Variable frequency drive (VFD)

Low voltage 380 – 480VAC

User Manual

en

H1 Series

LV-D – Low Voltage Variable Frequency Drive

RIGHT FROM THE START

AuCom

READ THESE INSTRUCTIONS BEFORE USE!

Imprint

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INTRODUCTION

GENERAL INFORMATION

PRODUCT IDENTIFICATION

Model:	H1 Series LV-D
Product type:	Speed regulation and control of AC low voltage three-phase motors
Product group:	Variable frequency drive (VFD)

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CHANGE LOG

Version	Change	Initiator	Date
1.0.0	Initial version	AuCom, (FB)	22.10.2024

Tab. 1-1 H1 Series LV-D User Manual – Change log

NOTES ON THIS USER MANUAL

This document contains important information for safe, effective, and efficient use of the H1 product.

SOURCE USER MANUAL The source user manual was written in English language.

STORAGE This user manual is an integral part of the H1 product and must always be kept in the immediate vicinity of the H1 VFD.

TARGET AUDIENCE This user manual is intended for the personnel responsible for the:

- installation,
- commissioning,
- operating,
- maintenance, and
- service

of the product. You can find further information on qualification requirements and access levels of the personnel in chapter "1.3 Target Audience and Qualification".

CHAPTER OVERVIEW

Chapter "1 Safety "
General safety instructions relevant to the product.

Chapter "2 Product Overview "
Basic information on the H1 frequency inverter and its features.

Chapter "**3 Mechanical Installation**"
Mechanical design of the H1 models and its main components.

Chapter "**4 Electrical Installation**
Electrical design of the H1 models and its main components.

Chapter "**5 Operation and Display**"
Presentation and explanation of all relevant elements and procedures for the initial commissioning and operation of the H1 VFD.

Chapter "**6 Commissioning**"
Measures and instructions for the initial commissioning of the H1 VFD for the various motor types.

Chapter "**7 Maintenance**"
Measures for planning and carrying out maintenance work to maintain the H1 VFD target state and optimise its availability.

Chapter "**8 Troubleshooting**"
Information on causes and remedial measures of potential malfunctions as well as instructions for restoring the H1 VFD to its target state.

Chapter "**9 Disposal**"
Instructions for the proper and environmentally friendly disposal of the H1 VFD after final decommissioning.

Chapter "**10 Spare Parts**"
Ordering information on available spare parts and accessories for the H1 product.

"Annex"

CHAPTER REFERENCE

For a quick and clear introduction to commissioning the H1 LV-D, the flowcharts for the various commissioning procedures are summarised in the "Annex".

SYMBOLS AND REPRESENTATIONS

WARNINGS

In this user manual, safety and protection levels are classified as DANGER, WARNING, HOT SURFACE, CAUTION and NOTICE.

DANGER

Warns of an electric shock hazard with a high degree of risk which, if not avoided, may result in death or serious injury.

WARNING

Warns of an electric shock hazard with a medium degree of risk which, if not avoided, may result in death or serious injury.

HOT SURFACE

Failure to follow these instructions may result in injury to the user.

CAUTION

Warns of a hazard (general hazard location) with a low degree of risk which, if not avoided, may result in minor or moderate injury.

NOTICE

Warns of situations that can lead to property damage if not avoided.

If several different levels of hazards are combined in one warning, the highest level of warning is always selected. Warnings about personal hazards may include warnings about property damage.

WARNING STRUCTURE

The warnings used in this user manual are each indicated by:

- a warning symbol,
- a signal word to indicate the extent of the hazard,
- an indication of the nature and source of the hazard,
- an indication of the possible consequences if the hazard is not avoided, and
- the measures to be taken to avoid the hazard.

Warning symbol

Signal word

Nature and source of the hazard

Possible consequences of not avoiding the hazard.

- ➢ Measure 1 to be taken to avoid the hazard
- ➢ Measure 2 to be taken to avoid the hazard
- ➢ ...

INFORMATIVE NOTES

In this user manual, additional information of a general nature or for more detailed information on specific matters is given as a NOTE or as a DISPOSAL NOTE.

NOTE

Indicates specific information relating to the use or operation of the product.

NOTES ON DISPOSAL

In this user manual, instructions for proper and environmentally friendly disposal are shown as DISPOSAL NOTES.

DISPOSAL NOTE

Indicates the regulations for the disposal of old electrical appliances.

REFERENCES

To increase the efficiency of this user manual, reference is made to exemplary instructions or further chapters for the description of the same procedure or further information.

CHAPTER REFERENCE

- Indication of the process/topic as well as indication of the referenced chapter number and the chapter title.

LABELLING OF INSTRUCTIONS

The *beginning* of a *general* instruction sequence on how to perform an action sequence is introduced as follows:

INSTRUCTION – Title of the instruction

START

The *beginning* of an instruction sequence *with indication of the required authorisation (user level)* to perform an action sequence is introduced as follows:

INSTRUCTION – Title of the instruction

START *USER LEVEL: "Unlocked keyboard"*

The action steps of the action sequence of an instruction are indicated as follows:
STEP 1: ...

- Result 1 of the first action step
- Result 2 of the first action step
- ...

STEP 2: ...

- Result 1 of the second action step
- Result 2 of the second action step
- ...

The end of a general or specific instruction sequence is indicated as follows:

END

TYPOGRAPHIC CONVENTIONS

In this user manual, *italics* are used for names of:

Parameters and functions,

Parameter setting options,

Alarm and fault messages, and

Common terms of particular importance.

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LIST OF ABBREVIATIONS

ABBREVIATIONS

Acronym	Description
ABS	absolute value
ACC, Acc	acceleration
ADS, Ads	address
AI	analog input
AMP	ampere, current
AMR	adaptive motor regulation
AO	analog output
APR	advanced program ramp
ASR	automatic speed regulation
AVR	automatic voltage regulation
Bro	broken
CHG	change
CiA402	CANopen device profile for drives and position (motion) control
CLR	clear
CMD, Cmd, cmd	command
CNT	counter
Comm	command sourced from serial communication
COMP	compensation
CTRL, Ctrl	control
Cur	current
DBC	dead band compensation
DCI	DC Injection
DCS	distributed communication system
dEb	decelerate energy backup, represents the instantaneous stop function, while voltage drop in the grid, this function is controlling the motor (slow down) to reduce the impact on the grid and resume the operation when the voltage is recovered. This is to achieve the undervoltage process without stopping.
DEC, Dec	deceleration
Det	detection
Dev	deviation
DFM	display frequency monitoring/measurement
DHCP	Dynamic Host Configuration Protocol
DI	digital input
DIR, Dir	direction
DO	digital output
DOB	disturbance observer
DPWM	Discrete Pulse Width Modulation
EF	error, fault
EMC	electromagnetic capability
EMF	electromotive force
Emp	empty

Acronym	Description
ERR, Err	error
FBK, Fbk, Fdb	feedback
FFD	feedforward
FLUXBEMF	flux back electromotive force
FLX	flux
FM	frequency modulation
FOC	field-oriented control
FVC	field (flux) vector control
FWD	forward
GF	ground fault
GFF	ground fault
HOA	Hand-Off-Automatic
Hp, HiSPD	high-speed
I/F, IF	current/flux
IDBST	initial deceleration boost
IGBT	insulated-gate bipolar transistor
ICT	In-Circuit Testing
IM	induction motor
INC	increase
JOG	derived from the English verb 'to jog', which in this context means 'to move slowly and in a controlled manner'
KPD	kinetic power demand
L/R	local/remote
LIM, Lim	limit
LMVF	low voltage motor variable frequency (drive)
Lo	lower
LOC/REM	local/remote
Lp	low pass
LPF	low pass filter
LPG	low pass gain
Ls, LoSPD	low speed
LSErr, LsEr	low speed error
LV	low voltage
Lvl	level
M1 ... M4	motor 1 ... motor 4
MID	middle
MOV	metal oxide varistor
MTPA	maximum torque per ampere
Mul	multiplication, multi
NB	Negative Big (PID controller - Fuzzy logic)
NL	negative limit
NS	Negative Small (PID controller - Fuzzy logic)
oc	overcurrent
oC	degrees Celsius [°C]

Acronym	Description
OH	overheat
oL	overload
OPER	operation
OPL	output phase loss
ORG	origin
OV, ov	overvoltage
P2P	point-to-point
PB	Positive Big (PID controller - Fuzzy logic)
PDFF	proportional-derivative feed-forward
PG	pulse generator
PHL	phase loss
PI	Proportional-Integral Controller (PI)
PID	Proportional-Integral-Derivative Controller (PID)
PLC	programmable logic controller
PL	positive limit
PLS	pulse
PM	permanent magnetic motor
PMLESS	without permanent magnet
PMVVC	voltage vector control method for permanent magnet synchronous motors
POS, Pos	position
PT	Potential Transformer
PTC	positive temperature coefficient
REC	recorded
REG	regulation
res	resistor
Ret	return
REV, Rev	reverse, reversal, change of direction
REV	revolutions
revs	revolutions
RLY	(output) relay
Rot	rotation
RPM, rpm	revolutions per minute
SCI	serial communication interface
SECT	sector
SEL, Sel	selection
SOOC	Selective Object Orientation Control or Start/Stop/Override Control ???
SPD, Spd	speed
SPWM	sinusoidal pulse width modulation
STO	Safe Torque Off
STP	Stop
sup	supress
SVC	sensorless vector control)

Acronym	Description
SVPWM	Space Vector Pulse Width Modulation
Sw	switching
S/W	software
SynRM	synchronous reluctance motor
Tap	taper
Ten	tension
TE	torque error
TQC, Tq	torque control
TQCPG	torque control with current proportional gain
TQR	torque control ratio
TRANS	transition
Unwd	unwind
Up	upper
VDR	Voltage dependent resistor
VF, V/F	voltage/frequency
VFD	variable frequency drive
VFFD	voltage feedforward
Vlt	Volt
VVC	voltage vector control
W/	with
W/O	without
Y-D	star/delta connection
Z, Zo	zero

SYMBOLS AND DEFINITIONS

Name/Symbol	Description	Unit
Id	magnetising current (dq transformation)	[A]
Iq	active motor current (dq transformation)	[A]
F	frequency	[Hz]
I	current	[A]
P	active power	[kW]
Jm, J	inertia of the motor	[kg m^2]
Rs	stator resistance	[Ω]
Rr	rotor resistance	[Ω]
Lm	mutual inductance	[mH]
Lx	leakage inductance	[mH]
Ld	d-axis inductance (dq transformation)	[mH]
Lq	q-axis inductance (dq transformation)	[mH]
n	speed	[rpm]
n*	speed setpoint	[rpm]
Vd, Ud	d-axis voltage (dq transformation)	[V]
Vq, Uq	q-axis voltage (dq transformation)	[V]
Kd	derivative term in the PID controller	-
Ke	constant to describe the back electromotive force (EMF)	-

Name/Symbol	Description	Unit
Ki, KI	integral factor of a controller; reciprocal of the time constant Ti	-
Kp, KP	proportional gain of a controller	-
Kr	Gain factor for the feedforward component within the proportional-derivative feedforward (PDFF) control in the speed control loop	-
⌀	diameter	

1 SAFETY

To use the AuCom H1 product safely, you must read, understand, and observe all the information in this user manual before use. This user manual must always be available when working on and with the product.

1.1 WARNING SIGNS ON THE H1 CABINET

The following warning signs are attached to the H1 cabinet and must be observed:

Warning sign	Description
	• Indicates a hazardous location with an electric shock hazard.
	• General reference to a hazardous point with reference to the relevant documentation.
	• Indicates a hazardous location with a hot surface and a risk of an injury hazard.

1.2 INTENDED USE

H1 frequency inverters are used for stepless speed control of three-phase drives (asynchronous motors) on the low voltage level (380 to 480 V).

This user manual serves as a specification for the intended use of the product and must be strictly adhered to. The user manual must be available for all activities connected with the product.

QUALIFIED AND AUTHORISED PERSONNEL

Only appropriately qualified and authorised personnel can carry out work on and with the product during the entire product life cycle.

TRANSPORT AND STORAGE

You must observe and comply with all instructions and relevant technical data on transport and storage conditions.

PERSONAL PROTECTIVE EQUIPMENT

At all times, you must observe the regulations on the use of personal protective equipment (PPE).

PLANT CONSTRUCTION

You must comply with all applicable country-specific, local, and industry-specific ordinances and regulations for the safety and construction of the plant.

ENVIRONMENT AND INSTALLATION

You must observe and comply with all instructions and information on ambient conditions and installation conditions.

OPERATION

All components of the application (frequency inverter, drive, power supply and its fuse protection) must be coordinated with each other regarding their rated variables, their function, and all parameter settings.

PRODUCT MODIFICATION AND DISCLAIMER

Modification or manipulation of the H1 VFD is not permitted.

Modification or tampering with the H1 VFD means that the product is being used outside of its specification and is therefore a non-intended use, which can cause personal injury and damage to the system. Any consequences of improper use of the product are not covered by AuCom Support and will void the guarantee or warranty. AuCom excludes all liability for improper use and any consequences that may arise from it.

MISUSE

Any use that does not correspond to the intended use of the H1 product is considered misuse.

DANGER

Danger in case of misuse

Misuse of the H1 VFD can result in death, serious personal injury, and damage to the equipment.

- Never operate the product unless all safety devices of the H1 VFD are functioning properly or are ready for operation.
- Never operate the product at a voltage level that does not correspond to the specified H1 VFD input voltage.
- Never connect drives to the product whose rated voltage and current are not matched to the rated values of the H1 VFD.
- Never put the product into operation unless all parameter settings of the H1 VFD have been adjusted to the connected drive and the application.
- Never modify or manipulate the product with hardware and/or software components not specified by AuCom.
- Never use spare parts that are not specified by AuCom.

1.3 TARGET AUDIENCE AND QUALIFICATION

The H1 VFD is intended for use by qualified personnel in commercial areas of various industries where frequency inverters are used to control the speed of three-phase low voltage motors.

This user manual is intended for qualified personnel for the installation, commissioning, operation, maintenance, and service of this product. According to their training and experience, qualified personnel are able to recognise risks when using the product and its applications and to avert potential hazards to persons and system components.

Key access to the operating unit (HMI) can be disabled or enabled via software settings. In this way, two user levels are available in the H1 VFD; see chapter "5.3.9 9:Keypad Lock".

USER LEVEL "LOCKED KEYBOARD"

In this user level, operation of the H1 VFD via the buttons on the operating unit (HMI) is disabled, while operation via DCS or DIS is possible, provided the H1 VFD is configured accordingly.

USER LEVEL "UNLOCKED KEYBOARD"

The technical personnel have advanced expertise for applications of frequency inverters on the low voltage level. This user level allows start/stop control of LV AC motors via the frequency inverter as well as reading and setting all parameters (commissioning, operation, and maintenance).

The instruction of the personnel is carried out based on the complete technical documentation as well as training by experts.

1.4 SAFETY INSTRUCTIONS

1.4.1 FIVE SAFETY RULES OF ELECTRICAL ENGINEERING

For all work on the H1 VFD you must apply the five safety rules of electrical engineering according to DIN VDE 0105 in the following order:

1. Switch off
2. Lock against reclosure
3. Check that lines and equipment are dead
4. Ground and short circuit all phases
5. Cover, partition, or screen adjacent line sections

To restart the equipment, follow the five safety rules is done in reverse order.

1.4.2 SAFE OPERATION

HANDLING THE H1 UNIT

Installation, commissioning, demounting, taking measurements, etc, of or on the H1 VFD may only be carried out by personnel technically qualified for the task. The installation must be carried out in accordance with local standards.

OPENING THE H1 UNIT

WARNING

Always switch off the mains voltage before opening the drive unit and wait at least 10 minutes to allow the buffer capacitors to discharge.

Always take adequate precautions before opening the H1 VFD. Although the connections for the control signals and the switches are isolated from the main voltage, do not touch the control board when the H1 VFD is switched on.

PRECAUTIONS TO BE TAKEN WITH A CONNECTED LOAD (MOTOR)

If work must be carried out on a connected load (motor) or on the driven machine, the mains voltage must always be disconnected from the H1 product first. Wait at least 10 minutes before starting work.

EMC REGULATIONS

To comply with the EMC Directive, it is essential to follow the installation instructions. All installation descriptions in this manual follow the EMC Directive.

MAINS VOLTAGE SELECTION

The H1 product may be ordered for use with the mains voltage range:

- 380 to 480 V AC

VOLTAGE TESTS (MEGGER)

Do not carry out voltage tests (Megger) on the motor, before all the motor cables have been disconnected from the H1 VFD.

CONDENSATION

If the H1 product is moved from a cold (storage) room to a room where it will be installed, condensation can occur. This can result in sensitive components becoming damp. Do not connect the mains voltage until all visible dampness has evaporated.

INCORRECT CONNECTION

The H1 VFD is not protected against incorrect connection of the mains voltage, and against connection of the mains voltage to the motor outputs U, V and W. The H1 product can be damaged in this way.

TRANSPORT

To avoid damage, keep the H1 VFD in its original packaging during transport. This packaging is specially designed to absorb shocks during transport.

HEAT WARNING

HOT SURFACE

Be aware of specific parts on the H1 VFD having high temperature.

DC-LINK RESIDUAL VOLTAGE

WARNING

After switching off the mains supply, dangerous voltage can still be present in the H1 drive.

- When opening the equipment for installing and/or commissioning activities wait at least 10 minutes.
- In case of malfunction a qualified technician should check the DC-link voltage or wait for one hour before dismantling the H1 VFD for repair.

2 PRODUCT OVERVIEW

2.1 IMPORTANT NOTES ON THE PRODUCT

H1 Series LV-D is a high-performance general frequency inverter (VFD) for low voltage 3-phase AC motors. This product line has rich hardware configuration and powerful software and accommodates multiple communication protocols. As a high-performance general-purpose VFD series that adopts a book-type design and meets the needs of multiple installation regions.

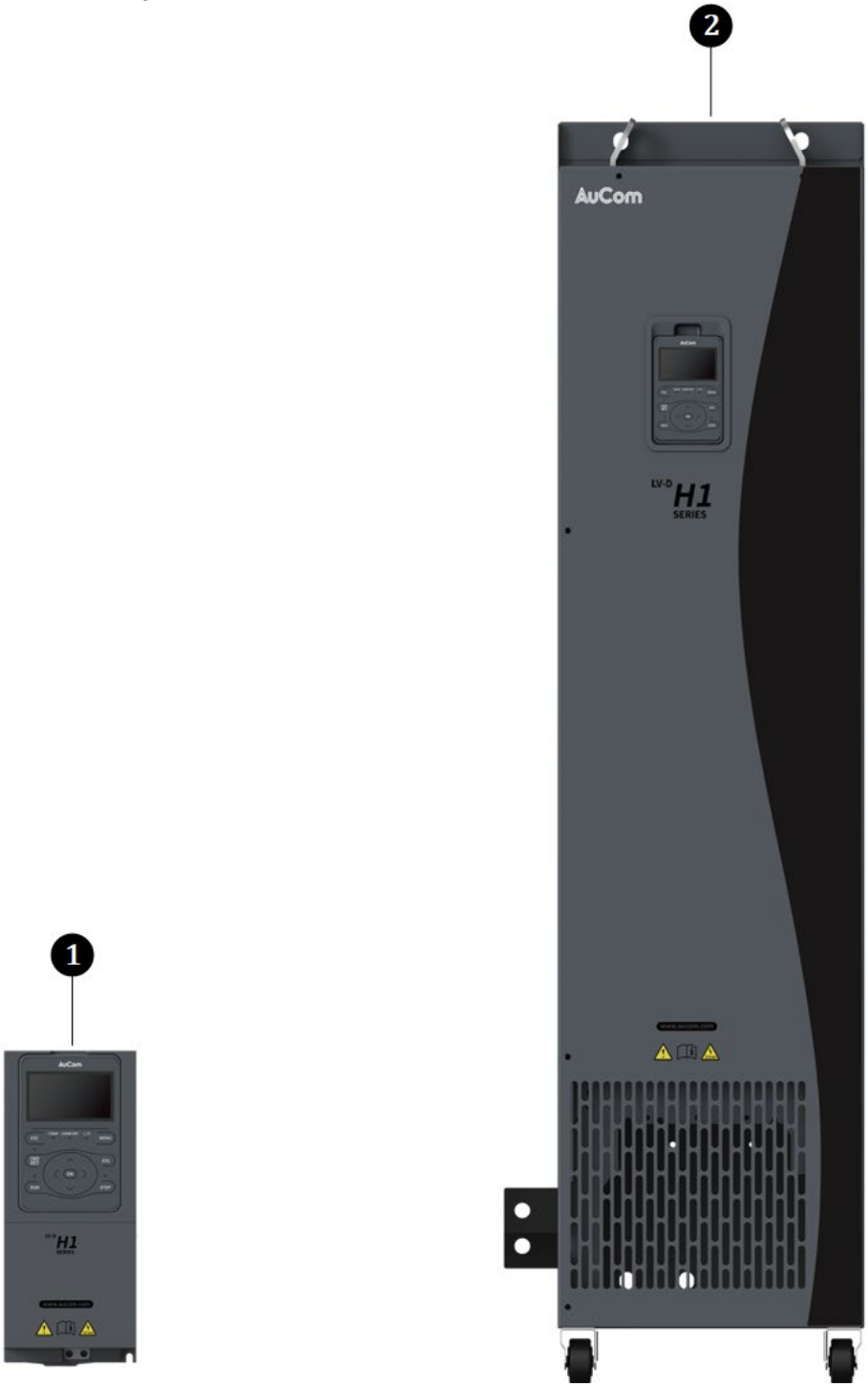


Fig. 2-1 H1 Series – LV-D

1. Frame size FS1: for applicable motors of 4 ... 7,5 kW
2. Frame size FS10: for applicable motors of 400 ... 475 kW

INTENDED USE OF THE H1 PRODUCT

H1 Series frequency inverters for drives with variable speed offer the following solutions for the use of low voltage motors with regard to:

- Intelligent control of low voltage AC synchronous and asynchronous motors (induction motors)
- Motor speed control (VFD)
- Motor soft start (extension of motor life cycle)
- Star/Delta motor start
- Motor DOL start (Package solution)
- Energy saving through optimised power consumption of the motor at different speed and power requirements

INDUSTRIES

Typical industries:

- Mining and minerals
- Food
- Woodworking
- Elevators
- Textiles
- Ceramics
- Logistics
- Conveyor Technology
- Others ...

AREAS OF APPLICATION

Rotational Speed up to Zero

- Design for crane application: Adopted to support the open loop zero-speed hold function of asynchronous motors with up to frequency of 599 Hz
- Supporting high-speed running (with the potential of supporting higher frequency values, such as 500 Hz); such VFDs can be used to control magnetic suspension centrifuges and machine tool spin dies.

Pressure Control

- Pressure control algorithm eliminates the necessity of purchasing an external controller.

Tension Control

- Different available modes:
  - Tension closed loop speed mode
  - Tension closed loop torque mode
  - Tension open loop torque mode
  - Linear speed closed loop speed mode

Position (Motion) Control

- Position control algorithm for positioning function
- Point-to-point (P2P) control: The location of the target is sent through communication, a pulse signal.

Motor Control

- Asynchronous motors (induction motors IM)
- Synchronous motors (permanent magnet motors PM)
  - Interior permanent magnet motors
  - Surface-mounted permanent magnet motors
  - Reluctance synchronous motors

AUCOM H1 SERIES
LV-D PRODUCT FAMILY

Fig. 2-2 H1 Series – LV-D product family

The H1 Series covers a wide range of applicable motor power.

All LV-D models are available as air-cooled systems and offer the same advantages such as high reliability, advanced functionality, user-friendly operation, and a wide range of options .

AuCom H1 Series LV-D	Description
Power range	4 ... 450 kW
Voltage range	3-phase, 380 ... 480 V
IP class, cabinet	IP20 / 54
Control mode	C: V/F, D: Direct torque control or V/F
LCL line filter	Option
EMC filter	Option
DCS communication (standard)	Modbus RTU
Other options	Encoder, PG card, PTC / PT100, Extended I/O, Safe Torque Off (STO)
DCS communication: phys. interface (Modbus RTU)	RS485
Communication card types (options)	DeviceNet, Profibus, CANopen, Modbus TCP, EtherNet/IP, EtherCAT, Lon Works, BACNet, DMCnet, Profinet
CE certification	All sizes

Tab. 2-1 AuCom H1 Series LV-D – Product family

2.1.1 RECEIVING INSPECTION

Upon receiving the H1 product:

- Confirm the exterior packaging of the VFD is in good condition.
- Unpack and confirm the surface of the VFD is in good condition and verify that there are no broken or shifted internal components.
- Check the packing list to confirm all components are received.

CAUTION

If there is any damage to the VFD, refuse shipment and immediately contact the carrier.

2.1.2 LABELLING OF THE PRODUCT

NAMEPLATE

All relevant information describing the H1 product is summarised on the nameplate of the H1 LV-D control unit. For H1 packages, there is a separate nameplate for the H1 cabinet.

