [AMxA_AlxMonitorAssignment](VW860).b3 = 1; The following configured parameters would be used to scale vibration sensor signal 4 [AMxX_AlxScalingInputMin](VW864); [AMxY_AlxScalingInputMax](VW866);</p> <p>2. Function description: Customer interface; Signal definition : AI 0~20mA;</p>
5	KPC13:IW4 / PLC_IW6_1304	reserved	AI	
6	KPC13:IW5 / PLC_IW6_1305	reserved	AI	
7	KPC13:IW6 / PLC_IW6_1306	reserved	AI	
8	KPC13:IW7 / PLC_IW6_1307	reserved	AI	

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Schneider Electric
35 rue Joseph Monier
92500 Rueil Malmaison - France
+ 33 (0) 1 41 29 70 00

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