H1 CONTROL UNIT – NAME PLATE

The nameplate is attached to the outside of the H1 VFD and shows the following information:

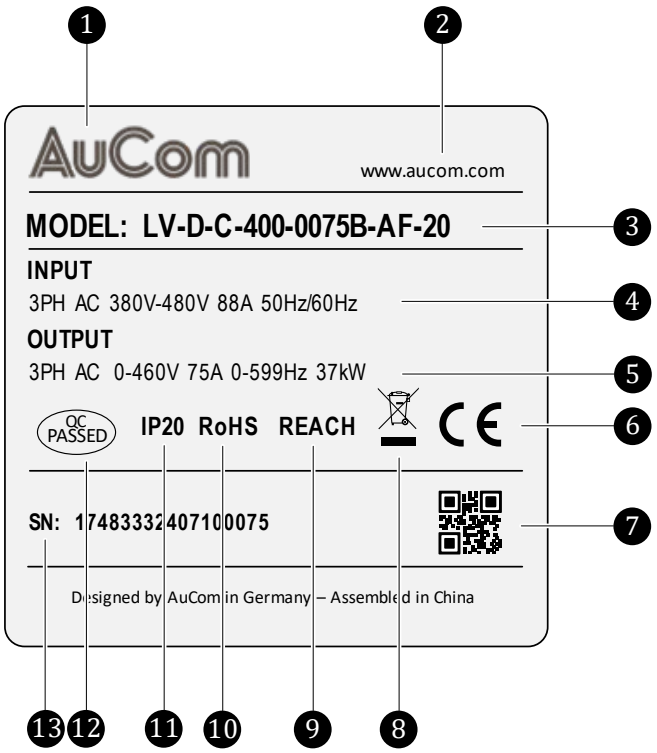


Fig. 2-3 H1 VFD control unit – Name plate

1. Company logo of the manufacturer
2. Manufacturer's website
3. H1 model
4. Technical product data: H1 VFD input
5. Technical product data: H1 VFD output
6. CE marking
7. QR code
8. Disposal symbol
9. *Registration, Evaluation, Authorisation and Restriction of Chemicals* compliance mark
10. *Restriction of Hazardous Substances* compliance mark
11. Ingress protection class according to IEC 60529:1989
12. Manufacturer's quality mark
13. Serial number

H1 CABINET – NAME PLATE

The nameplate is attached to the outside of the H1 cabinet and shows the following information:

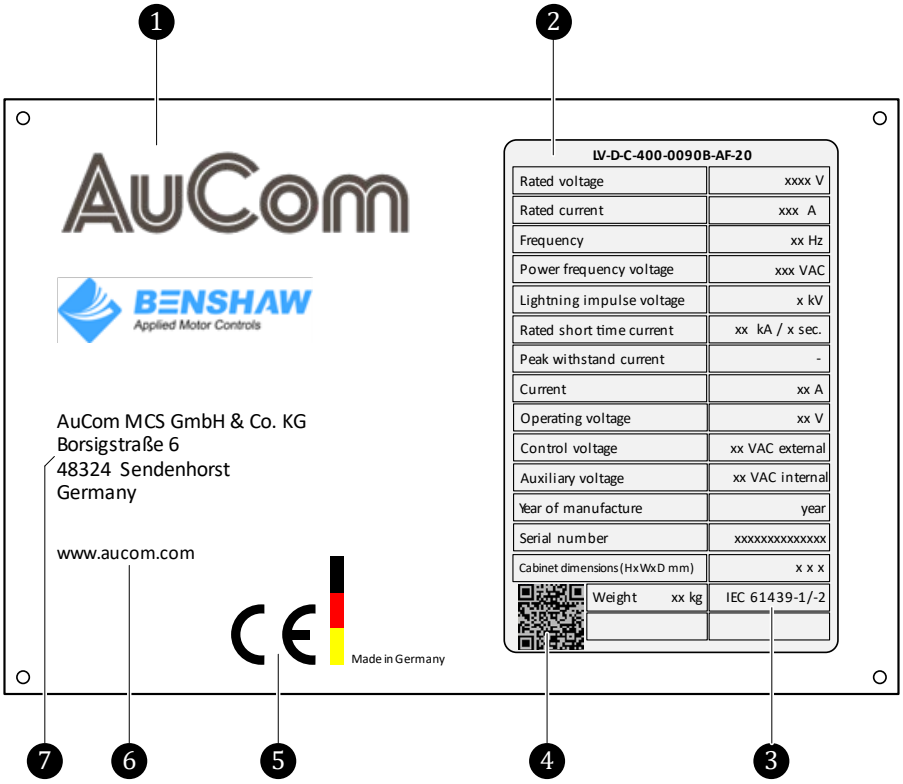


Fig. 2-4 H1 VFD cabinet – Name plate

1. Company logo of the manufacturer
2. Technical product data
3. Product standard (IEC)
4. QR code
5. CE marking
6. Manufacturer's website
7. Manufacturer's address

TECHNICAL PRODUCT DATA

Technical specification	Description
Rated Voltage value	Mains supply voltage
Rated current / power	Rated current/rated power at the H1 VFD output
Frequency	Mains supply frequency
Power frequency voltage	AC withstand voltage
Lightning impulse voltage	Impulse withstand voltage
Rated short time current	Rated short time withstand current
Peak withstand current	Rated impulse withstand current
Current	Rated current (H1 VFD output)
Operating voltage	Rated voltage (H1 VFD output)
Control voltage	-
Auxiliary voltage	-
Year of Manufacture	-
Serial number	-
IPxx	Ingress protection class according to IEC 60529:1989
Weight	Weight of the H1 VFD system

Tab. 2-2 Technical data on the H1 VFD cabinet nameplate

QR CODE In addition to the data on the nameplate, the QR code shown on the nameplate contains further information on the delivered H1 product.

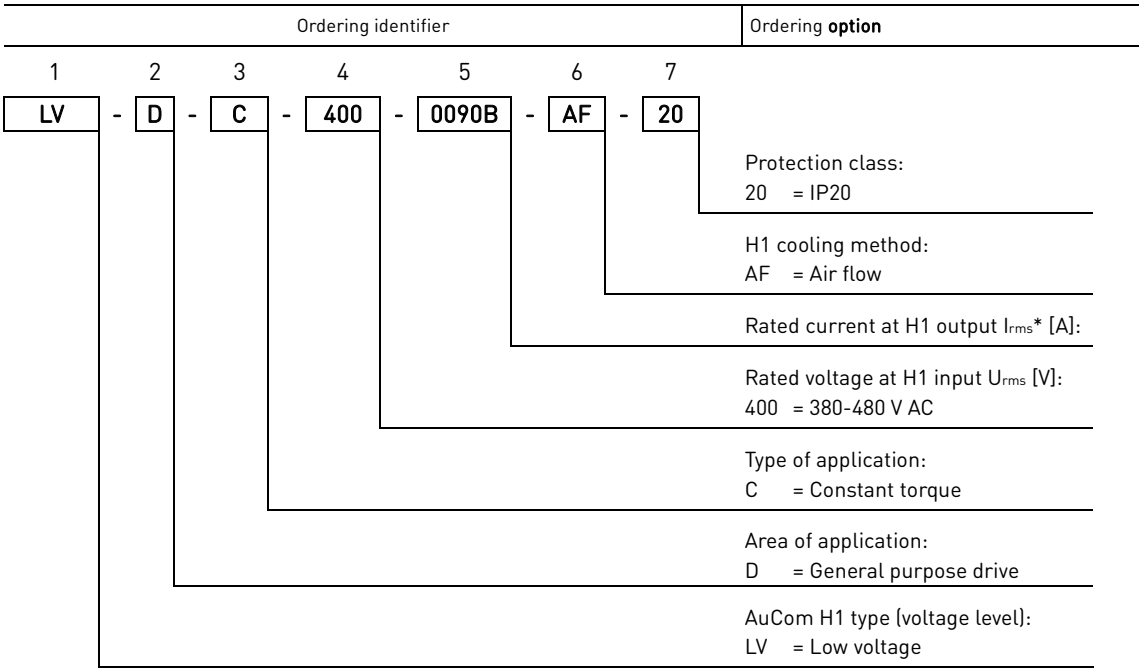
You can scan the QR code using a camera or a smartphone or a PC/notebook. Once scanned, you are automatically linked to this page on the AuCom website:

https://www.aucom.com/contact-us/support-enquiry

You can use the above link to submit a support request for further information.

PRODUCT CODE

The product code can be used to determine the exact model of the H1 product. This identification is required for model-specific information during assembly and installation. The product code is located on the name plate of the H1 LV-D control unit.



* See table below *Rated currents*

Tab. 2-3 Ordering identifiers and ordering options in the H1 product code

NOTES ON MODEL SELECTION

Model selection of the H1 VFD depends on the motor type to be driven, the motor ratings, and the load characteristics. For special or atypical loads, motors or environments, follow the advice and recommendations below.

EXTREME ENVIRONMENTAL CONDITIONS

When used in extreme environments, e.g., at high ambient temperatures or at high altitudes (> 1500 m) or ambient temperatures (> 40 °C), the power of the LV frequency inverter must be reduced. This may result in a VFD with a higher rated power being required for the application (see *Ordering identifier 5*).

CAUTION

The LV frequency inverter is not designed for operation in potentially explosive atmospheres. As a result, it must not be installed in such environments.

NOTE

- The connected load determines the output current that the H1 VFD must apply.
- The above recommendations do not cover all cases of special loads and motors. Contact AuCom or your local supplier to confirm the model required.

ORDERING IDENTIFIER AND ORDERING OPTIONS

The ordering identifier is shown at the top of "Tab. 2-3 Ordering identifiers and ordering options in the H1 product code".

ORDERING IDENTIFIER 1 Application voltage level of the H1 product.

ORDERING IDENTIFIER 2 Performance type of the H1 product.

ORDERING IDENTIFIER 3 H1 model according to the application referring to constant torque.

ORDERING IDENTIFIER 4 Rated voltage (mains voltage) at the H1 input.

ORDERING IDENTIFIER 5 Selection of rated output current at H1 output and brake unit:

Rated output current I_{rms} [A]	Ordering option		
	Standard-configuration brake unit	Selectable configuration brake unit	Frame size
9	0009B	-	FS1
13	0013B	-	
17	0017B	-	
25	0025B	-	FS2
32	0032B	-	
37	0037B	-	FS3
45	0045B	-	
60	0060B	-	
75	0075	0075B	FS4
90	0090	0090B	
110	0110	0110B	FS5
152	0152	0152B	
176	0176	0176B	
210	0210	0210B	FS6
253	0253	0253B	
304	0304	-	FS7
340	0340		
380	0380	-	FS8
426	0426	-	
465	0465	-	
520	0520	-	FS9
585	0585	-	
650	0650	-	
725	0725	-	FS10
820	0820	-	

Tab. 2-4 Rated currents and brake units available at the H1 output

NOTE

- FS1 to FS4 VFDs have no inductors.
- FS1 to FS3 VFDs have a standard-configuration internal brake unit; for FS4–FS6 VFDs, an internal brake unit can be selected.
- FS7 to FS10 without internal brake unit.

ORDERING IDENTIFIER 6 Cooling method of the H1 product.

ORDERING IDENTIFIER 7 The *Ingress Protection* class rating according to the IP code is IP20.

2.1.3 CONFORMITY

EU DECLARATION OF CONFORMITY

EU Declaration of Conformity

(Directive 2014/30/EU)
(Directive 2014/35/EU)
(Directive 2014/65/EU)

Product type: Low Voltage Variable Frequency Drive

Manufacturer: AuCom MCS GmbH & Co.KG

Address: Borsigstraße 6

48324 Sendenhorst

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Product identification: H1 Series

Design variants considered:

LV-D-C-400-0009B-AF-20
LV-D-C-400-0013B-AF-20
LV-D-C-400-0017B-AF-20
LV-D-C-400-0025B-AF-20
LV-D-C-400-0032B-AF-20
LV-D-C-400-0037B-AF-20
LV-D-C-400-0045B-AF-20
LV-D-C-400-0060B-AF-20
LV-D-C-400-0075-AF-20
LV-D-C-400-0075B-AF-20
LV-D-C-400-0090-AF-20
LV-D-C-400-0090B-AF-20
LV-D-C-400-0110-AF-20
LV-D-C-400-0110B-AF-20
LV-D-C-400-0152-AF-20
LV-D-C-400-0152B-AF-20
LV-D-C-400-0176-AF-20
LV-D-C-400-0176B-AF-20
LV-D-C-400-0210-AF-20
LV-D-C-400-0210B-AF-20
LV-D-C-400-0253-AF-20
LV-D-C-400-0253B-AF-20
LV-D-C-400-0304-AF-20
LV-D-C-400-0340-AF-20
LV-D-C-400-0380-AF-20
LV-D-C-400-0426-AF-20
LV-D-C-400-0465-AF-20
LV-D-C-400-0520-AF-20
LV-D-C-400-0585-AF-20
LV-D-C-400-0650-AF-20
LV-D-C-400-0725-AF-20
LV-D-C-400-0820-AF-20

The object of the declaration described above is in conformity with the following relevant Union harmonisation legislation(s):

2014/30/EU: DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast) (Text with EEA relevance); Official Journal of the European Union L96/79, 29/03/2014.

2014/35/EU: DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; Official Journal of the European Union L96/357, 29/03/2014.

2011/65/EU: Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast) (Text with EEA relevance); Official Journal of the European Union L174/88, 01/07/2011.

Conformity to the directives is verified through total compliance with all of the specifications applicable to the product in the following Standards:

DIN EN IEC 61800-3:2024-04: Adjustable speed electrical power drive systems - Part 3: EMC requirements and specific test methods for PDS and machine tools (IEC 61800-3:2022); German version EN IEC 61800-3:2023

DIN EN 61800-5-1:2017-11: Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy (IEC 61800-5-1:2007 + A1:2016); German version EN 61800-5-1:2007 + A1:2017
DIN EN 61800-5-1/A11:2021-08: Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy; German version EN 61800-5-1:2007/A11:2021

DIN EN IEC 63000:2019-05: Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances (IEC 63000:2016); German version EN IEC 63000:2018

Signed for on behalf of AuCom MCS GmbH & Co.KG

Sendenhorst, 16/10/2024

Place/ Date of issue

Patrick van der Kooy, Quality-Manager

Name, Function, Signature

EU Declaration of Conformity H1-Series V-20241016-GB.docx

2/2

PRODUCT STANDARD FOR EMC

Product standard DIN EN IEC 61800-3, second edition of 2004 defines the:

FIRST ENVIRONMENT (Extended EMC) as environment that includes domestic premises. It also includes establishments directly connected without intermediate transformers to a low voltage power supply network that supplies buildings used for domestic purposes.

- Category C2:

  Power Drive System (PDS) of rated voltage < 1000 V, which is neither a plug-in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by a professional.

SECOND ENVIRONMENT (Standard EMC) includes all other establishments.

- Category C3:

  PDS of rated voltage < 1000 V, intended for use in the second environment and not intended for use in the first environment.

- Category C4:

  PDS or rated voltage equal or above 1000 V, or rated current equal to or above 400 A, or intended for use in complex systems in the second environment.

The H1 VFD complies with the product standard DIN EN IEC 61800-3 (Any kind of metal screened cable may be used). The H1 VFD is designed to meet the requirements according to category C3.

By using the optional "Extended EMC" filter the H1 VFD fulfils the requirements according to category C2.

WARNING

In a domestic environment this product may cause radio interference, in which case it may be necessary to take adequate additional measures.

WARNING

The H1 VFD, complying with category C3, is not intended to be used on a low-voltage public network which supplies domestic premises; radio interference is expected if used in such a network. Contact your supplier if you need additional measures.

NORMS AND STANDARDS

EUROPEAN MARKET

INTERNATIONAL

Standard	Definition
EMC Directive	2014/30/EU
Low Voltage Directive	2014/35/EU
WEEE Directive	2012/19/EU
EN 60204-1:2018	Safety of machinery - Electrical equipment of machines Part 1: General requirements.
EN IEC 61000-6-2:2019 EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) Part 6-2: Generic standards - Immunity standard for industrial environments. Part 6-4: Generic standards - Emission standard for industrial environments.
DIN EN IEC 61800-3:2024	Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods. EMC Directive: Declaration of Conformity and CE marking
IEC TR 61000-3-15:2011	Electromagnetic compatibility (EMC) Part 3-15: Limits assessment of low frequency electromagnetic immunity and emission requirements for dispersed generation system in LV network.
DIN EN 61800-5-1:2017	Adjustable speed electrical power drive systems Part 5-1. Safety requirements - Electrical, thermal and energy. Low Voltage Directive: Declaration of Conformity and CE marking

Tab. 2-5 European and international standards

EMC AND SAFETY OF MACHINERY

EMC STANDARDS

The H1 VFD complies with the following EMC standards:

- Generic EMC standards i.e., EN IEC 61000-6-2 and EN IEC 61000-6-4
- DIN EN IEC 61800-3 Adjustable speed electronic power drive systems, part 3, EMC product standards:
- Standard: Category C3, for systems of rated supply voltage < 1000 V AC, intended for use in the second environment.
- Optional: Category C2, for systems of rated supply voltage < 1000 V, which is neither a plug-in device nor a movable device and, when used in the first environment, is intended to be installed and commissioned only by experienced person with the necessary skills in installing and/or commissioning variable speed drives including their EMC aspects.

SAFETY OF MACHINERY – STOP CATEGORIES AND EMERGENCY STOP

The following information is important if EMERGENCY STOP circuits are used or needed in the installation where a variable speed drive is used. The standard EN 60204-1 "Safety of machinery - Electrical equipment of machines - Part 1: General requirements" defines 3 stop categories:

- **Category 0: Uncontrolled STOP:**

  Stopping by switching off the supply voltage. A mechanical stop must be activated. This STOP may not be implemented with the help of a variable speed drive or its input/output signals.

- **Category 1: Controlled STOP:**

  Stopping until the motor has come to standstill, after which the mains supply is switched off. This STOP may not be implemented with the help of a variable speed drive or its input/output signals.

- **Category 2: Controlled STOP:**

  Stopping while the supply voltage is still present. This STOP can be implemented with each of the variable speed drives STOP command.

WARNING

With option Safe Torque Off (STO), a stop according EN IEC 62061:2005 SIL 2 & EN ISO 13849-1:2006, can be achieved.

2.2 PRODUCT DATA

2.2.1 FEATURES AND FUNCTIONS OF THE H1 VFD

The H1-D drives are suitable for frequency regulation and control of low voltage three-phase motors. The H1-D VFD offer the following features and functions:

MAIN FEATURES

BOOK TYPE DESIGN

- Independent vertical straight-through air duct for heat dissipation Side-by-side installation to save the footprint
- Narrow-body scheme: with a small footprint and high-power density

MOTOR CONTROL

- Multiple motor control types such as SPM, 1PM, SynRM and IM are supported to meet the diversified motor needs of the customers

INTERFACES

- Rich peripherals are available such as CANopen / PROFIBUS-DP / PROFINET / Ethernet / IP / EtherCAT, multiple encoder cards, friendly human-machine interaction is provided, and multiple industrial application macros are supported

GREEN & HIGH EFFICIENCY

- Automatic energy saving control: Improve the control efficiency for no-load motors in fans and water pumps their no-load current values can be reduced by 30 %
- Energy control: To increase the operational efficiency the deceleration time can be shortened

EASE OF RELIABILITY AN USE

- Switching between English, Chinese, German and Spanish HMI menu languages
- Standard-configuration HMI keypad
- Parameter classification and quick copying

FUNCTIONS

VOLTAGE LEVELS

VFD applications for low voltage levels from 380 V to 480 V.

ADJUSTABLE FREQUENCY RANGE

Motor speed is controlled via an adjustable frequency range from 0 to 599 Hz.

MOTOR CONTROL METHODS

- Asynchronous motor (induction motor) according to extended V/F control characteristic
- Synchronous motor (permanently excited, reluctance motor) according to extended V/F control characteristic
- Asynchronous motor (induction motor) with/without speed sensor according to open loop/closed loop vector control
- Synchronous (permanent magnet) motor with/without rotor position sensor according to open loop/closed loop vector control

START/STOP MODES

Various, adjustable start/stop characteristics for the motor such as acceleration and deceleration ramps as well as motor coasting.

N OR F* SETPOINT SETTING*

You can specify the required speed/frequency setpoint either manually on site via the touchscreen of the operating unit (HMI) or remotely via an analog input (AI), digital inputs (DI) or via the distributed control system (DCS).

VFD OPERATING MODES

You can control the VFD either manually on site via the RUN/STOP buttons of the operating unit (HMI) or remotely via a distributed control system (DCS) or via digital inputs (DI).

DISTRIBUTED CONTROL SYSTEM (DCS)

The VFD can be integrated into a distributed control system. The following communication protocols are available: Modbus RTU, Profibus DP, CANopen, Profinet, Ethernet, IP, EtherCAT (others on request).

STATIC AND DYNAMIC PARAMETER IDENTIFICATION

Automatic determination of motor parameters, for the pre-assignment of control parameters in case of missing motor data for idle start and start under load.

MOTOR REVERSE MODE

Reverse the motor rotation direction via the VFD.

2.2.2 DIMENSIONS AND WEIGHTS

H1 LV-D MODELS

Dimensions, weight, and space requirements for a H1 LV-D model depend on the rated power of the H1 VFD. For dimensions and weights of the various H1 LV-D models refer to "Tab. 2-6 H1 Series LV-D model specifications".

H1 LV-D CABINETS

Dimensions, weight, and space requirements for a H1 cabinet depend on the rated power of the H1 VFD.

The exact specifications are only known when the product code is defined.

For detailed information, contact AuCom.

2.2.3 TECHNICAL DATA

ELECTRICAL AND MECHANICAL LV-D MODEL SPECIFICATIONS

The following LV-D model specifications refer to:

- LV-D input voltage: 380 ... 480 V AC -15 % / +10 %
- LV-D input frequency: 50/60 Hz
- LV-D output voltage: 0 ... 460 V AC

LV-D MODEL SPECIFICATIONS

Product code	Input current [A]	Output current [A]	Applicable motor [kW]	Frame size	Frame dimension H x W x D [mm]	Net weight [kg]
LV-D-C-400-0009B-AF-20	11.4	9	4	FS1	235 x 100 x 178	2
LV-D-C-400-0013B-AF-20	16.7	13	5.5			
LV-D-C-400-0017B-AF-20	21	17	7.5			
LV-D-C-400-0025B-AF-20	32	25	11	FS2	320 x 118 x 200	3.5
LV-D-C-400-0032B-AF-20	41	32	15			
LV-D-C-400-0037B-AF-20	47	37	18.5	FS3	365 x 140 x 245	6
LV-D-C-400-0045B-AF-20	56	45	22			
LV-D-C-400-0060B-AF-20	72	60	30			
LV-D-C-400-0075-AF-20	88	75	37	FS4	430 x 180 x 260	13
LV-D-C-400-0075B-AF-20						
LV-D-C-400-0090-AF-20	110	90	45			
LV-D-C-400-0090B-AF-20						
LV-D-C-400-0110-AF-20	106	110	55	FS5	593 x 250 x 362	47.5
LV-D-C-400-0110B-AF-20						
LV-D-C-400-0152-AF-20	139	152	75			
LV-D-C-400-0152B-AF-20						
LV-D-C-400-0176-AF-20	165	17	93			
LV-D-C-400-0176B-AF-20						
LV-D-C-400-0210-AF-20	190	210	110	FS6	640 x 270 x 370	49.5
LV-D-C-400-0210B-AF-20						
LV-D-C-400-0253-AF-20	230	253	132			
LV-D-C-400-0253B-AF-20						
LV-D-C-400-0304-AF-20	276	304	160	FS7	780 x 290 x 425	80.5
LV-D-C-400-0340-AF-20	314	340	185			
LV-D-C-400-0380-AF-20	346	380	200	FS8	1101 x 300 x 506	121.5
LV-D-C-400-0426-AF-20	380	426	220			
LV-D-C-400-0465-AF-20	435	465	250			
LV-D-C-400-0520-AF-20	478	520	280	FS9	1248 x 340 x 545	167.5
LV-D-C-400-0585-AF-20	534	585	315			
LV-D-C-400-0650-AF-20	598	650	355			
LV-D-C-400-0725-AF-20	672	725	400	FS10	1389 x 340 x 545	207.5
LV-D-C-400-0820-AF-20	742	820	450			

Tab. 2-6 H1 Series LV-D model specifications

GENERAL ELECTRICAL SPECIFICATION

General specification	
LV-D rated power	4 ... 450 kW
Mains voltage	380-480 V: +10 % / -15 %
Output AC voltage	0 ... 460 V AC
Protection class	IP20
Main control performance	
Output frequency	0 ... 599 Hz
Carrier frequency	• 7.5 kW and below: 2 kHz ... 15 kHz • 11 kW ... 93 kW: 2 kHz ... 10 kHz • 110 kW ... 450 kW: 2 kHz ... 6 kHz Automatic carrier frequency adjustment can be done according to the load characteristics.
Input frequency resolution	• Digital setting: 0.01 Hz • Analog Setting: Maximum Frequency × 0.025 %
Control mode	• Asynchronous (induction) motors (IM): V/F, VVC , SVC , and FVC • Permanent magnet motors (PM): SVC, VVC, and FVC
Starting torque	• SVC: 150 % • FVC: 180 %
Speed regulation range	• 1:200 (SVC) • 1:1000 (FVC)
Speed Stability Accuracy	• SVC: ≤ ±0.5 % • FVC: ≤ ±0.3 %
Torque response	Torque step response < 20ms
Torque accuracy	• ±10 % (SVC) • ±5 % (FVC)
Overload capacity	150 % rated current 60 s / 1 min
Torque boost	Automatic and manual torque boost modes are included
V/F curve	• Multi-point V/F curve • 1.5-power V/F curve • Square V/F curve
Acceleration and deceleration curve	• Linear or S-curve acceleration/deceleration • four groups of acceleration/deceleration times • acceleration/deceleration time range: 0.00 ... 600.00 s or 0.0 ... 6000.0 s
Tension control	Tension control modes: • Tension closed loop mode • Linear speed closed loop mode • Tension closed loop torque mode • Tension open loop torque mode
Multi-speed running	Up to 16 preset speeds can be realized through terminals
Built-in PID	Can easily realize closed loop process control.
Customized functions	
Peripheral safety self-test	A safety test is performed on the peripherals to timely identify any problems, such as a grounding problem or a short-circuit, and improve the reliability of the system
Common DC busbar function	A common DC bus can be shared by multiple VFDs.
JOG function	The JOG key on the operation panel can be used for jog running.
Fast current limiting function	A quick current limiting algorithm is embedded to reduce the probability that an overcurrent fault happens to the VFD.
Motor parameter identification	Automatic motor parameter identification

Automatic Voltage Regulation (AVR)	A constant voltage output can be maintained in case of grid voltage variations.
Standardized panel extension cable	Customers can extend the panel using standard network cables.
DCS Communication	At least six protocol types are supported (Modbus, Profinet, CANopen, Profibus-DP, EtherCAT, and Ethernet)
Expansion function	Multiple bus communication expansion cards; PG card (incremental, resolver)
Safe Torque Off (STO)	Safe torque off (2 channels)
VFD operation (RUN)	
Run command channels	Support multiple command signal input methods: • Operating unit (HMI) • Digital inputs (DI) • DCS communication
Frequency sources	Multiple frequency setting sources: • Operating unit (HMI), • Analog inputs (AI), • Digital inputs (DI), • DCS communication
Auxiliary frequency sources	Multiple auxiliary frequency setting sources: • Operating unit (HMI), • Analog inputs (AI), • Digital inputs (DI), • DCS communication setting Users can flexibly fine tune and combine auxiliary frequency sources.
Universal terminals	8 x Digital input (DI) including 1 x high-speed input 3 x Digital output (DO), including 1 x high-speed output 2 x Relay output (RY) 3 x Analog input (AI) 2 x Analog output (AO) 2 x STO (external safety relay connection) 1 x RS485 (Modbus RTU)
Automatic acceleration/deceleration	Automatic acceleration/deceleration time adjustment based on the load torque
Display and panel operation	
LCD display	English, German, and Chinese languages are supported
LCD parameter copying	Quick parameter copying can be accomplished on the LCD panel
Protections and options	
Protection functions	• Motor short-circuit detection • Input/output phase loss protection • Overcurrent protection • Overvoltage protection • Undervoltage protection • Overtemperature protection • Overload protection
Options	Brake assembly

Tab. 2-7 General specification

ENVIRONMENTAL CONDITIONS

OPERATION

Item	Specification
Use place	Indoor, free from direct sunlight, dust, corrosive gas, flammable gas, oil mist, water vapour, dripping water or salt, etc.
Pollution degree	2
Altitude	• < 1000 m: no derating is required • 1000 m < h < 3000 m: derate VFD current and voltage by 1 % for each 100 m
Nominal ambient temperature	-10 ... +50 °C (in case the environment temperature ranges from 40 °C to 50 °C, use it with its working current lower than its rated current.)
Storage temperature	-20 °C ... +60 °C
Transportation temperature	-20 °C ... +60 °C
Relative humidity, non-condensing	< 95 %, without water droplets
Vibrations	< 5.9 m/s² (0.6 g)
Contamination, according to IEC 60721-3-3	No electrically conductive dust allowed. Cooling air must be clean and free from corrosive materials. Chemical gases, class 3C2 (Coated boards 3C3). Solid particles, class 3S2.

Tab. 2-8 Environmental conditions – Operation

BASIC I/O DATA

Digital Inputs (DI), 8 Channels			
Design	Opto-coupler isolation, compatible with bipolar inputs		
Default built-in power supply	PNP type (source)		
Input voltage range (DI 1 to DI 7)	9 ... 30 V DC		
Input voltage range (HDI 8)	15 ... 30 V DC		
Input impedance	< 3.3 V DC: 3 kΩ / ≥ 3.3 V DC: 3 kΩ		
Signal delay	≤ 8 ms		
Terminals	Terminal No.	Name	Function (*Default*)
	X1:5	COM	*DI power* supply for: PNP mode (wire-bridge to DCM) or NPN mode (wire bridge to +24V) *with* external power supply or *DI Common* for: PNP mode (neg. potential) or NPN mode (pos. potential) *without* external power supply
	X1:6	+24V	*DI power supply* for: PNP mode or NPN mode (wire bridge to +24V) *without* external power supply or *No function* for: PNP or NPN mode *with* external power supply
	X1:7	DCM	*Digital Common* for: PNP mode (wire-bridge to COM) or NPN mode *without* external power supply or *No function* for: PNP or NPN mode *with* external power supply
	X1:8	DI 1	*Forward / STOP*
	X1:9	DI 2	*Reverse / STOP*
	X1:10	DI 3	*Multi-stage command 1*
	X1:11	DI 4	*Multi-stage command 2*
	X1:12	DI 5	*Multi-stage command 3*
	X1:13	DI 6	*Multi-stage command 4*
	X1:14	DI 7	N/A
	X1:25	HDI 8	N/A (100 kHz high-speed DI)
Functional Safety Inputs, 2 Channels			
Rated input voltage	+24 V DC ± 10 %		
Maximum input voltage	+30 V DC		
Rated input current	6.8 mA ± 10 %		
NOTE:	When the STO function is not used, it can be disabled by short-circuiting S1 and S2 with +24 V (default wiring on delivery).		
Terminals	Terminal No.	Name	Function (Default)
	X2:1	STO 1	*Safety Relay*
	X2:2	STO 2	

	X2:3	+24 V	
Digital Outputs (DO) , 3 Channels			
Design (DO1, DO2)	Opto-isolated, bipolar open-collector outputs		
Design (High-speed DO)	Opto-coupled isolated output		
Output voltage (DO1, DO2)	0 ... 48 V DC		
Output current (DO1, DO2)	0 ... 50 mA		
Output voltage (High-speed DO)	0 ... 24 V DC		
Output current (High-speed DO)	0 ... 30 mA		
Max. output frequency (HDI 8)	100 kHz		
Terminals	Terminal No.	Name	Function (*Default*)
	X2:4	DCM	Common (High-speed DO)
	X2:5	FM	High-speed DO: *No Function*
	X2:6	CME	Common (DO 1, DO 2)
	X2:7	DO 1	*No Function*
	X2:8	DO 2	*No Function*
Analog Inputs (AI, differential), 3 Channels			
Design	Voltage input: 0 ... 10 V or Current input: 0 ... 20 mA (parameterizable)		
Input voltage	0 ... 10 V DC		
Input current	0 ... 20 mA		
Max. input voltage	+30 V		
Input impedance	10 kΩ (voltage); 500 Ω (current)		
Resolution	12 bit		
Hardware accuracy	0.5 % Type + 1 LSB		
Non-linearity	1 LSB		
Terminals	Terminal No.	Name	Function (*Default*)
	X2:11	GND	Ground
	X2:12	AI 1	*FREQ Reference*
	X2:13	AI 2	*No Function*
	X2:14	AI 3	*No Function*
	X2:15	+10 V	+10 V or 20 mA
Analog Outputs (AO), 2 Channels			
Design	Voltage output: 0 ... 10 V or Current output: 0 ... 20 mA (parameterizable)		
Output voltage	0 ... 10 V DC		
Output current	0 ... 20 mA		
Output impedance	10 Ω		
Resolution	10 V, 1 %; 20 mA, 1 %		
Maximum load impedance for current	500 Ω		
Hardware accuracy	10 V, 1 %; 20 mA, 1 %		
Offset	3 LSB		
Non-linearity	2 LSB		
Terminals	Terminal No.	Name	Function (Default)
	X2:9	AO 1	*Output FREQ*
	X2:10	AO 2	*Output FREQ*
	X2:11	GND	Ground
Relay Outputs (RY), 2 relays			
Design	Potential-free changer-over contacts		

<table>
<tr><td>Single relay output capability</td><td colspan="4">250 V AC / 3 A (NO)
250 V AC / 3 A (NC)
250 V AC / 2 A (NO) estimate cosφ = 0.4
250 V AC / 1.2 A (NC) estimate cosφ = 0.4
30 V DC / 3 A (NO)
30 V DC / 2 A (NC)</td></tr>
<tr><td rowspan="8">Terminals</td><td>Terminal No.</td><td colspan="2">Name</td><td>Function (Default)</td></tr>
<tr><td>X3:14</td><td>TC (NO)</td><td rowspan="3">RY1</td><td rowspan="2">Error Indication</td></tr>
<tr><td>X3:12</td><td>TB (NC)</td></tr>
<tr><td>X3:11</td><td>TA</td><td>COM: TB, TC</td></tr>
<tr><td>X3:24</td><td>RC (NO)</td><td rowspan="3">RY2</td><td rowspan="2">Drive Running</td></tr>
<tr><td>X3:22</td><td>RB (NC)</td></tr>
<tr><td>X3:21</td><td>RA</td><td>COM: RB, RC</td></tr>
<tr><td colspan="5">RS485 Communication (Modbus RTU)</td></tr>
<tr><td>RS485 transmit (T) & receive (R) signals</td><td colspan="4">Isolated differential signals -7 V ... 12 V</td></tr>
<tr><td rowspan="5">Terminals</td><td>Terminal No.</td><td>Name</td><td colspan="2">Function</td></tr>
<tr><td>X1:1</td><td>PE</td><td colspan="2">Shielding</td></tr>
<tr><td>X1:2</td><td>EGND</td><td colspan="2">Earth Ground</td></tr>
<tr><td>X1:3</td><td>485+</td><td colspan="2">RxD/TxD high level</td></tr>
<tr><td>X1:4</td><td>485-</td><td colspan="2">RxD/TxD low level</td></tr>
</table>

Tab. 2-9 Basic I/O data

2.3 SCOPE OF SUPPLY

Standard:

- 1 x LV-D low voltage variable frequency converter

Option: H1 package

- 1 x H1 LV-D cabinet

3 MECHANICAL INSTALLATION

3.1 FS1 TO FS10 OVERALL DIMENSIONS

3.1.1 DIMENSIONS – H1 LV-D DEVICES

FRAME SIZE FS1 AND FS2

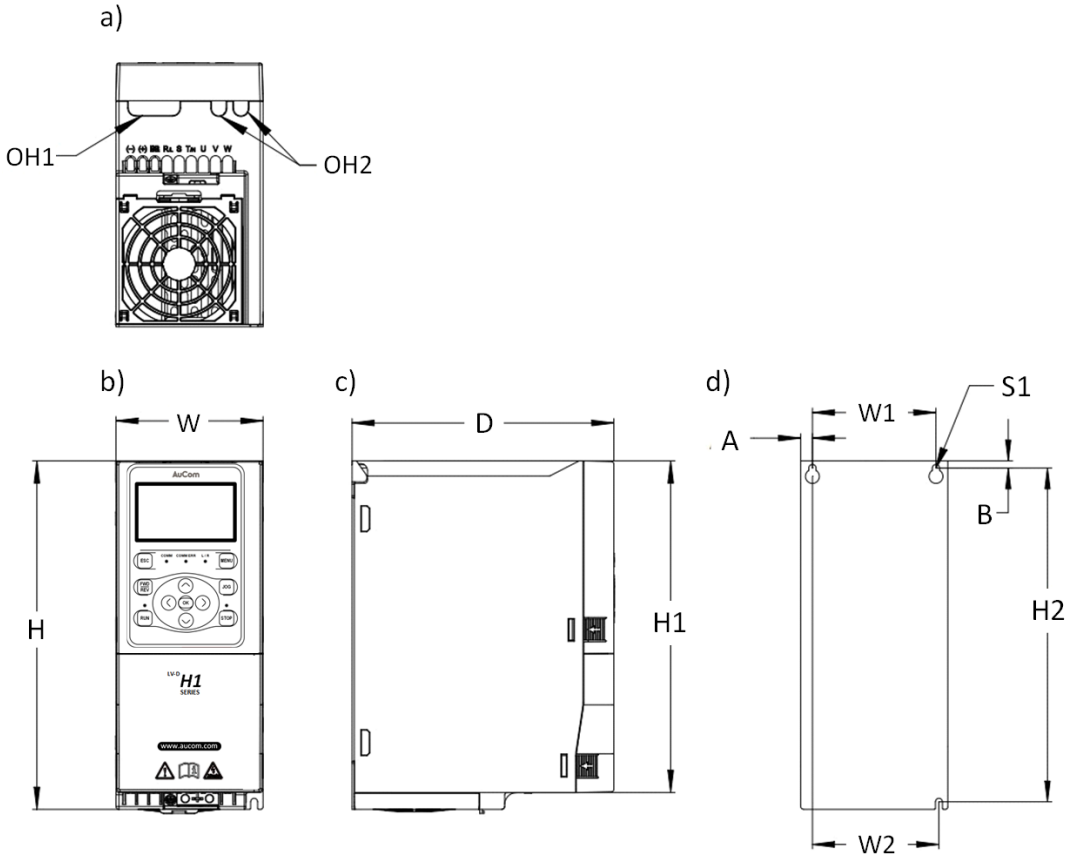


Fig. 3-1 Four-view drawing – FS1 & FS2:
a) Bottom view
b) Front view
c) Side view
d) Rear view

Frame size	H [mm]	W [mm]	D [mm]	W1 [mm]	W2 [mm]	H1 [mm]	H2 [mm]	A [mm]	B [mm]	S1 [mm]	OH1 [mm]	OH2 [mm]
FS1	235	100	178	84	86	224	225	8	5	5	35x10	10x10
FS2	320	118	200	100	102	307	308	9	6	6	35x10	10x10

Tab. 3-1 Housing/Mounting dimensions – FS1 & FS2

FRAME SIZE FS3

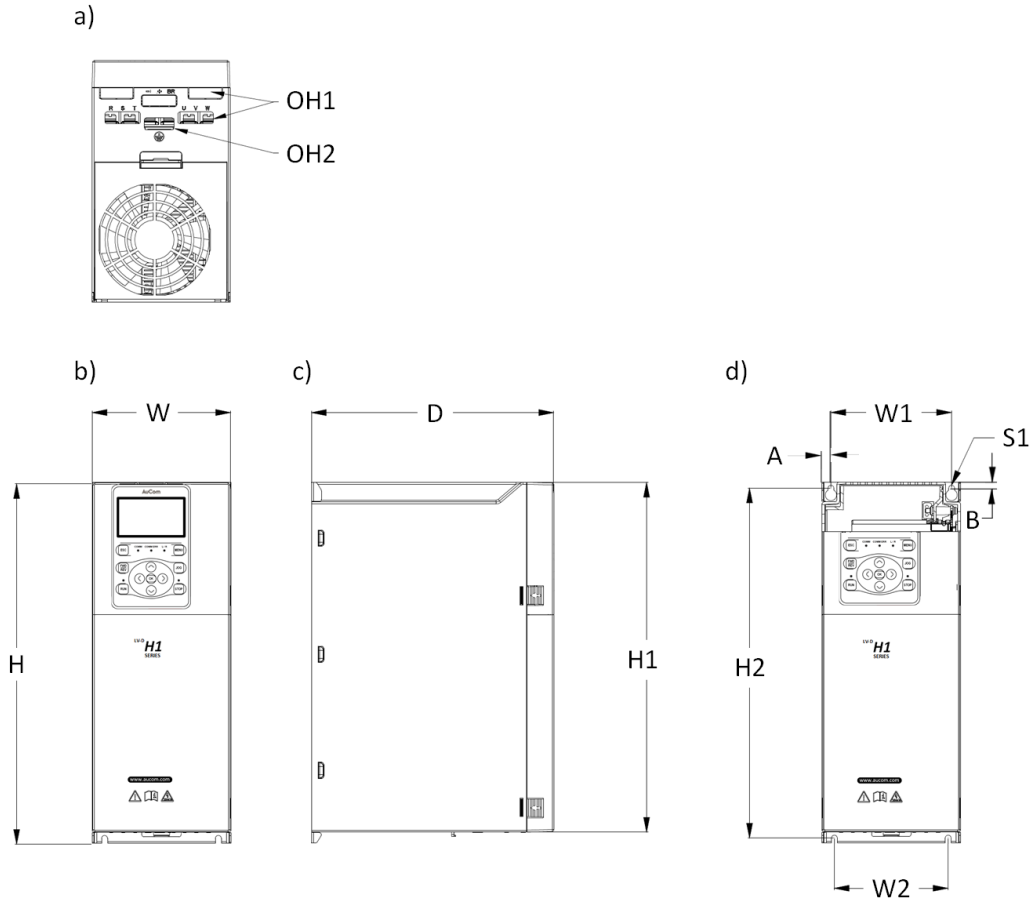


Fig. 3-2 Four-view drawing – FS3:
a) Bottom view
b) Front view
c) Side view
d) Front sectional view: back panel mounting points

Frame size	H [mm]	W [mm]	D [mm]	W1 [mm]	W2 [mm]	H1 [mm]	H2 [mm]	A [mm]	B [mm]	S1 [mm]	OH1 [mm]	OH2 [mm]
FS3	365	140	245	122	115	354	354	9	5.5	6	36x12	30x12

Tab. 3-2 Housing/Mounting dimensions – FS3

FRAME SIZE FS4

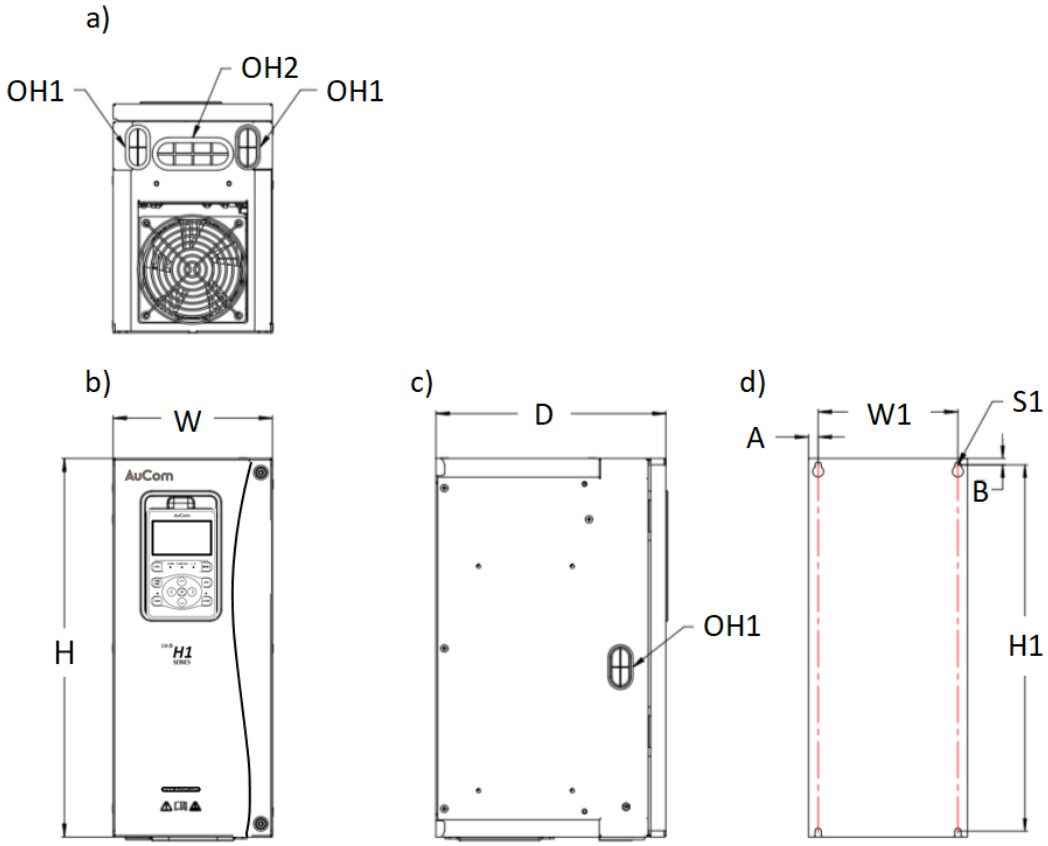


Fig. 3-3 Four-view drawing – FS4:
a) Bottom view
b) Front view
c) Side view
d) Rear view

Frame size	H [mm]	W [mm]	D [mm]	W1 [mm]	H1 [mm]	A [mm]	B [mm]	S1 [mm]	OH1 [mm]	OH2 [mm]
FS4	430	180	260	158	416	11	7.5	7	46x23	85x30

Tab. 3-3 Housing/Mounting dimensions – FS4

FRAME SIZE FS5 TO FS7

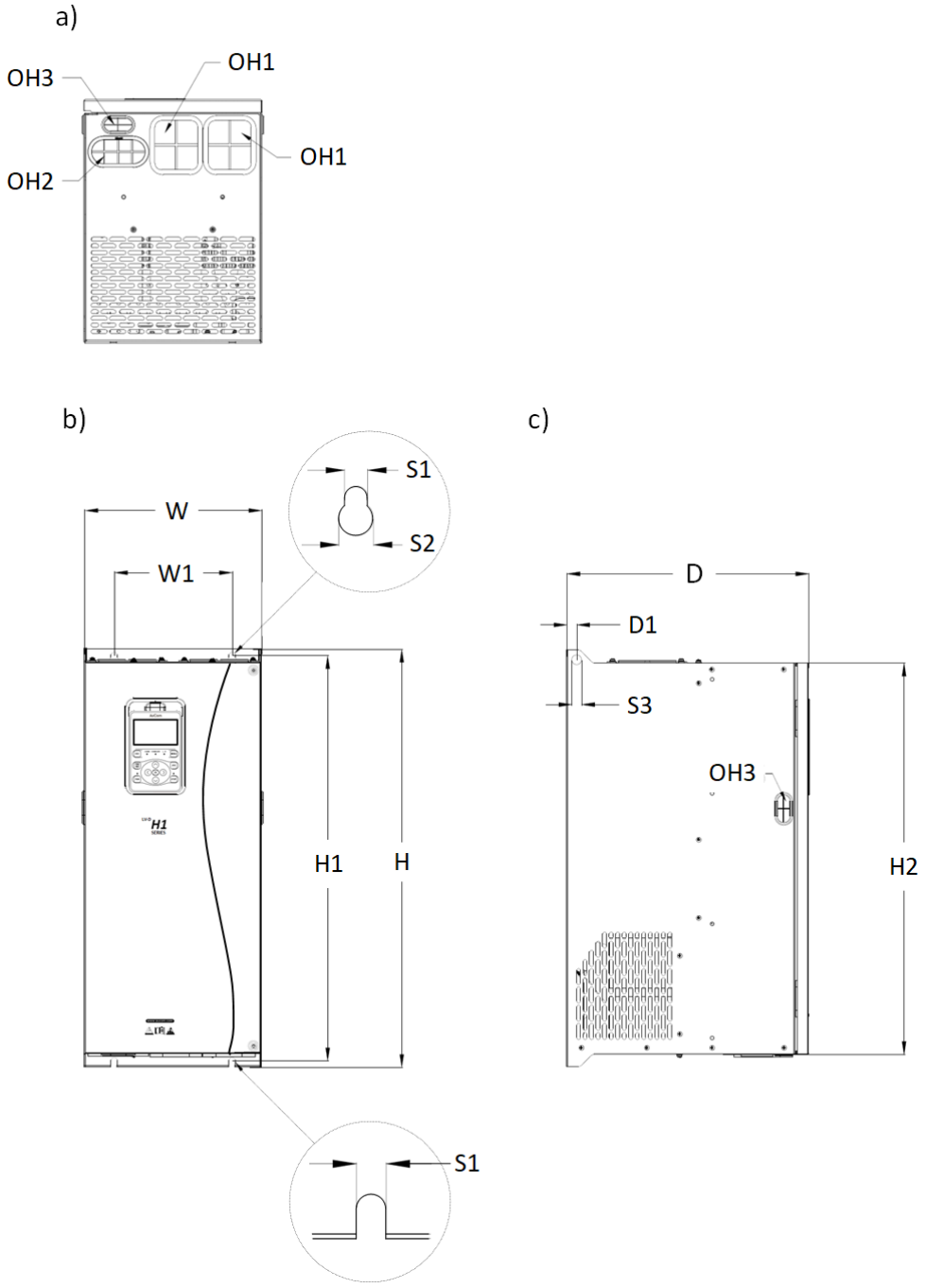


Fig. 3-4 Four-view drawing – FS5 to FS7:
a) Bottom view
b) Front view
c) Side view

Frame size	H [mm]	W [mm]	D [mm]	W1 [mm]	H1 [mm]	H2 [mm]	D1 [mm]	S1 [mm]	S2 [mm]	S3 [mm]	OH1 [mm]	OH2 [mm]	OH3 [mm]
FS5	593	250	362	170	573	553	15	9	14	15	70x80	⌀ 30	46x23
FS6	640	270	270	180	620	600	15	10	15	15	70x80	85x38	46x23
FS7	780	290	425	190	764	730	17.5	9	14	15	70x80	85x38	46x23

Tab. 3-4 Housing/Mounting dimensions – FS5 to FS7

FRAME SIZE FS8 TO FS10

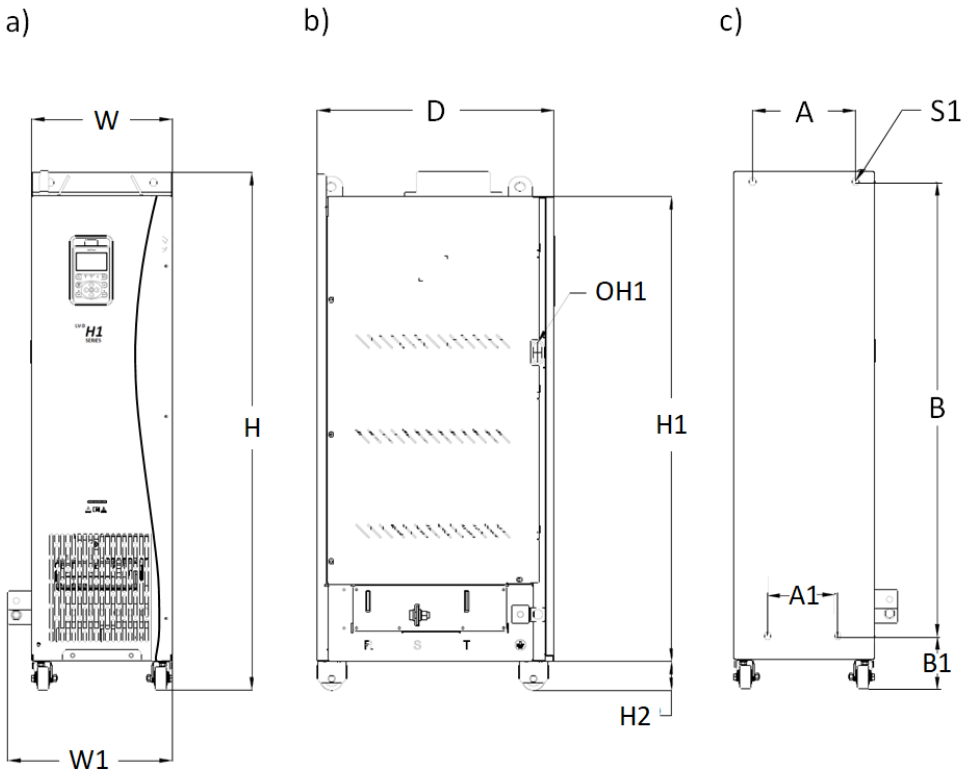


Fig. 3-5 Four-view drawing – FS8 to FS10:
a) Front view
b) Side view
c) Rear view

Frame size	H [mm]	W [mm]	D [mm]	W1 [mm]	H1 [mm]	H2 [mm]	A [mm]	A1 [mm]	B [mm]	B1 [mm]	S1 [mm]	OH1 [mm]
FS8	1101	300	506	350	990	62	220	150	968	112	14x17	46x23
FS9	1248	340	545	390	1135	62	246	147	1111	115	17x20	46x23
FS10	1389	340	545	400	1286	62	246	180	1262	115	17x20	46x23

Tab. 3-5 Housing/Mounting dimensions – FS8 to FS10

3.1.2 DIMENSIONS - THROUGH-WALL MOUNTING

FRAME SIZES FS1 AND FS2

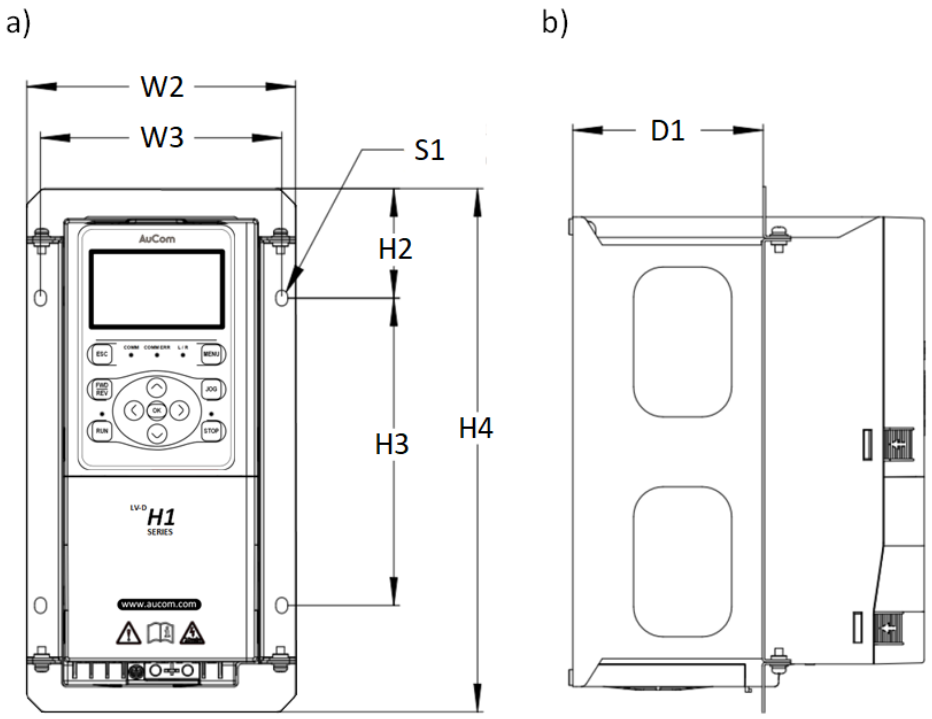


Fig. 3-6 Through-wall mounting FS1 & FS2:
a) Front view
b) Side view

FRAME SIZE FS3

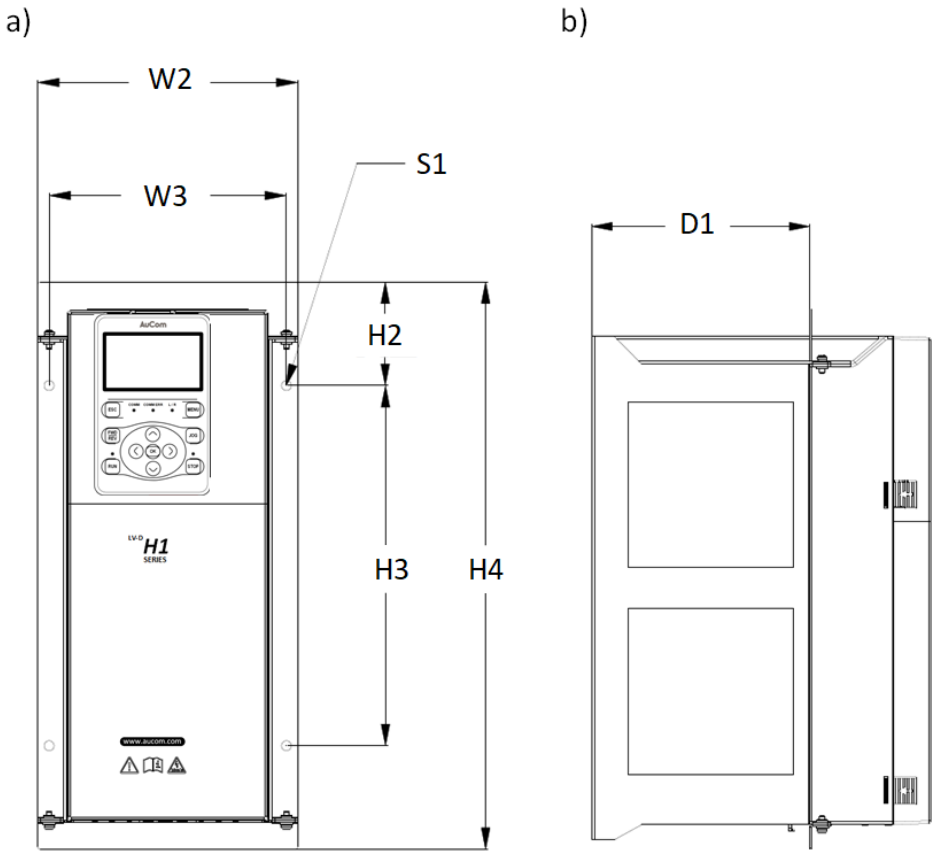


Fig. 3-7 Through-wall mounting FS3
a) Front view
b) Side view

FRAME SIZE FS4

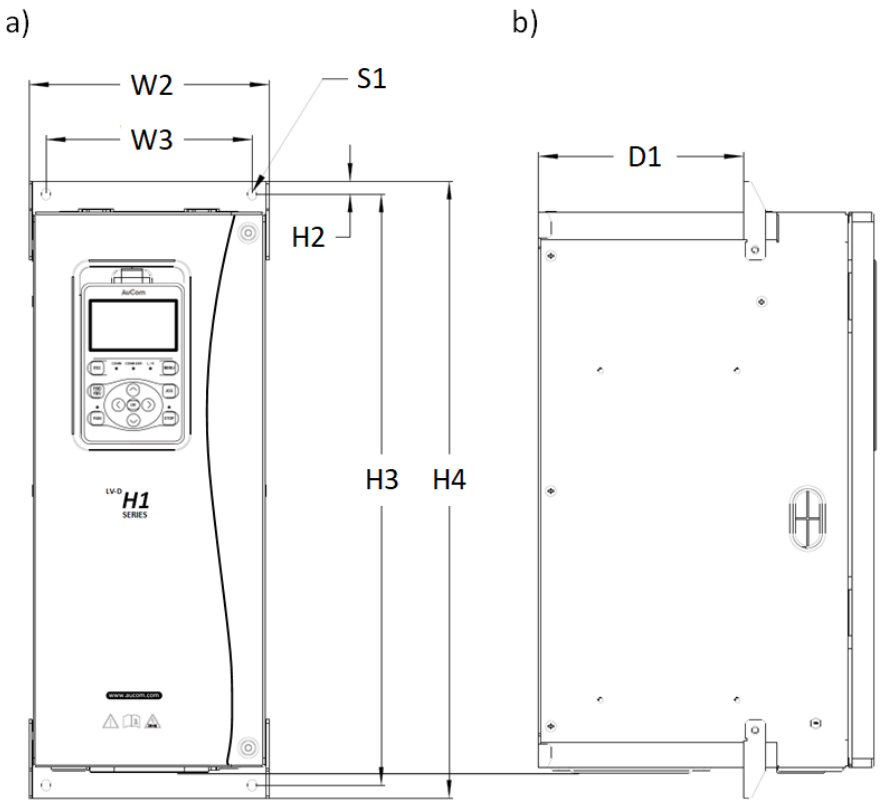


Fig. 3-8 Through-wall mounting FS4
a) Front view
b) Side view

FRAME SIZES FS5 TO FS7

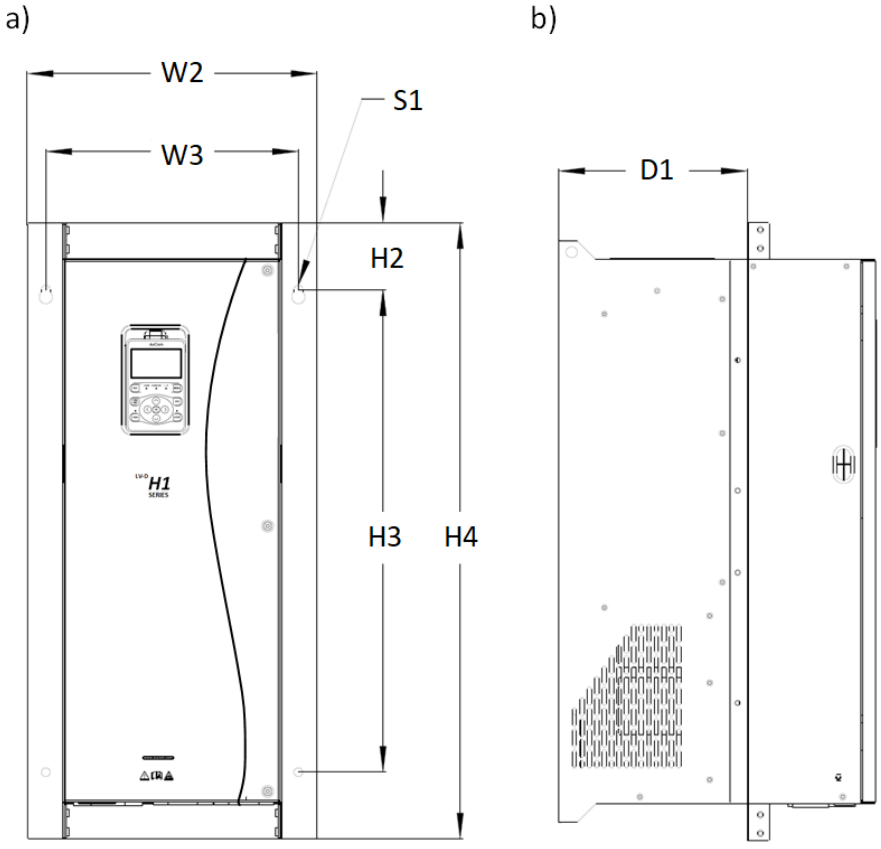


Fig. 3-9 Through-wall mounting FS5 to FS7:
a) Front view
b) Side view

THROUGH-WALL MOUNTING DIAGRAM

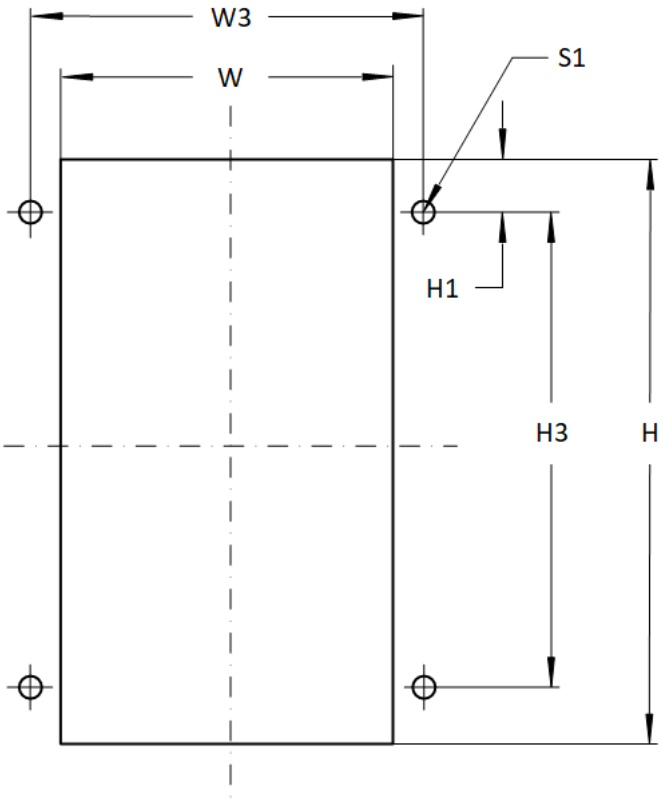


Fig. 3-10 Through-wall mounting diagram:
- *Panel cutout: W x H*
- *Mounting holes: diameter S1; hole positions acc. to W3, H1, H3*

Frame size	Panel cutout		Mounting holes			
			Position of holes			Hole diameter
	H [mm]	W [mm]	W3 [mm]	H1 [mm]	H3 [mm]	S1 [mm]
FS1	241	108	124	41.5	155	Ø 5
FS2	327	126	142	43.5	240	Ø 6
FS3	368	148	165	53.5	250	Ø 7
FS4	440	185	160	11	458	Ø 7
FS5	597	254	287	22	553	Ø 10
FS6	644	274	300	72	500	Ø 10
FS7	784	294	330	67	650	Ø 10

Tab. 3-6 Through-wall mounting – Panel cutout dimensions and hole positions/dimensions

NOTE

No through-wall mounting is provided for the H1 models with frame sizes FS8 to FS10.

3.1.3 DETACHED OPERATING UNIT (HMI)

All H1 models are equipped with a remote operating unit (HMI) that can be mounted separately from the H1 control unit in two different ways:

- Detached HMI with mounting frame
- Detached HMI without mounting frame

NOTE

➢ When using a detached HMI, a standard LAN communication cable is required to be connected between the HMI and the H1 control unit.

DETACHED HMI WITH MOUNTING FRAME

The use of a mounting frame requires a panel cut-out into which the mounting frame is fixed with retaining clips.

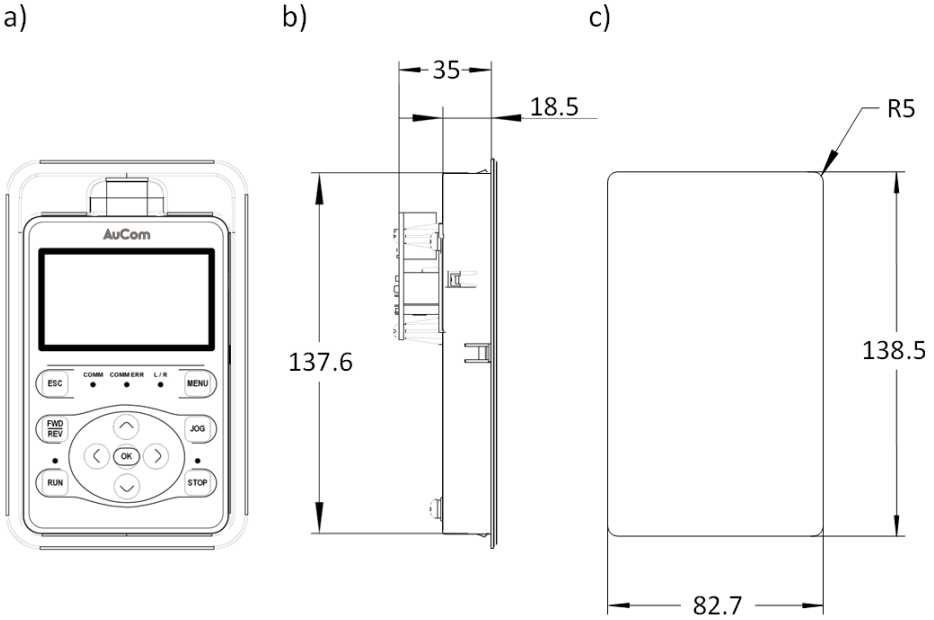


Fig. 3-11 Detached HMI with mounting frame:
a) HMI front view
b) Mounting frame side view
c) Panel cutout

DETACHED HMI WITHOUT MOUNTING FRAME

As an alternative to the mounting frame, the detached HMI unit can also be mounted directly on a mounting plate (or a panel plate).

To do this, two M4 threaded screws are screwed through the mounting plate into the back of the operating unit (HMI).

NOTE

This method requires a mounting plate cut-out for connecting the communication cable to the RJ45 interface on the back of the HMI.

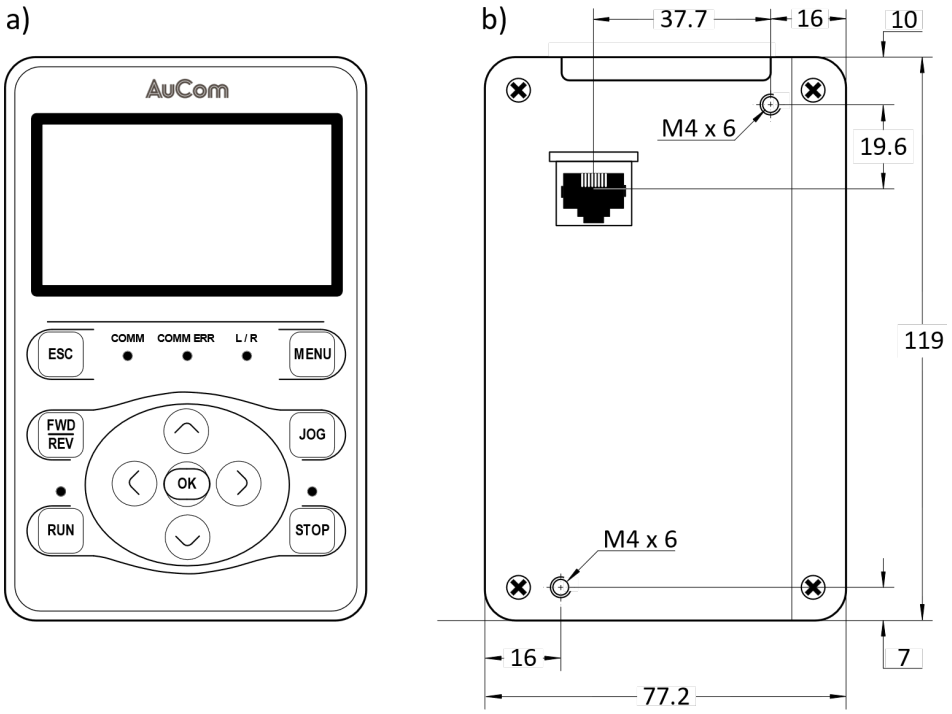


Fig. 3-12 Detached HMI without mounting frame:
a) HMI front view
b) HMI rear view (2 x M4 internal thread)

3.2 INSTALLATION REQUIREMENTS

3.2.1 INSTALLATION ENVIRONMENT

- Ambient temperature: The surrounding ambient temperature greatly affects the lifespan of the VFD, and the operating environment temperature of the VFD should not exceed the allowable temperature range (-10 °C ... 50 °C). When the ambient temperature is between 40 °C ... 50 °C, derating is required.
- Install the inverter on the surface of a flame-retardant object. There should be enough space around it for heat dissipation. The inverter easily generates a lot of heat when working and install it vertically on the mounting support with screws.
- Please install in a place that is not prone to vibration, with vibrations not exceeding 0.6 g, especially away from equipment such as punch presses.
- Avoid installation in places exposed to direct sunlight, humidity, or water droplets.
- Avoid installation in locations with corrosive, flammable, or explosive gases in the air.
- Avoid installation in places with oil pollution, high dust levels, or metal dust.

3.2.2 THROUGH-WALL MOUNTING FOR PLASTIC-ENCASED STRUCTURES (FS1 TO FS3)

For plastic-encased VFD structures, through-wall installation method please note the following Installation instructions.

INSTRUCTION – Through-Wall Installation for Plastic-encased Structures

START

NOTE

For detailed through-wall installation opening sizes, see "Tab. 3-6 Through-wall mounting – Panel cutout dimensions and hole positions/dimensions".

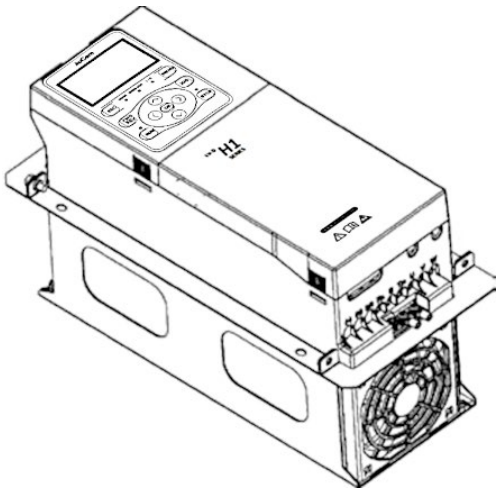


Fig. 3-13 Plastic-encased H1 VFD with U-shaped brackets

STEP 1: Remove the front and rear U-shaped brackets of the through-wall support.

STEP 2: Secure the VFD and the base of the through-wall support.

STEP 3: Reattach the front and rear U-shaped brackets to the support.

STEP 4: Insert the embedded panel and secure with screws.

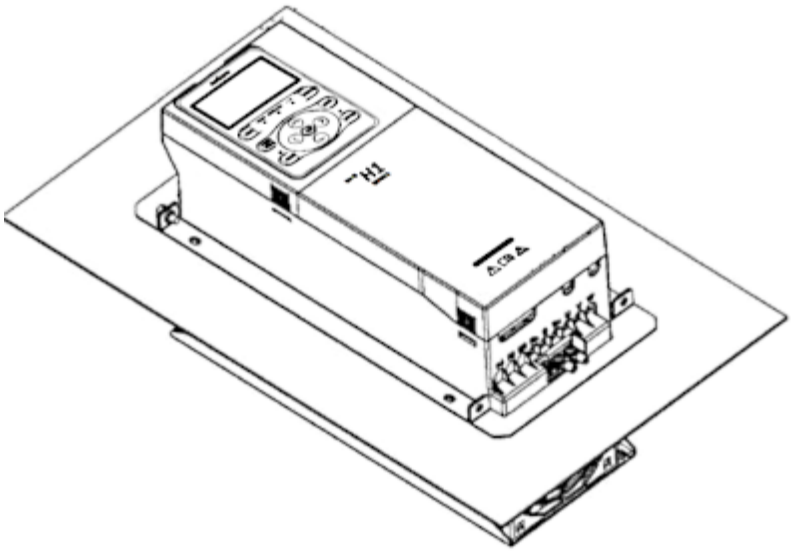


Fig. 3-14 Plastic-encased H1 VFD – Through-wall mounting method

END

3.2.3 THROUGH-WALL MOUNTING FOR SHEET METAL STRUCTURES (FS4 TO FS7)

For sheet metal VFD structures, through-wall installation method please note the following Installation instructions.

INSTRUCTION – Through-Wall Installation for Sheet Metal Structures

START

NOTE

For detailed through-wall installation opening sizes, see „Tab. 3-6 Through-wall mounting – Panel cutout dimensions and hole positions/dimensions".

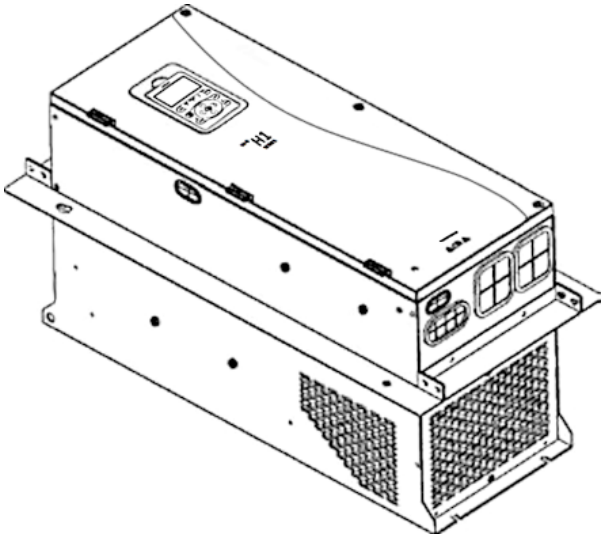


Fig. 3-15 Sheet metal structure H1 VFD with brackets

STEP 1: Fix the through-wall bracket to all four sides of the VFD.

STEP 2: Secure the VFD and the through-wall bracket.

STEP 3: Install the embedded panel and fix it with screws.

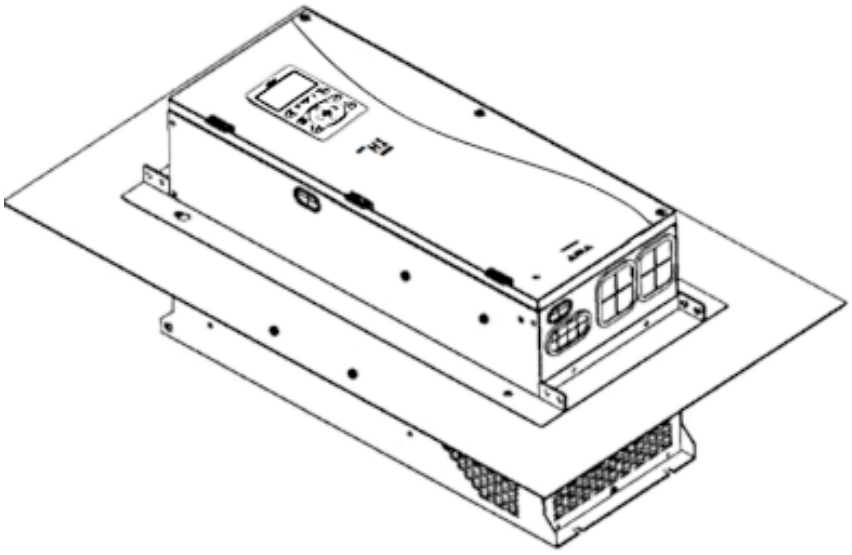


Fig. 3-16 Sheet metal structure H1 VFD - Through-wall mounting method

END

3.2.4 WALL MOUNTING INSTALLATION

NOTE

When installing models, attention should be paid to cooling issues:

- Please install the VFD vertically to facilitate upward heat dissipation, but it should not be inverted. If there are multiple VFDs in a cabinet, it is best to install them side by side. In cases where top and bottom installations are necessary, refer to the schematic in "Fig. 3-18 Wall mounting installation FS1 to FS7:" and install a heat dissipation guide plate.
- Follow the installation space guidelines shown in "Fig. 3-17 Wall mounting installation FS1 to FS7 – Covered wall mounting" and "Fig. 3-19 Wall mounting installation FS8 to FS10: " to ensure proper cooling space for the VFD. However, consider the heat dissipation of other devices in the cabinet when arranging.
- The installation bracket must be made of flame-retardant material.
- For applications with metal dust, it is recommended to install the radiator outside the cabinet. Therefore, the space inside the fully sealed cabinet should be as large as possible.

FRAME SIZES FS1 TO FS7

COVERED INSTALLATION

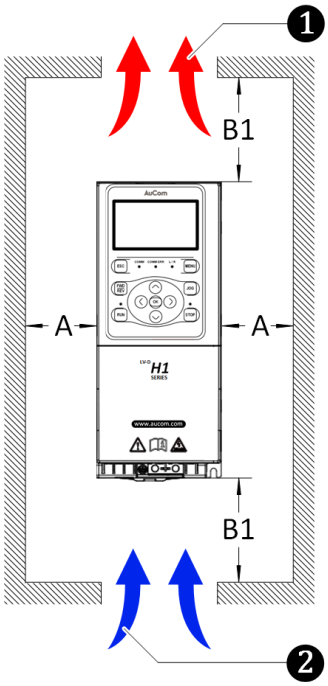


Fig. 3-17 Wall mounting installation FS1 to FS7 – Covered wall mounting

1 Hot air
2 Cold air
A Minimum horizontal cooling space
B1 Minimum vertical cooling space

TOP AND BOTTOM ROW INSTALLATION

The H1 product can be used in applications that require installation in the top and bottom row. The heat from the appliances in the bottom row may cause the temperature of the appliances in the top row to rise, resulting in overheating/overload faults. Therefore, measures such as the installation of heat baffles should be taken.

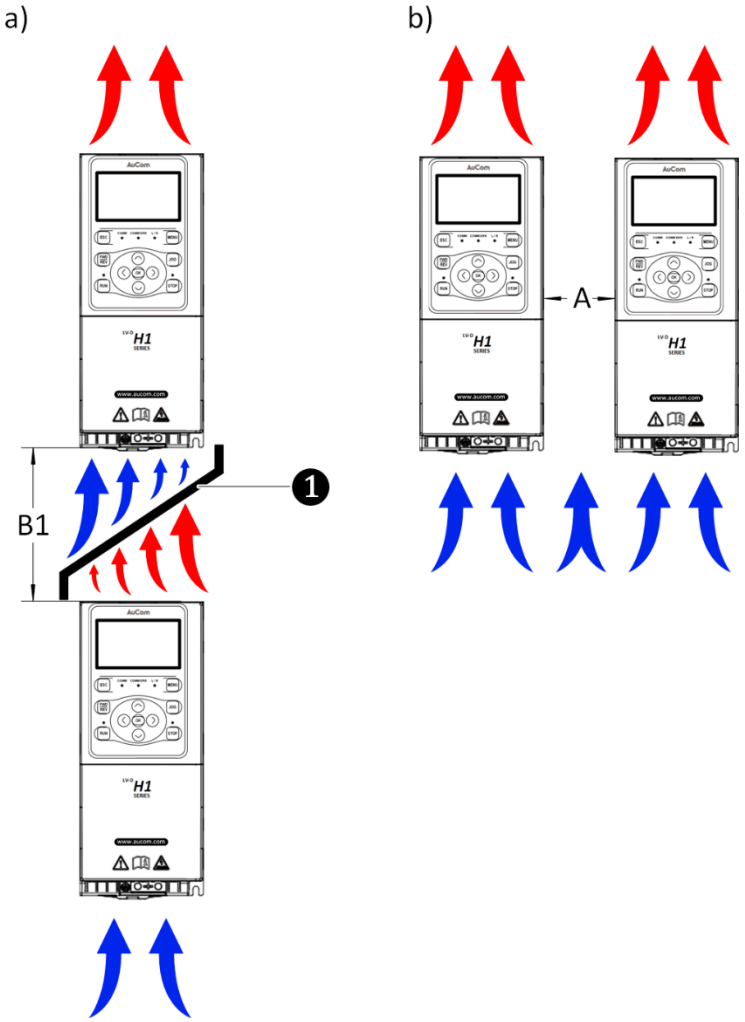


Fig. 3-18 Wall mounting installation FS1 to FS7:
a) Top row installation
b) Bottom row installation

1 Heat insulation deflector
A Minimum horizontal cooling space
B1 Minimum vertical cooling space

Frame size	Vertical cooling space A [mm]	Horizontal cooling space B1 [mm]
FS1 & FS2	≥ 10	≥ 100
FS3	≥ 10	≥ 150
FS4	≥ 30	≥ 200
FS5 to FS7	≥ 100	≥ 300

Tab. 3-7 Installation space requirements – FS1 to FS7

FRAME SIZES FS8 TO FS10

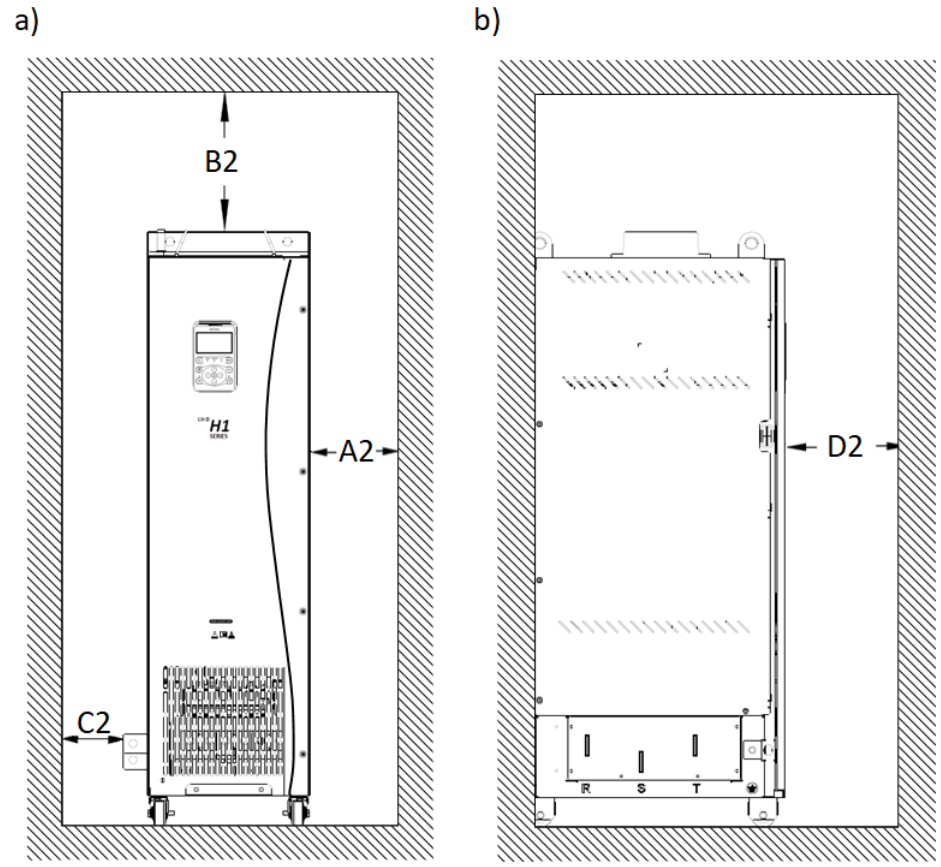


Fig. 3-19 Wall mounting installation FS8 to FS10:
a) Front view
b) Side view

Frame size	Horizontal cooling space			Vertical cooling space
	A2 [mm]	B2 [mm]	C2 [mm]	D2 [mm]
FS1 & FS2	≥ 10	≥ 250	≥ 20	≥ 20

Tab. 3-8 Installation space requirements – FS8 to FS10

3.2.5 CABINET INSTALLATION (FS8 TO FS10)

INSTRUCTION – Cabinet Installation

START

BOTTOM BRACKET INSTALLATION

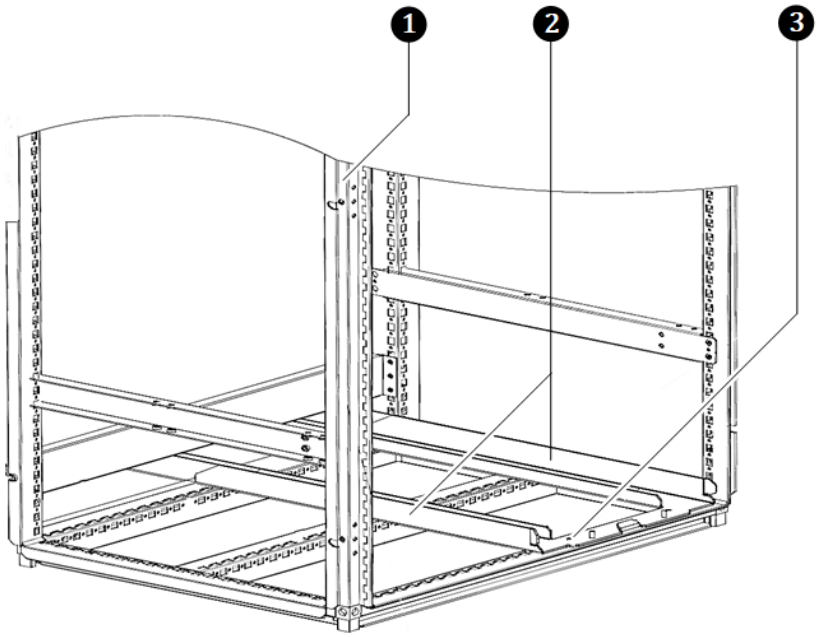


Fig. 3-20 Bottom mounting bracket installation

1. 9-fold profiled cabinet frame
2. Bottom mounting bracket (standard)
3. M6 self-tapping screws (quantity: 6 pcs)

STEP 1: Fix the mounting bracket onto the base of the nine-fold profile cabinet frame.

➢ For this, use six M6 self-tapping screws.

NOTE

If the cabinet used by the customer is not a nine-fold profile cabinet, then the fixing holes of the mounting bracket need to be drilled and assembled on site.

RAIL INSTALLATION

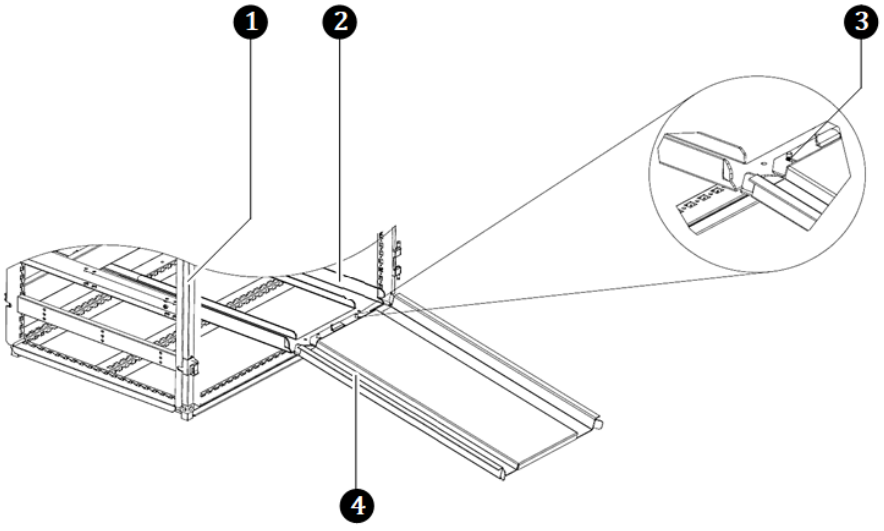


Fig. 3-21 Cabinet rail installation

1. Cabinet
2. Mounting bracket
3. M6 riveting screws
4. Mounting rail (optional accessory)

STEP 2: Align the two round holes at the front of the mounting rail with the mounting holes of the mounting bracket.

STEP 3: Align the rail's slot with the bracket's bent part.

STEP 4: Secure both with two M6 rivet nuts, as shown in the following figure.

VFD INSTALLATION

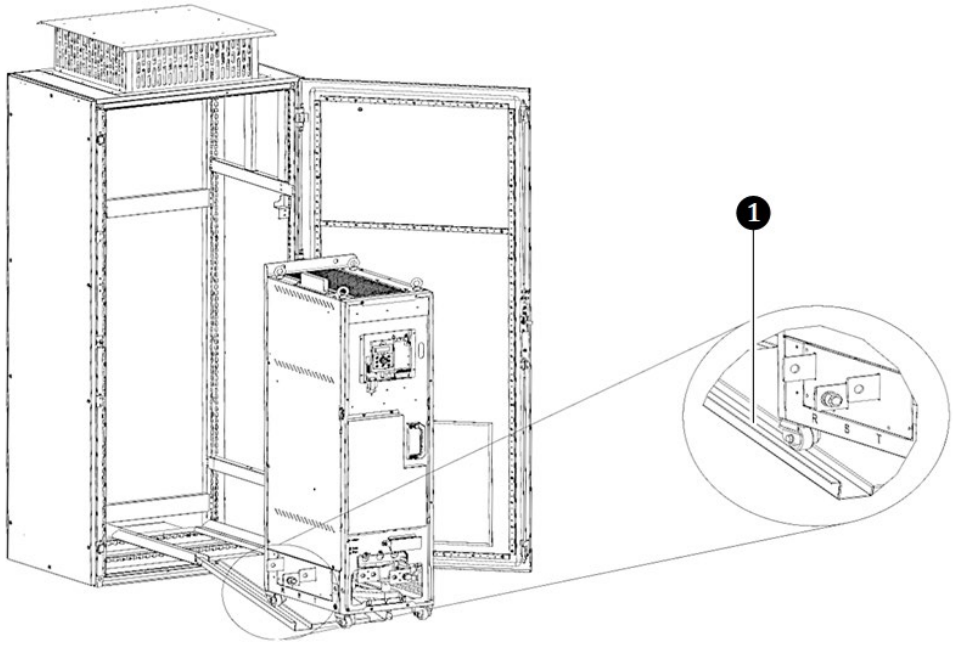


Fig. 3-22 Casters aligned with mounting rail

1. Mounting rail (optional accessory)

STEP 5: Remove the VFD cover to expose the mounting aid handle on the VFD.

STEP 6: Align the casters of the VFD with the mounting rails and slowly push them into the cabinet.

- Use an auxiliary strap during installation to avoid the VFD from tipping over during pushing in/out.
- It is recommended that two people cooperate in the operation.

STEP 7: Tighten the four fixing holes on the back of the VFD with screws to fix the VFD to the fixing beam inside the cabinet

STEP 8: Remove the auxiliary strap.

END

4 ELECTRICAL INSTALLATION

4.1 CONNECTION TERMINAL ACCESS

PLASTIC ENCLOSURE – FS1 TO FS3

To remove the terminal cover on the H1 variants with plastic enclosure, press both sides of the cover plate ❶ and open it upwards ❷.

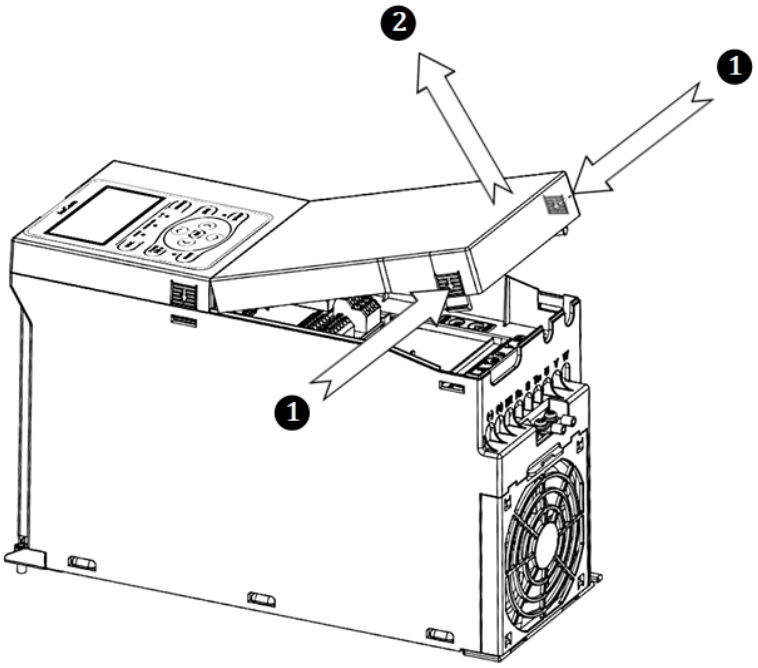


Fig. 4-1 Plastic enclosure terminal access

SHEET METAL ENCLOSURE – FS4 TO FS10

For terminal access loosen the fixing screws ❶ and open the door panel.

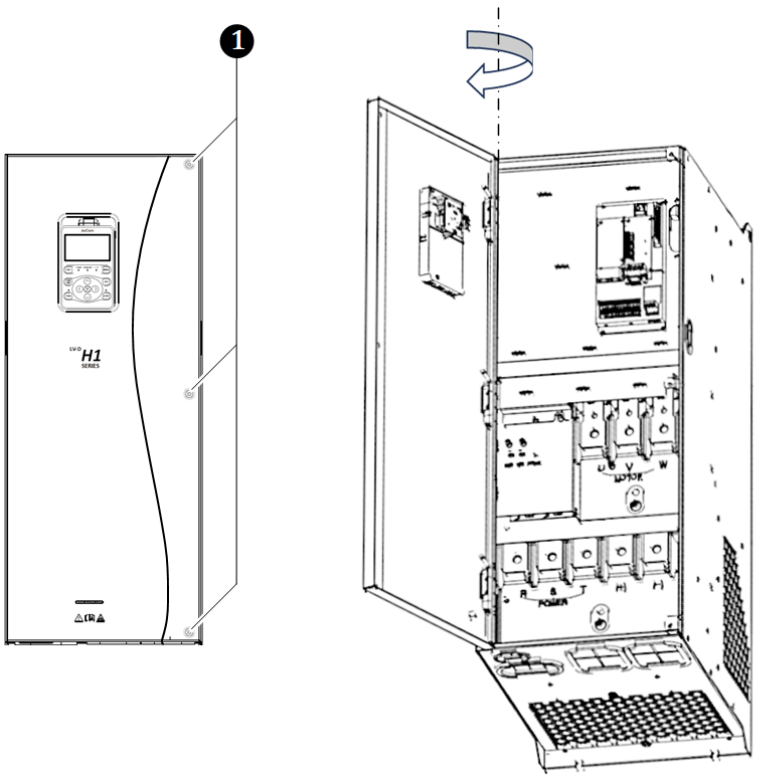


Fig. 4-2 Sheet metal enclosure terminal access

4.2 CONNECTING POWER LINES TO THE H1 VFD

INSTRUCTION – Connecting Power Lines to the H1 VFD

START

CONNECTING MAINS POWER LINES TO THE VFD INPUT

STEP 1: Connect the mains power line to the R, S, T connection terminals of the VFD input.

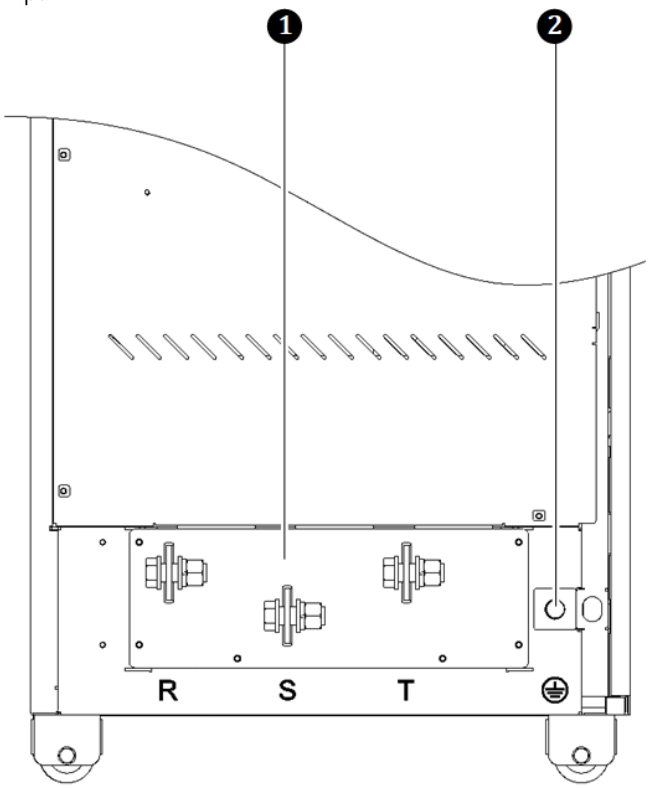


Fig. 4-3 VFD input: power line connection – R, S, T and Ground terminals

1. Mains power line: connection terminals of phases R, S, T
2. VFD input grounding cable connection terminal

CONNECTING MOTOR AND GROUNDING CABLE TO THE VFD OUTPUT

STEP 2: Connect the motor cable to the U, V, W connection terminals of the VFD output.

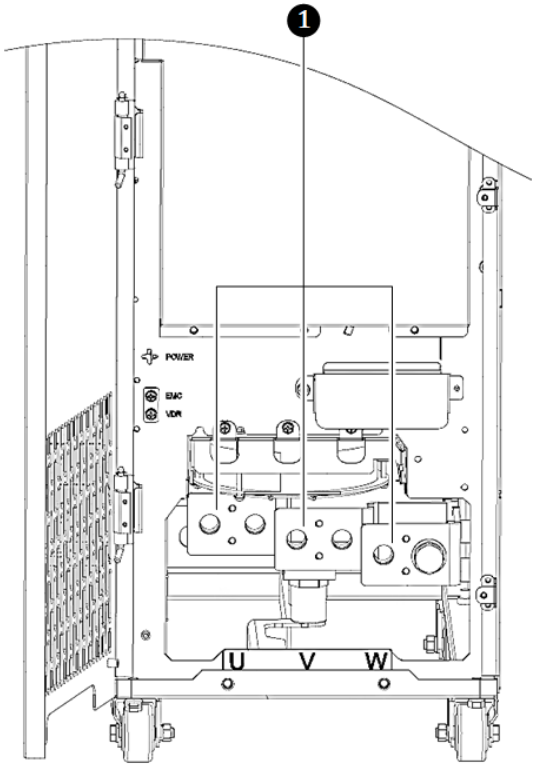


Fig. 4-4 VFD output: motor cable connection – U, V, W terminals

1 Motor cable: connection terminals of phases U, V, W

CONNECTING GROUNDING CABLE TO THE VFD OUTPUT

STEP 3: Connect the Grounding cable to the VFD output connection terminal.

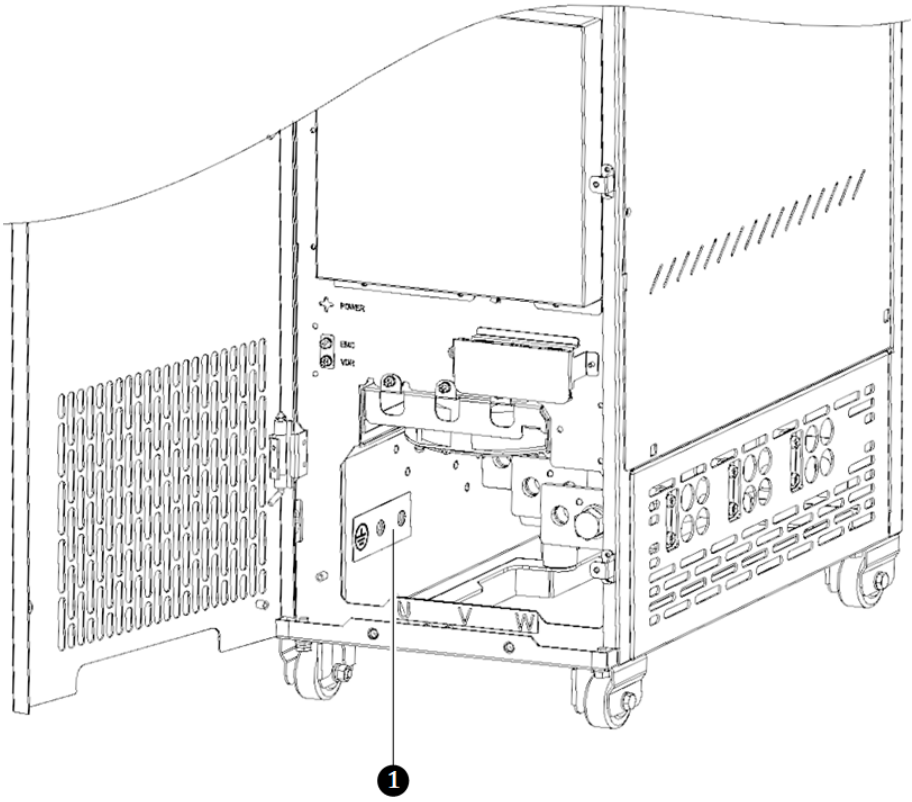


Fig. 4-5 VFD output: grounding cable connection

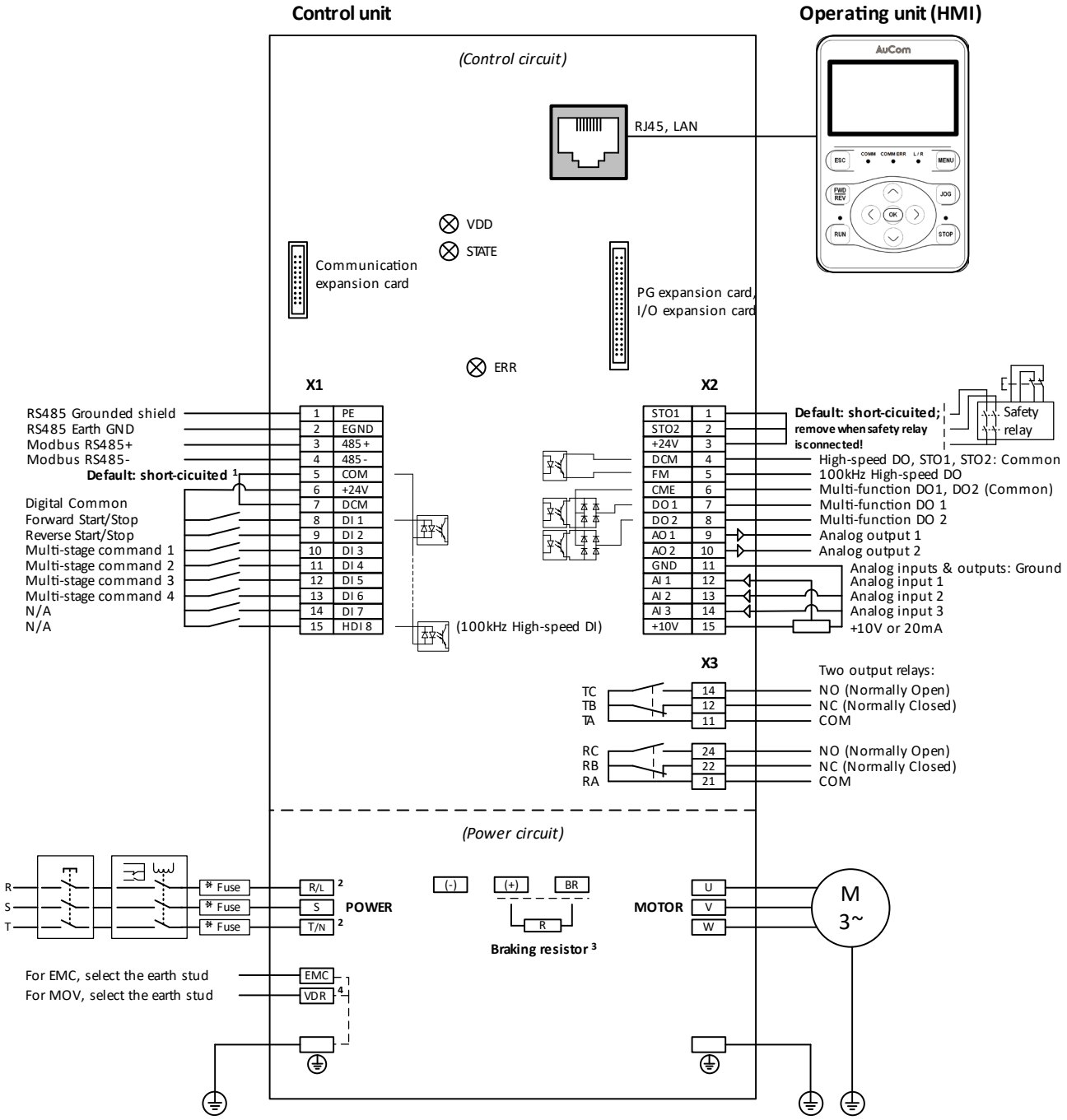
1 Motor cable: connection terminals of phases U,V,W

END

4.3 ELECTRICAL WIRING

4.3.1 CONNECTION DIAGRAM

H1 CONNECTION DIAGRAM
FS1 TO FS10



1 Default wiring method: PNP mode without external power supply.
2 R/L and T/N: 1-phase connection terminals; FS1 to FS3 models only.
3 FS7 to FS10 models do not offer a braking function option.
4 FS1 models do not offer VDR terminal.

Fig. 4-6 H1 VFD connection diagram – FS1 to FS10

NOTE

The H1 models 11 ... 30 kW (FS2 and FS3) provide an *integrated* braking unit, while the H1 models 37 ... 132 kW (FS4 to FS6) braking unit is an *optional* feature. Please specify when ordering, if required.

4.3.2 CONTROL CIRCUIT

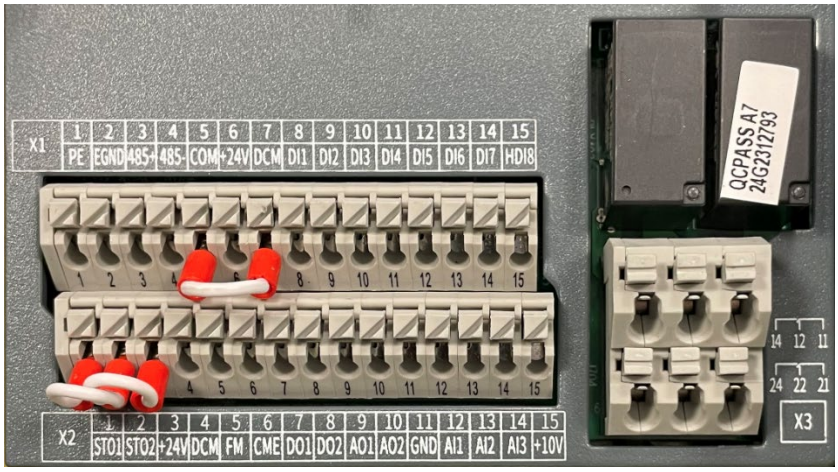
INTERFACES AND LED INDICATIONS

Fig. 4-7 H1 Control unit – Interfaces and LED indications

Interface	Description	
RJ45	LAN communication to operating unit (HMI); plug	
20-pin	Interface for communication expansion card	
40-pin	Interface for: • either Pulse generator (PG) expansion card, • or I/O expansion card	
LED indicators	**Description**	
VDD	GREEN:	H1 power supply is on;
	OFF:	H1 power supply is off
STATE	FLASHING GREEN:	H1 system is ok
	OFF:	H1 system error
ERR	FLASHING RED:	active fault
	OFF:	no active fault

Tab. 4-1 H1 Control unit – Interfaces and LED indications

CONNECTION TERMINALS



Tab. 4-2 H1 Control unit – Terminals of auxiliary and control circuits

X1 TERMINALS

Terminal		Description
X1		
No.	Name	
		RS485 interface for Modbus communication
1	PE	Protection Earth for Grounded Shield connection of signal cable
2	EGND	Earth Ground
3	485+	Positive data line in differential signal transmission
4	485-	Negative data line in differential signal transmission
		Digital inputs (DI)
5	COM	Common for digital inputs (DI) acc. to the selected DI wiring method (NPN mode/PNP mode, with/without external power supply)
6	+24 V	+24 V DC power supply generally used for digital input; maximum output current: 200 mA
7	DCM	
8	DI 1	• Opto-coupler isolation, compatible with bipolar input • Input impedance: 3 kΩ • Voltage range for DI 1-DI 7 level input: 9 ... 30 V DC • Voltage range for HDI 8 level input: 15 ... 30 V DC • HDI8 can be used as a high-speed input port. • Default built-in power supply, PNP type (source)
9	DI 2	
10	DI 3	
11	DI 4	
12	DI 5	
13	DI 6	
14	DI 7	
15	HDI 8	

Tab. 4-3 H1 control circuit - X1 Terminals

X2 TERMINALS

Terminal		Description
X2		
No.	Name	
		EMERGENCY STOP 1 and EMERGENCY STOP 2 (Functional safety)
1	STO 1	• Rated input voltage: +24 V DC ± 10 % • Maximum input voltage: +30 V DC • Rated input current: 6.8 mA ± 10 % NOTE: If the EMERGENCY STOP function is not used, it can be disabled by short-circuiting terminals STO1 with STO2 and +24 V.
2	STO 2	
3	+24 V	+24 V DC power supply generally used for digital output terminals or an external sensor; maximum output current: 200 mA
4	DCM	STO1, STO2: Digital Common

Terminal		Description
X2		
No.	Name	
High-speed digital output (100 kHz)		
4	DCM	FM: Digital Common
5	FM	• Opto-coupled isolated high-speed output • Output voltage range: 0 ... 24 V • Output current range: 0 ... 30 mA • Maximum output frequency: 100 kHz
Multi-function digital output (DO)		
6	CME	DO1, DO2: Common
7	DO1	Opto-isolated, bipolar open-collector outputs: • Output voltage range: 0 ... 48 V • Output current range : 0 ... 50 mA
8	DO2	
Analog outputs (AO)		
9	AO1	Software-configurable current output or voltage output: • Output voltage range: 0 ... 10 V • Output current range: 0 ... 20 mA
10	AO2	
11	GND	AO1, AO2: Common
Analog inputs (AI)		
11	GND	AI1, AI2, AI3: Common
12	AI1	• Configurable input range: 0 ... 10 V DC / 0 ... 20 mA / 4 ... 20 mA • Input impedance: 10 kΩ for voltage input, 500 Ω for current input
13	AI2	
14	AI3	
15	+10V	0 ... 10 V DC / 0 ... 20 mA / 4 ... 20 mA (depending on AI configuration)

Tab. 4-4 H1 control circuit – X2 Terminals

X3 TERMINALS

Terminal			Description
X3			
No.	Name		
Output relay R (Change-over contact)			
14	RY1	TC	NC (Normally Open)
12		TB	NO (Normally Closed)
11		TA	COM (Common)
Output relay T (Change-over contact)			
24	RY2	RC	NC (Normally Open)
22		RB	NO (Normally Closed)
21		RA	COM (Common)

Tab. 4-5 H1 control circuit – X3 Terminals

WIRING METHODS

This section describes the various wiring methods for the signal input terminals for digital inputs (DI), digital outputs (DO) and analog inputs (AI).

Due to the susceptibility of weak analog voltage signals to external interference, shielded cables are generally required, and the wiring distance should be as short as possible, not exceeding 20 m.

DIGITAL INPUT (DI) TERMINALS

If the *Active operating mode* is selected, suitable filter measures must be taken to prevent crosstalk from the power supply.

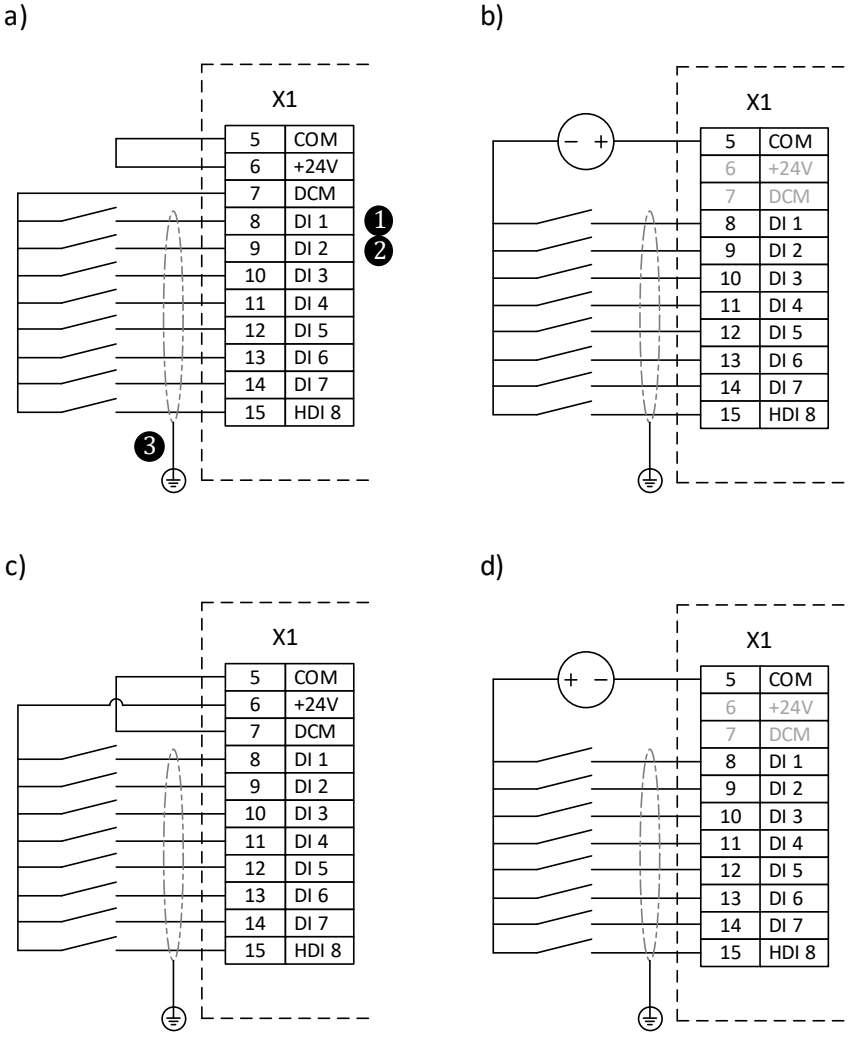


Fig. 4-8 Digital Inputs (DI) terminal wiring methods:
a) NPN mode without external power supply
b) NPN mode with external power supply
c) PNP mode without external power supply
d) PNP mode with external power supply

1. DI 1: Default setting is "FWD Start/Stop"
2. DI 2: Default setting is "REV Start/Stop"
3. Grounded shield

NOTE

When using an external power supply unit:

- the DI ports (DI 1 ... DI 7) require an external power supply in the range of 9 ... 30V, and

- the high-speed DI port (HDI 8) requires an external power supply in the range of 15 ... 30V.

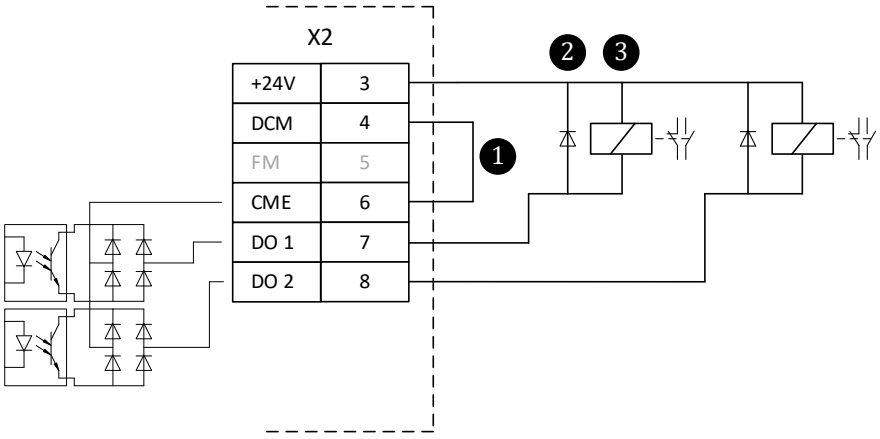
DIGITAL OUTPUT (DO) TERMINALS

When the digital output terminal is required to drive the relay, snubber diodes should be installed across the relay coil, and the driving capacity should not be greater than 50 mA. Otherwise, the 24 V DC power supply is easily damaged.

NOTE

Ensure the correct installation of the diode's polarity to absorb surges, as shown in Fig. 4-9, otherwise the 24 V DC power supply will be immediately damaged when the digital output terminal is active.

a)



b)

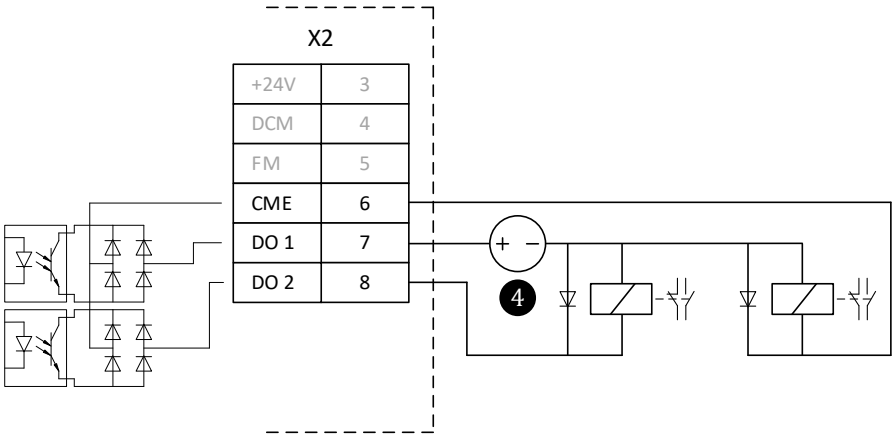


Fig. 4-9 Digital Outputs (DO) terminal wiring methods:
a) Without external power supply
b) With external power supply

1. Short-circuited terminals DCM and CME
2. Snubber diode
3. External relay
4. External 24 V DC power supply

ANALOG INPUT (AI) TERMINALS

Where some analog signals are subjected to serious interference, a filter capacitor or a ferrite core needs to be used on the analog signal source side.

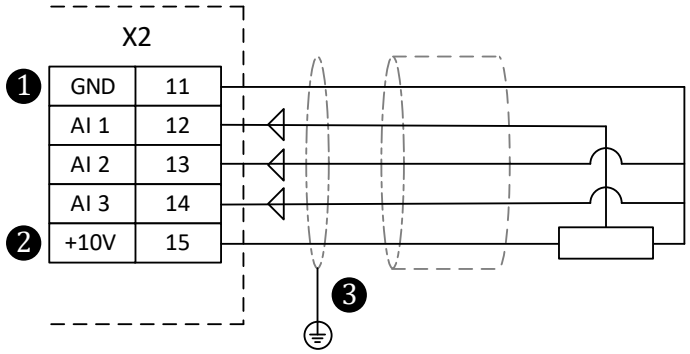


Fig. 4-10 Analog inputs (AI) terminal wiring method

1. Analog Ground
2. +10 V or 20 mA (selectable)
3. Grounded shield

4.3.3 POWER CIRCUIT

CONNECTION TERMINALS

H1 VFD INPUT SIDE

Terminal	Description
	LV mains
POWER:	
R/L	Phase R (3-phase power supply) / Phase L (1-phase power supply)
S	Phase S (3-phase power supply)
T/N	Phase T (3-phase power supply) / Neutral N (1-phase power supply)
	Earthing
⏚	Protection Earth (PE) The terminal must be reliably grounded to avoid abnormal operation or damage to the equipment.
EMC	For electromagnetic capability (EMC) purposes
VDR	For use with metal oxide varistors (MOV)

Tab. 4-6 H1 VFD terminals – Input side

H1 VFD BRAKE UNIT

Terminal	Description
	Brake unit
Braking resistor:	
(-)	DC Bus (-)
(+)	DC bus (+) / Braking resistor
BR	BR Breaking Resistor / Internal connection to Ground Source

Tab. 4-7 H1 VFD terminals – External braking resistor

H1 VFD OUTPUT SIDE

Terminal	Description
	3-phase AC motor
MOTOR:	
U	Phase U of connected 3-phase AC motor
V	Phase V of connected 3-phase AC motor
W	Phase W of connected 3-phase AC motor
⏚	Protection Earth (PE)

Tab. 4-8 H1 VFD terminals – Output side

5 OPERATION AND DISPLAY

5.1 OPERATING UNIT (HMI)

The keyboard allows for modification of VFD function parameters, monitoring of VFD working status, and control of VFD operation (START, STOP), etc. The HMI layout is shown in Fig. 5-1, with detailed function descriptions in "Tab. 5-2 Operating unit (HMI) – Operating keys", and LED indicator explanations in "Tab. 5-1 Operating unit (HMI) – LED indicators".

Fig. 5-1 Operating unit (HMI) with 4-line display, LEDs, and keys

1. 4-line LC display
2. LED indicators
3. Main menu key
4. JOG function key
5. LED indication (STOP)
6. STOP key
7. Navigation/Setting keys
8. RUN key
9. LED indication (RUN)
10. Forward/Reverse selection key
11. Exit key

4-LINE LC DISPLAY

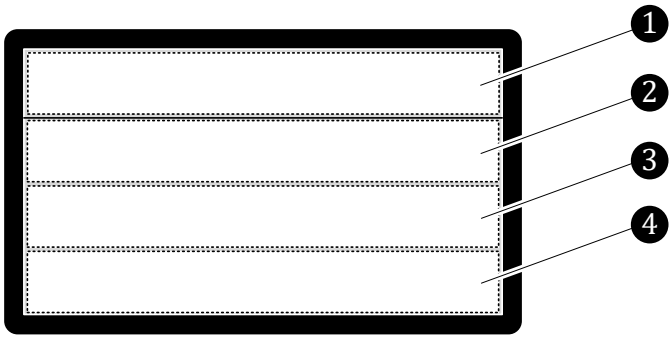


Fig. 5-2 4-lines LC display

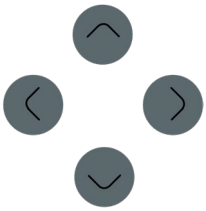
1. Line 1: menu page header
2. Line 2: menu context, e.g., parameter setting value
3. Line 3: menu context, e.g., parameter name
4. Line 4: menu context, e.g., parameter setting range

LED INDICATORS

LED	Function		
	ON	Flashing	OFF
FWD/REV	Steady green: Forward running state	Flashing green (200 ms cycle): Currently switching direction from forward to reverse	-
	Steady red: Reverse running state	Flashing red (200 ms cycle): Currently switching direction from reverse to forward	
RUN	Steady green: VFD running state	Flashing green (200 ms cycle): VFD is in the process of stopping (in this case, the stop LED is steady red).	-
STOP	Steady green: VFD running state	-	VFD is in the running state.
COMM	Good communication connection between the VFD and the keypad.	-	Abnormal communication connection between the VFD and the keypad.
COMM ERR	VFD is in a fault or warning state (e.g., overcurrent during acceleration/ deceleration...).	-	No fault or warning in the VFD.
L/R	The VFD is controlled remotely by another device, such as an upper-level computer Modbus.	Flashing green (200 ms cycle):	The VFD is controlled by the digital operator keypad.

Tab. 5-1 Operating unit (HMI) – LED indicators

OPERATING KEYS

Key	Function	Description
	Main Menu	Press this key from any interface to directly enter the main menu interface.
	Exit	• Return to the previous menu • Cancel execution.
	Navigation	• In *value setting mode*, use *LEFT/ RIGHT* keys to move the digit position, and *UP/DOWN* keys to increase or decrease the value. • In *menu option mode*, use the *UP/ DOWN* keys to move through options
	Confirmation	• Confirm parameter settings • Enter the next level of the selected menu option.
	VFD RUN command	• This key is only effective when the VFD operation command source is set to digital operator. Press the RUN key to start running. • When the VFD starts running, the corresponding status LED (green) lights up.
	VFD STOP command	• This key is only effective when the VFD operation command source is set to digital operator, press to stop output. • In *stop mode*, the corresponding status LED (red) lights up. • In the event of a *fault*, press this key to reset the VFD.
	VFD run direction switch	• VFD forward/reverse selection, FWD for *forward* and REV for *reverse*. • When the VFD is set to *forward*, the corresponding status LED (green) lights up; when set to *reverse*, the corresponding red LED lights up.
	VFD JOG operation	VFD JOG operation

Tab. 5-2 Operating unit (HMI) – Operating keys

5.2 GENERAL OPERATING INSTRUCTIONS

5.2.1 START-UP SCREEN AND MAIN SCREEN

START-UP SCREEN

After power on the H1 VFD requires approx. 3 s to start up the system. The *Start-up screen* is displayed during the system start-up phase.

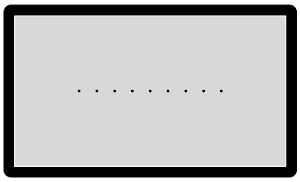


Fig. 5-3 Start-up screen

➢ When start-up phase is complete the display automatically shows the *Main screen*.

MAIN SCREEN

The *Main screen* displays the actual values of the following *physical quantities*:

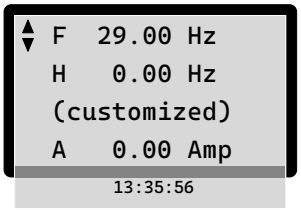


Fig. 5-4 Main screen

- F[Hz]: Frequency setpoint
- H(Hz): Output frequency
- *customized* display
- A[Amp]: Output current
- System time [hh:mm:ss]

NOTE

The quantity for the *customized* display can be selected by parameter „F7-21 User Display".

MENU SCREEN

When you press the *MENU* key MENU, the display switches from the main screen to the *Menu* screen.

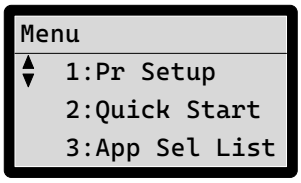


Fig. 5-5 H1 menu

➢ By using the *UP/DOWN* keys you can scroll to the required submenu.

➢ The following section shows the H1 menu structure.

5.2.2 MENU STRUCTURE

The software menu of the VFD control unit is divided into menu levels.
The following figure shows the menu structure in the display of the operating unit (HMI).

Menu level 1	Menu level 2	Menu level 3
Start-up screen		
Main screen		
Menu	1. Pr Setup	F0: Basic Func->tion Para
		F1: Start Stop->Ctrl Para
		F2:V/F Control->Para 02
		F3: Vector Ctrl->Para 03
		F4: Motor Para
		F5: Input Terni->nals
		F6: Output Term->inals 06
		F7: Aux Functio->n & Disp
		F8: Communicati->on
		F9: Protect & F->ault Para
		FA: PID Control
		FB: Tension Ctr->l Para
		FC: Position Ct->rl Para
		FD: Multi-spd &->Simp PLC
		FE: Torque Cont->rol Para
		FF: FACTORY Para
		U0: Fault record
		U1: Status Moni->toring 17
		H0: Other Motor->Para18
		H1: Other Motor->VF Set
		H2: Other Motor->Vect Para
		H3: Other Motor->Fault Para
		L0: System Cont->rol Para
		L1: Customizati->on Code
		L2: Optimize Ct->rl Para
		L3: Master Slav->e Ctrl
		L4: Holding Bra->ke
		L5: Sleep Wake->Up
		L6: Swing Frq &->Count...
		L7: AI Mutipoi->nt Curve
		L8: Application->Macro
	2. Quick Start	1: V/f Mode

Menu level 1	Menu level 2	Menu level 3
		2: VFPG Mode
		3: SVC Mode
		4: FVC Mode
		5: TQCPG Mode
		6: My Mode
	3. App Sel List	L8-00
	4. Changed List	(ENTER) Map to: F0-00 to L2-02
	5. Copy Pr	
	6. Fault Record	
	7. Set Language	
	8. Set Time	
	9. Keypad Lock	
	10. Display Setup	
	11. Start-up	

Tab. 5-3 Menu structure of the operating unit (HMI)

5.2.3 MENU NAVIGATION

Navigation through the software menu is required to operate the H1 VFD. "Menu navigation" means:

- to select of a menu option at the same menu level or
- to select of a further menu page at the same menu level or
- to move to the digit position to set a parameter value or
- to enter or exit a menu.

Four different operating keys are arranged on the operating unit (HMI) for these functions.

MENU OPTION SELECTION

Fig. 5-6 Up/Down keys

You can scroll through the menu options on the same menu level as follows:

- Press the *UP* key to select the menu option above the currently selected menu option.
- Press the *DOWN* key to select the menu option below the currently selected menu option.

The scroll symbol ▲▼ always appears in front of the selected menu option.

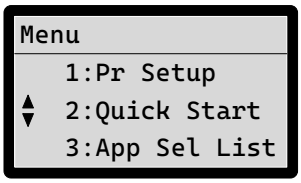


Fig. 5-7 Selected menu option "Quick Start"

MENU PAGE SELECTION

Fig. 5-8 Left/Right keys

You can navigate to a further menu page on the same menu level as follows:

- Press the *RIGHT* key to select the next available menu page for the currently selected menu option.
- Press the *LEFT* key to return to the previous menu page for the currently selected menu option.

The arrow symbol pointing to the right ► indicates the next available menu page.

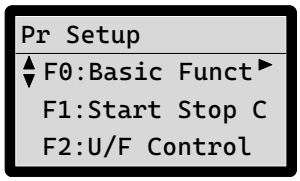


Fig. 5-9 Next available menu page

The arrow symbol pointing to the left ◄ indicates the previously available menu page.

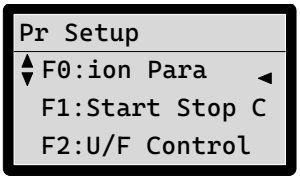


Fig. 5-10 Previously available menu page

MOVING TO DIGIT POSITION

For parameter value setting you can move to the required digit as follows:

- Press the *LEFT* key to move to the next digit to the left.
- Press the *RIGHT* key to move to the next digit to the right.

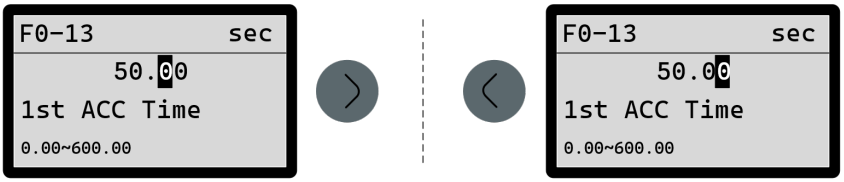


Fig. 5-11 Parameter setting – Navigating between the value digits

ENTER/EXIT A MENU

Fig. 5-12 Enter/Exit keys

You can enter or exit a menu as follows:

- Press the *OK* key to enter the selected menu.
- Press the *ESC* key to exit the current menu and return to the upstream menu level.

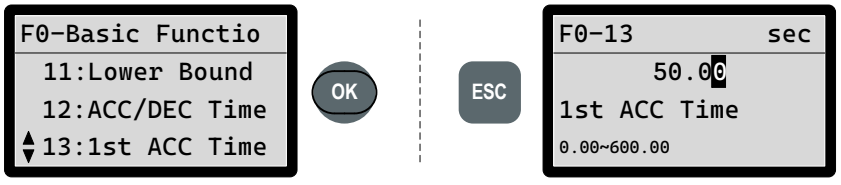


Fig. 5-13 Parameter setting – Enter and exit a menu

5.2.4 CHANGING PARAMETER SETTINGS (GENERAL)

For correct and safe operation of the VFD, the control must be adapted to the general conditions of the various applications. This is done by setting the parameters on the HMI.

You can set the H1 VFD parameters using:

- the *UP/DOWN* keys (to select an option)
- the *LEFT/RIGHT* and *UP/DOWN* keys (to set a value)

In the following, the two types of parameter setting are explained with the help of example instructions.

PARAMETER SETTING VIA UP/DOWN KEYS (TO SET AN OPTION)

INSTRUCTION (example) – Setting the *F0-06 Source of FREQ* parameter

START *USER LEVEL: Keypad Unlock*

STEP 1: Navigate to parameter menu *06: Source of FREQ*.

➢ Parameter menu *06: Source of Freq* is selected.

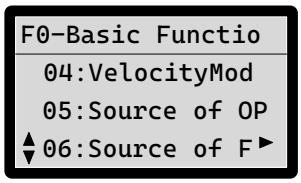


Fig. 5-14 Navigate to parameter menu 06

STEP 2: Press the *OK* key  to enter the menu.

➢ The display shows the actual setting of parameter F0-06.

➢ 0 shows the corresponding index of setting option "Digital Keypad".

➢ "Digital Keypad" means the controlling the H1 VFD via the operating unit (HMI).

➢ "0~10" shows the index setting range for the parameter setting options.

Fig. 5-15 F0-06 Actual setting

STEP 3: Press 2 x *UP* key  to select setting option "Analog Input".

➢ The display shows the selected setting option "Analog Input" with the corresponding index 2.

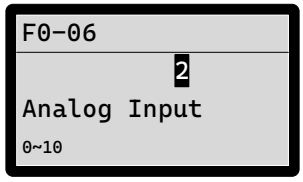


Fig. 5-16 F0-06 Changed setting

NOTE

The changed parameter setting is not yet saved in the VFD control unit and therefore has no influence on the functions of the VFD!

➢ To save the change of a parameter setting, the new setting option must be confirmed by the *OK* key.

STEP 4: Press the *OK* key  to confirm the new setting option.

➢ The new parameter setting is now saved in the H1 control unit and is effective.

➢ The display automatically shows the upstream menu level and highlights the next parameter menu.

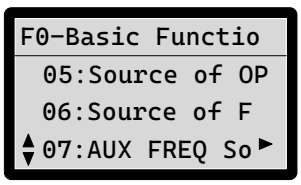


Fig. 5-17 Return to upstream menu level

END

PARAMETER SETTING VIA LEFT/RIGHT AND UP/DOWN KEYS

INSTRUCTION (example) – Setting the *F0-14 1st DEC Time* parameter (to set a value)

START *USER LEVEL: Keypad Unlock*

STEP 1: Navigate to parameter menu *14 1st DEC Time*.

➢ Parameter menu *14: 1st DEC Time* is selected.

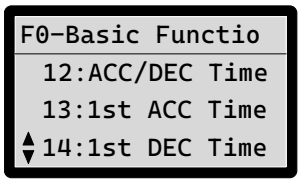


Fig. 5-18 Navigate to parameter menu 14

STEP 2: Press the *OK* key  to enter the menu.

➢ The display shows the actual setting of parameter F0-06.
➢ 0 shows selected digit of the time value which can be changed.
➢ "1st DEC Time" is the name of parameter F0-14.
➢ "0.00~600.00" shows the time setting range [s].

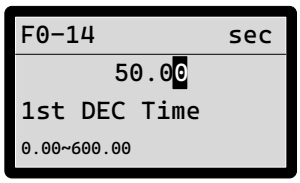


Fig. 5-19 F0-14 Actual setting

STEP 3: Press 2 x the *LEFT* key  to select the first digit before the decimal point.

➢ The first digit before the decimal point is selected and the setting value can be changed.

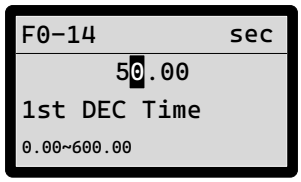


Fig. 5-20 F0-14 Selected digit

NOTE

➢ The other decimal places can be set in the same way.
➢ Both the *LEFT* key and the *RIGHT* key can be used for navigation.

STEP 4: Press the *UP* key  (or *DOWN* key ) to change the value of the selected digit accordingly. Here for example: *UP* key.

➢ The setting value of the first deceleration time is changed.

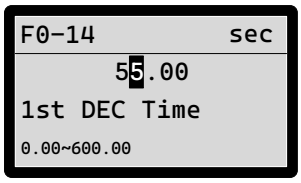


Fig. 5-21 F0-14 Changed setting

NOTE

The changed parameter setting is not yet saved in the VFD control unit and therefore has no influence on the functions of the VFD!

➢ To save the change of a parameter setting, the new setting value must be confirmed by the *OK* key.

STEP 5: Press the *OK* key  to confirm the new setting value.

➢ The new parameter setting is now saved in the H1 control unit and is effective.
➢ The display automatically shows the upstream menu level and highlights the next parameter menu.

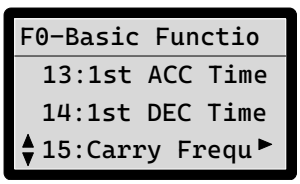


Fig. 5-22 Return to upstream menu level

END

5.2.5 SELECTING THE MENU LANGUAGE

You can display the HMI menu in the following languages:

- English
- Chinese
- German
- Spanish

Changing the menu language does not require a password and can be done during VFD operation. To change the menu language, please note the following exemplary instruction.

INSTRUCTION (example) – Set the Menu Language to German

START — *USER LEVEL: Keypad Unlock*

STEP 1: Navigate to *Menu*|*7:Set Language*|***Set Language.***

➢ Menu ***7: Set Language*** is selected.

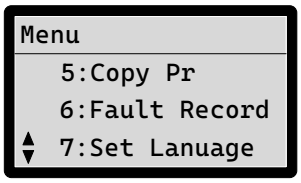


Fig. 5-23 Menu "7:Set Language"

STEP 2: Press the *OK* key  to enter the menu.

➢ Icon ⦿ indicates the actual set menu language.

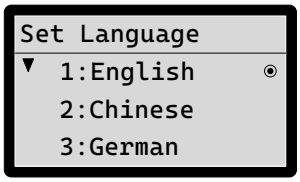


Fig. 5-24 Actual menu language: English

STEP 3: Select the language of your choice by using the *UP/DOWN* keys. Here: *DOWN* key )

➢ *German* is selected as the menu language.

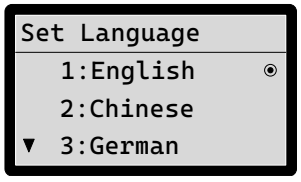


Fig. 5-25 Select German language

NOTE

English is still the actual menu language; see icon ⦿.

➢ To save the change of the menu language, it must be confirmed by the *OK* key.

STEP 4: Press the *OK* key  to save the new menu language setting.

➢ Icon ⦿ now indicates *Deutsch* (German) as the actual menu language.

➢ Immediately after confirmation all menu texts are displayed in this language.

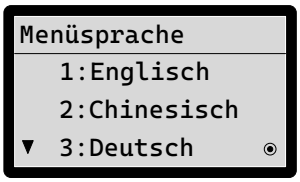


Fig. 5-26 Actual menu language: German

END

5.3 MAIN MENU (HMI)

The menu screen of the H1 VFD operating unit (HMI) displays the *main menu* of the H1 VFD. The following submenus are available:

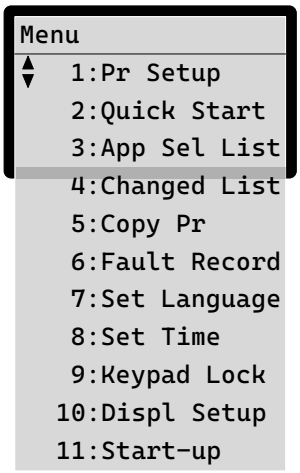


Fig. 5-27 H1 VFD main menu

- 1:Pr Setup (Parameter Setup)
- 2:Quick Start
- 3:App Sel List (Application Selection List)
- 4:Changed List (Modified parameters record)
- 5:Copy Pr (Copy Parameters)
- 6:Fault Record
- 7:Set Language (HMI menu language)
- 8:Set Time (H1 VFD system time)
- 9:Keypad Lock (HMI lock)
- 10:Displ Setup (Display Setup)
- 11:Start-up (Selecting the start-up screen)

5.3.1 1:PARAMETER SETUP

PARAMETER SETTING PROCEDURE

CHAPTER REFERENCE

➢ For parameter setting procedure, see chapter "5.2.4 Changing Parameter Settings (General)".

PARAMETER FUNCTION CODES

A *function code* is assigned to each parameter. The function code consists of:

- the *number of the menu* to which the parameter belongs, e.g., "F2", and
- a *consecutive parameter number*.

Both the menu number and the parameter number are connected by a hyphen.

EXAMPLE *"F0-03 Control Mode"*

Menu		Consecutive parameter number	Parameter name
Menu number	Menu name		
F0	Basic Function Para	*-03*	*Control Mode*

1: PR SETUP SUBMENUS

Menu ***1: Parameter Setup*** refers to the various operating functions of the H1 VFD and consists of the following submenus with its *Function Group Codes Fx, Ux, Hx and Lx*:

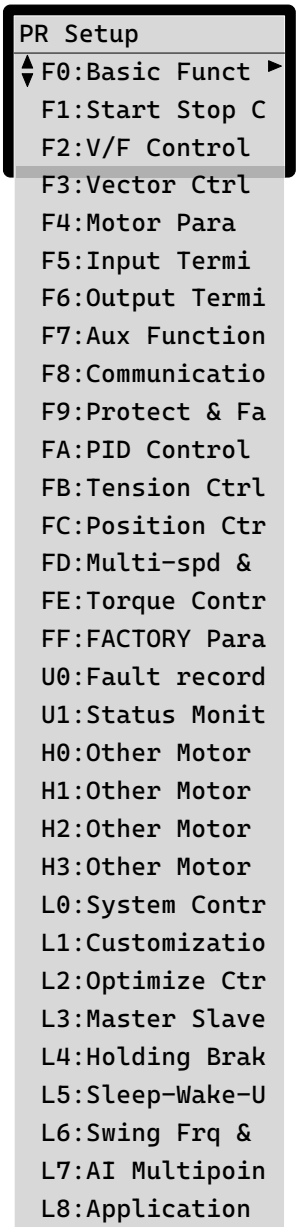


Fig. 5-28 1:Pr Setup - Submenus

- F0:Basic Function Parameters
- F1:Start Stop Control Parameters
- F2:V/F Control Parameters
- F3:Vector Control Parameters 03
- F4:Motor Parameters (parameters of motor M1)
- F5:Input Terminals (parameters)
- F6:Output Terminals (parameters)
- F7:Auxiliary Functions & Display
- F8:Communication (parameters)
- F9:Protection & Fault Parameters
- FA:PID Control (parameters)
- FB:Tension Control Parameters
- FC:Position Control Parameters
- FD:Multi-speed & Simp-PLC (multi-stage speed and simple PID function parameters)
- FE:Torque Control Parameters
- FF:FACTORY Parameters (manufacturer parameters)
- U0:Fault record (parameters)
- U1:Status Monitoring 17 (parameters)
- H0:Other Motor Parameters 18
- H1:Other Motor VF Set (parameters)
- H2:Other Motor Vector Parameters
- H3: Other Motor Fault Parameters
- L0:System Control Parameters
- L1:Customization Code (parameters))
- L2:Optimize Control Parameters
- L3:Master Slave Control (parameters)
- L4:Holding Brake (holding brake function parameters)
- L5:Sleep Wake-Up (sleep wake function parameters)
- L6:Swing Frequency & Counter (parameters)
- L7:AI Multipoint Curve (analog input multipoint curve parameters)
- L8:Application Macro (parameters)

PARAMETER CHANGEABILITY

The *changeability symbols* are described as follows:

- ☆ indicates that the H1 VFD parameters can be modified during both STOP and RUN operation.
- ★ indicates that the H1 VFD *cannot* be modified while in RUN operation.
- ○ Indicates that the parameter is a factory parameter and *cannot* be changed by the user.
- ● Indicates the VFD's actual detected value or manufacturer's fixed value, which *cannot* be changed.

SERIAL COMMUNICATION

Communication addresses in the function parameter table are written in hexadecimal.

F0: BASIC FUNCTION PARAMETERS

PARAMETER LIST

Parameter group *F0: Basic Function Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F0-00	*Identity Code* (Product model)	• Product type • Input voltage [V], • Power [kW], • number of input voltage phases.	Machine type determination	●	0000
F0-01	*Duty Selection* (Light and heavy load selection)	1 = Heavy duty (Heavy load)	1	★	0001
F0-02	*Rated current*	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Machine type determination	●	0002
F0-03	*Control Method* (Control mode)	0 = Speed mode 1 = Point-to-point mode 2 = Torque mode 3 = Home return mode	0	★	0003
F0-04	*Velocity mode* (Speed mode selection)	0 = VF control 2 = VVC voltage vector control 3 = Closed loop control for induction motors 4 = Closed loop control for permanent magnet motors 6 = SVC open loop vector control	0	★	0004
F0-05	*Source of OPER* (Run command source selection)	0 = Digital operator 1 = External terminal input 2 = RS485 communication input 3 = CANopen input 4 = Reserved 5 = Communication card input	0	★	0005
F0-06	*Source of FREQ* (Frequency source selection)	0 = Digital operator 1 = RS485 communication 2 = Analog input 3 = External Up/Down input 4 = Pulse input without direction 5 = Pulse input with direction 6 = CANopen input 7 = Reserved 8 = Communication card input 9 = PID 10 = Digital terminal multispeed	0	★	0006
F0-07	*AUX FREQ Source* (Auxiliary frequency sources)	0 = Disable 1 = Digital operator 2 = RS485 communication 3 = Analog input 4 = External Up/Down input 5 = Pulse input 6 = CANopen input 7 = Reserved 8 = Communication card input	0	★	0007
F0-08	*AUX FREQ FUN SEL* (Selection of frequency source combination)	0 = Main + Auxiliary frequency 1 = Main frequency - Auxiliary frequency 2 = Auxiliary frequency - main frequency 3 = Main frequency + Auxiliary frequency 2	0	★	0008
F0-09	*Fwd/Rev Forbid* (Forward/reverse disable selection)	0 = Forward and reverse enabled 1 = Reverse disabled 2 = Forward disabled	0	★	0009
F0-10	*Upper Bound FREQHz* (Maximum frequency)	0.00Hz ... 599.00Hz	599.00Hz	☆	000A
F0-11	*Lower Bound FREQHz* (Minimum frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	000B
F0-12	*ACC/DEC TimeUnit*	0 = Acceleration and deceleration unit is	0	★	000C

Parameter group *F0: Basic Function Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Speed curve time unit)	0.01s 1 = Acceleration and deceleration unit is 0.1s			
F0-13	*1st ACC Time* (Acceleration time 1)	0.00s ... 600.00s	Machine type determination	☆	000D
F0-14	*1st DEC Time* (Deceleration time 1)	0.00s ... 600.00s	Machine type determination	☆	000E
F0-15	*Carry Frequency kHz* (Carrier frequency)	2kHz ... 15kHz	6kHz	★	000F
F0-16	*Derating Method* (Carrier reduction mode)	0 = Reduce carrier based on current temperature 1 = Fixed carrier and limit current 2 = Same as setting 0	0	☆	0010
F0-17	*High Speed Mode*	0 ... 65535	0	★	0011
F0-18	*Parameter Reset* (Parameter management setting)	0 = No Function 1 = Parameter write protection 2 = No Function ... 4 = No Function 5 = kWh display reset 7 = Reset CAN slave 9 = Reset to factory value of 50Hz	0	★	0012
F0-19	*Keypad FREQ*	0.00 Hz ... 599.00 Hz	29.0 Hz		

Tab. 5-4 Parameter list – F0: Basic Function Parameters

F1: START STOP CONTROL PARAMETERS

PARAMETER LIST

Parameter group *F1: Start Stop Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F1-00	*Restart Method* (Start speed tracking)	0 = Disable (No action) 1 = From Fmax (Track from maximum frequency) 2 = From SPD REF (Track frequency at start-up) 3 = From Fmin (Track from the minimum frequency)	0	☆	0100
F1-01	*PM startup way* (Initial position identification method)	0 = No initial angle identification 1 = Attraction method 3 = Pulse injection method 1 4 = Pulse injection method 2	0	☆	0101
F1-02	*Fault Re-RUN Way* (Abnormal restart mode)	0 = Stop Operation (Stop running) 1 = SPD REF Search (Track current speed) 2 = MIN SPD Search (Track minimum frequency)	0	☆	0102
F1-03	*SPD Search Curr %* (Maximum current for speed tracking)	20% ... 200%	100%	☆	0103
F1-04	*Voltage INC Gain* (Voltage increase rate)	1% ... 200%	100%	☆	0104
F1-05	*Start Frequency Hz*	0.00Hz ... 599.00Hz	0.50Hz	★	0105
F1-06	*Gear ACC Time* (Start-up hold time)	0.00s ... 600.00s	0.00s	☆	0106
F1-07	*Gear ACC FREQ* (Startup hold frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	0107
F1-08	*DC Inject Level %* (Braking current size)	0% ... 100%	0%	☆	0108
F1-09	*DC Inject Start sec* *(Start-up braking* time)	0.0s ... 60.0s	0.0s	☆	0109
F1-10	*DCI Kp Gain* (DC braking proportion coefficient)	0 ... 65535	2000	☆	010A
F1-11	*DCI Ki Gain* (DC brake integral coefficient)	0 ... 65535	100	☆	010B
F1-12	*Stop Methods*	0 = Deceleration stop 1 = Free stop	0	☆	010C
F1-13	*Decel Method* (Deceleration methods)	0 = Deceleration method 0 1 = Deceleration method 1 2 = Deceleration method 2	0	★	010D
F1-14	*Fast Dec I Limit* (Maximum current for flux braking)	0 ... 26214	10485	☆	010E
F1-15	*TRANS ACC/DEC1-4Hz* (1-4 segment acceleration/deceleration switching point)	0.00Hz ... 599.00Hz	0.00Hz	☆	010F
F1-16	*Curve Time 1* (S acceleration time 1)	0.00s ... 25.00s	0.20s	☆	0110
F1-17	*Curve Time 1* (S acceleration time 2)	0.00s ... 25.00s	0.20s	☆	0111
F1-18	*Curve Time 1* (S deceleration time 1)	0.00s ... 25.00s	0.20s	☆	0112
F1-19	*Curve Time 1* (S deceleration time 2)	0.00s ... 25.00s	0.20s	☆	0113
F1-20	*Auto ACC/DEC* (Automatic acceleration and deceleration selection)	0 = Linear acceleration and deceleration 1 = Automatic acceleration linear deceleration 2 = Linear acceleration auto deceleration 3 = Automatic acceleration and deceleration 4 = Auto acceleration deceleration suppression	0	☆	0114

Parameter group *F1: Start Stop Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F1-21	*Auto ACC/DEC Kp Hz* (Auto acceleration and deceleration Kp)	0 ... 65535	20	☆	0115
F1-22	*Auto ACC/DEC Ki sec* (Auto acceleration and deceleration Ki)	0.000 ... 65.535	0.400	☆	0116
F1-23	*EF Stop Select* (Abnormal stop mode)	0 = Free stop 1 = According to the first deceleration time 2 = According to the second deceleration time 3 = According to the third deceleration time 4 = According to the fourth deceleration time 5 = According to the system deceleration time 6 = Automatic deceleration	0	☆	0117
F1-24	*DC Inject Stop* (Stop braking time)	0.0s ... 60.0s	0.0s	☆	0118
F1-25	*DC Inject StartFHz* (Braking start frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	0119
F1-26	*Gear DEC Time* (Stop hold time)	0.00s ... 600.00s	0.00s	☆	011A
F1-27	*Gear DEC FREQ* (Stop hold frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	011B
F1-28	*Demag Count* (Speed tracking demagnetization time)	0 ... 65535	50	☆	011C
F1-29	*Momentary Power* (Instantaneous power failure start mode)	0 = Stop running 1 = Track current speed 2 = Track minimum frequency	0	☆	011D
F1-30	*Power Loss Time sec* (Allowed power-off time)	0.0s ... 20.0s	2.0s	☆	011E
F1-31	*Base Block Time sec* (Base block interruption time)	0.0s ... 5.0s	0.5s	☆	011F
F1-32	*dEb Return LevelVdc* (dEb recovery threshold)	0.0 ... 200.0	40.0	☆	0120
F1-33	*dEb offset Level* (dEb action bias threshold)	0.0 ... 200.0	40.0	☆	0121
F1-34	*dEb Decel SE* (dEb deceleration selection)	0 = No action 1 = Enabled, not recoverable 2 = Enabled, recoverable	0	☆	0122
F1-35	*dEb Return Time sec* (dEb recovery time)	0.0s ... 25.0s	3.0s	☆	0123
F1-36	*Rot Pos Det PLS ms* (PM voltage pulse width)	0.0ms ... 3.0ms	1.0ms	☆	0124
F1-37	*Reserved* (PM high frequency injection frequency)	0Hz ... 1200Hz	500Hz	☆	0125
F1-38	*Reserved* (PM high frequency injection amplitude)	0.0V ... 200.0V	30.0V	☆	0126
F1-39	*Reserved* (Zero-voltage start-up time)	0.000s ... 60.000s	0.000s	☆	0127
F1-40	*Reserved* (Maximum reverse prohibition angle)	0.00s ... 30.00s	10.00s	☆	0128
F1-41	*Reserved* (Flux zero alignment Time)	0.0s ... 60.0s	0.0s	☆	0129
F1-42	*Stop Freq. Sel.*	0 = Freq. Cmd 1 = Freq. Cmd Set 0 2 = Init Stop Freq	0		
F1-43	*Stop Freq. Init.Hz*	0.00Hz ... 599.00Hz	0Hz		

Tab. 5-5 Parameter list – F1: Start Stop Control Parameters

F2: V/F CONTROL PARAMETERS 02

PARAMETER LIST

Parameter group *F2: V/F Control Parameters 02*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F2-00	*VF Curve Mode* (V/F voltage selection)	0 = General V/F curve 1 = 1.5 power V/F curve 2 = 2 power V/F curve	0	★	0200
F2-01	*TQR COMP Gain* (Torque compensation gain)	0 ... 10	1	☆	0201
F2-02	TQR COMP Filter sec (Torque filter time)	0.001s ... 10.000s	0.500s	☆	0202
F2-03	*Reserved*	0 ... 65535	0	●	0203
F2-04	*M1 Min Out FREQ Hz* (M1 multi-point VF frequency point 1)	0.00Hz ... 599.00Hz	0.50Hz	★	0204
F2-05	*M1 Min Out VOLT V* (M1 multi-point VF voltage point 1)	0.0V ... 480.0V	2.0V	★	0205
F2-06	*M1 Mul VF FREQ 2Hz* (M1 multi-point VF frequency point 2)	0.00Hz ... 599.00Hz	1.50Hz	★	0206
F2-07	*M1 Mul VF VOLT 2V* (M1 multi-point VF voltage point 2)	0.0V ... 480.0V	10.0V	★	0207
F2-08	*M1 Mul VF FREQ 3Hz* (M1 multi-point VF frequency point 3)	0.00Hz ... 599.00Hz	3.00Hz	★	0208
F2-09	*M1 Mul VF VOLT 3V* (M1 multi-point VF voltage point 3)	0.0V ... 480.0V	22.0V	★	0209
F2-10	*Slip COMP Filter sec* (Slip compensation filter time)	0.001s ... 10.000s	0.100s	☆	020A
F2-11	*Slip COMP Gain* Slip compensation gain)	0.00 ... 10.00	0.00	☆	020B
F2-12	*Gen Slip Comp GA* (Generating torque compensation gain)	0.00 ... 1.00	1.00	☆	020C
F2-13	*MAX Slip Freq.* (Maximum slip limit value)	0.00Hz ... 200.00Hz	20.00Hz	☆	020D
F2-14	*Vibrate sup Gain* (Oscillation suppression gain)	0 ... 10000	1000	☆	020E
F2-15	*Reserved* (Stopping frequency mode)	0 = According to the current frequency command 1 = According to frequency command reset to zero 2 = Parameter F2-16 set value	0	☆	020F
F2-16	*Reserved* (Stopping initial frequency)	0.00Hz ... 599.00Hz	50.00Hz	☆	0210
F2-17	*Reserved* (No-load start gain)	0 ... 100	20	☆	0211
F2-18	*Reserved* (Voltage compensation filter)	0.00Hz ... 8.00Hz	1.50Hz	☆	0212
F2-19	*Reserved* (Voltage compensation coefficient)	1 ... 300	200	☆	0213
F2-20	*Reserved* (Maximum voltage compensation	0.0 ... 50.0V	50.0	☆	0214

Tab. 5-6 Parameter list – F2: V/F Control Parameters 02

F3: VECTOR CONTROL PARAMETERS 03

PARAMETER LIST

Parameter group *F3: Vector Control Parameters 03*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F3-00	*System Control*	0 ... 65535	0	★	0300
F3-01	*ASR1/2 Switch F Hz* (ASR1/2 switching frequency)	5.00Hz ... 599.00Hz	7.00Hz	☆	0301
F3-02	*ASR Band Width* (Zero speed bandwidth)	1Hz ... 40Hz	10Hz	☆	0302
F3-03	*ASR1 Band Width* (ASR1 low-speed bandwidth)	1Hz ... 40Hz	10Hz	☆	0303
F3-04	*ASR2 Band Width* (ASR2 high-speed bandwidth)	1Hz ... 40Hz	10Hz	☆	0304
F3-05	*ASR2 Kp (Zero SPD) Hz* (ASR zero-speed gain)	0Hz ... 40Hz	10Hz	☆	0305
F3-06	*ASR2 Ki (Zero SPD) sec* (ASR zero-speed integral)	0.000s ... 10.000s	0.100s	☆	0306
F3-07	*ASR1 Kp (Low SPD) Hz* (ASR1 low speed gain)	0Hz ... 40Hz	10Hz	☆	0307
F3-08	*ASR1 Ki (Low SPD) sec* (ASR1 low-speed integral time)	0.000s ... 10.000s	0.100s	☆	0308
F3-09	*ASR2 Kp (High SPD) Hz* (ASR2 high-speed gain)	0Hz ... 40Hz	10Hz	☆	0309
F3-10	*ASR2 Ki (High SPD) sec* (ASR2 high-speed integral time)	0.000s ... 10.000s	0.100s	☆	030A
F3-11	*ASR FFD Gain* (ASR speed feedforward)	0% ... 200%	0%	☆	030B
F3-12	*SPD Loop Kr Gain* (PDFF coefficient)	0 ... 200	30	☆	030C
F3-13	*DOB Gain* (DOB compensation gain)	0Hz ... 5000Hz	0Hz	☆	030D
F3-14	*ASR Output LPF* (ASR output filtering time)	0.000s ... 0.350s	0.008s	☆	030E
F3-15	*Notch Deep* (Notch filter depth)	0dB ... 20dB	0dB	☆	030F
F3-16	*Notch FREQ* (Notch filter frequency)	0.00Hz ... 200.00Hz	0.00Hz	☆	0310
F3-17	*Speed Limit SEL* (Speed limit selection)	0 = Parameters FE-03 and FE-04 1 = Frequency source 2 = Absolute value of frequency source 3 = Tension control line speed	0	★	0311
F3-18	*ACR Band Width* (Current loop bandwidth)	0Hz ... 65535Hz	290Hz	☆	0312
F3-19	*Iq-ACR Kp Gain* (Iq current loop proportional gain)	0% ... 65535%	100%	☆	0313
F3-20	*Iq-ACR Ki Gain* (Iq current loop integral time)	0s ... 65535s	100s	☆	0314
F3-21	*Id-ACR Kp Gain* (Id current loop proportional gain)	0% ... 65535%	100s	☆	0315
F3-22	*Id-ACR Ki Gain* (Id current loop integral time)	0s ... 65535s	100s	☆	0316
F3-23	*I/F Id Level* (I/F mode current command)	0% ... 150%	40%	☆	0317
F3-24	*IF PMLESS Sw Frq Hz*	0.00Hz ... 599.00Hz	20.00Hz	☆	0318

Parameter group *F3: Vector Control Parameters 03*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(IF switching frequency 1)				
F3-25	*PMLESS-IF Sw Frq Hz* (IF switching frequency 2)	0.00Hz ... 599.00Hz	20.00Hz	☆	0319
F3-26	*Kp of AMR* (Field weakening proportional coefficient)	0.00 ... 3.00	1.00	☆	031A
F3-27	*Ki of AMR* (Field weakening integral coefficient)	0.00 ... 3.00	0.20	☆	031B
F3-28	*Uout Limited* (Output voltage limit value)	0 ... 115	100	☆	031C
F3-29	*TQR COMP Filter sec* (Torque filter time)	0.001 ... 10.000	0.500	☆	031D
F3-30	*VVC VFFD Gain* (VVC voltage feedforward gain)	0.00 ... 2.00	1.00	☆	031E
F3-31	*VVC Comp Lp* (VVC frequency compensation low pass)	0.00s ... 600.00s	0.05s	☆	031F
F3-32	*FWD Motor Tq LIM%* (Forward motoring torque upper limit)	0% ... 500%	500%	☆	0320
F3-33	*FWD Reg. Tq LIM%* (Forward braking torque upper limit)	0% ... 500%	500%	☆	0321
F3-34	*REV Motor Tq LIM%* (Reverse motoring torque upper limit)	0% ... 500%	500%	☆	0322
F3-35	*REV Reg. Tq LIM%* (Reverse braking torque upper limit)	0% ... 500%	500%	☆	0323
F3-36	*BW of FLUX BEMF Hz* (FLUXBEMF bandwidth)	20.0Hz ... 100.0Hz	40.0Hz	☆	0324
F3-37	*Ki in Flux Weaken* (PM weak magnetic Ki)	0 ... 65535	32	☆	0325
F3-39	*LPF of FLX_OBSER ms* (Flux observer filter)	1ms ... 1000ms	50ms	☆	0327
F3-40	*FLUX Riseing T* (Flux rise time)	33% ... 100%	100%	☆	0328
F3-41	*VCC Comp Hp* (VVC frequency compensation high pass)	0.00s ... 600.00s	5.00s	☆	0329
F3-42	*VCC Comp Gain* (VVC frequency compensation gain)	0.00 ... 655.35	1.00	☆	032A
F3-43	*PMLESS CTRL SEL* (PM sensorless control bit)	0 ... 65535	0	☆	032B
F3-44	*LPF Gain of ID* (Id filter time)	0.0s ... 6.0s	0.2s	☆	032C
F3-45	*LPF of Id* (IDBST filter coefficient)	0 ... 1000	10	☆	032D
F3-46	*Motor1 Id Curve %* (M1 weak magnetic curve)	0 ... 200	90	☆	032E
F3-47	*Motor2 Id Curve %* (M2 weak magnetic curve)	0 ... 200	90	☆	032F
F3-48	*Flux Weak ACC/DEC %* (Weak magnetic speed response)	0 ... 150	65	☆	0330
F3-49	*Weaken ASR slop P* (Weak magnetic ASR proportional coefficient)	0% ... 65535%	7618%	☆	0331
F3-50	*Weaken ASR slop I* (Weak magnetic ASR integral coefficient)	0s ... 65535s	30s	☆	0332
F3-51	*I MAX* (I maximum value)	0 ... 250	150	★	0333

Parameter group *F3: Vector Control Parameters 03*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F3-52	*TE Limited* (Torque limit value)	0 ... 500	200	☆	0334
F3-53	*Flux Weaken I* (Weak magnetic current)	0 ... 65535	100	☆	0335
F3-54	*LPF of FREQ* (Frequency filter coefficient)	0 ... 1000	10	★	0336
F3-55	*Us MAX* (Us maximum value)	0 ... 100	100	★	0337
F3-56	*Id Weaken Band* (Id weak magnetic bandwidth)	0 ... 546	273	☆	0338
F3-57	*MTPA Flux Weak V%* (MTPA weak magnetic limit voltage)	0.0% ... 12.0%	10.5%	☆	0339

Tab. 5-7 Parameter list – F3: Vector Control Parameters 03

F4: MOTOR PARAMETERS

PARAMETER LIST

Parameter group *F4: Motor Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F4-00	*Motor Type Sel* (Motor type selection)	0 = Induction motor 1 = Surface-mounted permanent magnet synchronous motor 2 = Interior permanent magnet synchronous motor 3 = Synchronous reluctance motor	0	★	0400
F4-01	*Auto-Tuning SEL* (Motor parameter identification)	0 = No function 1 = IM advanced rotation identification 2 = IM static identification 4 = PM motor pole identification 5 = PM rotation identification 6 = IM rotation identification 7 = No Function ... 11 = No Function 12 = Inertia identification 13 = PM static identification	0	★	0401
F4-02	*M1 Max Output FR Hz* (M1 maximum frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0402
F4-03	*Motor1 F base* (M1 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0403
F4-04	*M1 VOLT Base* (M1 rated voltage)	0.0V ... 510.0V	380.0V	★	0404
F4-05	*Motor1 Rated P* (IM1 rated power)	0.00kW ... 655.35kW	Machine type determination	★	0405
F4-06	*Motor1 Poles* (IM1 number of poles)	2 ... 20	Machine type determination	★	0406
F4-07	*Motor1 Rated A* (IM1 rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Confirmation of F4-05	★	0407
F4-08	*Motor1 Rated* (IM1 rated speed)	0rpm ... 65535rpm	Confirmation of F4-05	★	0408
F4-09	*System Jm* (Inertia per unit value)	1pu ... 65535pu	Machine type determination	★	0409
F4-10	*Motor1 No-Load* (IM1 no-load current)	0.00A ... setting value of F4-07	Machine type determination	★	040A
F4-11	*Motor1 Rs* (IM1 stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	040B
F4-12	*Motor1 Rr* (IM1 rotor resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	040C
F4-13	*Motor1 Lm* (IM1 mutual inductance)	0.0mH ... 6553.5mH	Machine type determination	★	040D
F4-14	*Motor1 Lx* (IM1 leakage inductance)	0.00mH ... 655.35mH	Machine type determination	★	040E
F4-15	*PM Rated Power* (PM rated power)	0.00kW ... 655.35kW	Machine type determination	★	040F
F4-16	*PM Pole number* (PM number of poles)	0 ... 65535	Machine type determination	★	0410
F4-17	*PM Rated Current A* (PM rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Confirmation of F4-15	★	0411
F4-18	*PM Rated RPM* (PM rated speed)	0rpm ... 65535rpm	Confirmation of F4-15	★	0412

Parameter group *F4: Motor Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F4-19	*PM Inertia* (PM motor inertia)	0.0kgm2 ... 6553.5kgm2	Machine type determination	★	0413
F4-20	*PM Rs* (PM stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	0414
F4-21	*PM Ld* (PM d-axis inductance)	0.00mH ... 655.35mH	Machine type determination	★	0415
F4-22	*PM Lq* (PM q-axis inductance)	0.00mH ... 655.35mH	Machine type determination	★	0416
F4-23	*PM Ke Coefficient V* (PM Ke parameters)	0V ... 65535V	Machine type determination	★	0417
F4-24	*Pmotor Bemf coff* (PM back electromotive force coefficient)	0.0 ... 6553.5	Machine type determination	★	0418
F4-25	*PM TUN I LEVEL* (PM identification current threshold)	0.00% ... 100.00%	Machine type determination	☆	0419
F4-26	*PM Magnetic ANGl DEG* (PM pole angle)	0.0DEG ... 360.0DEG	Machine type determination	★	041A
F4-27	*Encoder Type* (Encoder type selection)	0 = No PG card 1 = ABZ encoder 2 = Reserved 3 = Resolver	0	★	041B
F4-28	*Encoder Pulse* (Encoder pulse count)	6ppr ... 20000ppr	600ppr	★	041C
F4-29	*Encoder Signal* (Pulse input type)	0 = No function 1 = Phase A leading Phase B indicates forward rotation 2 = Phase B leading Phase A indicates forward rotation 3 = Phase A pulse, Phase B direction HL 4 = Phase A pulse, Phase B direction LH 5 = Single-phase input	0	★	041D
F4-30	*REF Pulse Signal* (Reference pulse input type)	0 = No function 1 = Phase A leading Phase B indicates forward rotation 2 = Phase B leading Phase A indicates forward rotation 3 = Phase A pulse, Phase B direction HL 4 = Phase A pulse, Phase B direction LH 5 = Single-phase input	0	★	041E
F4-31	*PG Scale Factor* (Frequency output setting)	1 ... 255	1	☆	041F
F4-32	*RESOV pole pairs* (Rotary encoder's number of pole pairs)	1 ... 50	1	★	0420
F4-33	*PG Digital LPF* (PG digital filter value)	0CNT ... 65535CNT	100CNT	★	0421
F4-34	*PGFBK Hi SPD* (PG feedback high-speed filter)	0Hz ... 2000Hz	100Hz	☆	0422
F4-35	*PGFBK Lo SPD LPF Hz* (PG feedback low-speed filter)	0Hz ... 2000Hz	50Hz	☆	0423
F4-36	*PM MECH Gear A1* (Load side gear A1)	1 ... 65535	100	☆	0424
F4-37	*PM MECH Gear B1* (Load side gear B1)	1 ... 65535	100	☆	0425
F4-38	*PM MECH Gear A2* (Load side gear A2)	1 ... 65535	100	☆	0426

Parameter group *F4: Motor Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F4-39	*PM MECH Gearr B2* (Load side gear B2)	1 ... 65535	100	☆	0427
F4-40	*Electrical Gear A* (Electronic gear A)	1 ... 65535	100	☆	0428
F4-41	*Electrical Gear B* (Electronic gear B)	1 ... 65535	100	☆	0429
F4-42	*SynRM No Load Cur A*	0.00 ... 13.00	5.20		

Tab. 5-8 Parameter list – F4: Motor Parameters

F5: INPUT TERMINALS

PARAMETER LIST

Parameter group *F5: Input Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F5-00	*DI1 Function SEL* (DI1 terminal function selection)	0 = No function 1 = Multi-stage/multi-point position 1 2 = Multi-stage/multi-point position 2 3 = Multi-stage/multi-point position 3 4 = Multi-stage/multi-point position 4 5 = Fault reset 6 = Jogging 7 = Speed pause 8 = 1-2 stage acceleration/deceleration switching 9 = 3-4 stage acceleration/deceleration switching 10 = External fault 11 = Gate blocking 12 = Stop output 13 = Automatic acceleration and deceleration disabled 15 = AI1 input frequency command 16 = AI2 input frequency command 17 = AI3 input frequency command 18 = Deceleration stop 19 = External command for frequency rise 20 = External command for frequency drop 21 = PID function disable 22 = Clear counter 23 = Input counter 24 = External forward jogging 25:External reverse jogging 26 = Torque/speed mode switching 27 = Speed loop 1/2 switch 28 = External fault free stop 31 = High torque compensation 32 = Medium torque compensation 33 = Low torque compensation 34 = Multi-stage speed/position switch 35 = Internal positioning enable 36 = Multi-point position input 37 = Pulse input position control 39 = Torque command direction switch 40 = Motor free stop 41 = Manual mode enable 42 = Automatic mode enable 43 = Frequency resolution switch 44 = NL reverse limit 45 = PL forward limit 46 = ORG homing point 47 = Home action enable 48 = Mechanical gear ratio switch 49 = VFD enable 50 = Slave dEb execution 51 = PLC SEL Bit 0 52 = PLC SEL Bit 1 53 = CANopen quick stop 54 = No Function 55 = No Function 56 = LOC/REM switch 57 = No Function ... 69 = No Function 70 = Auxiliary frequency disable 71 = PID disable, zero output 72 = PID disable, maintain output 73 = PID I gain zero	0	★	0500
F5-01	*DI2 Function SEL* (DI2 terminal function selection)		0	★	0501
F5-02	*DI3 Function SEL* (DI3 terminal function selection)		1	★	0502
F5-03	*DI4 Function SEL* (DI4 terminal function selection)		2	★	0503
F5-04	*DI5 Function SEL* (DI5 terminal function selection)		3	★	0504
F5-05	*DI6 Function SEL* (DI6 terminal function selection)		4	★	0505
F5-06	*DI7 Function SEL* (DI7 terminal function selection)		0	★	0506
F5-07	*HDI8 Func SEL* (HDI8 terminal function selection)		0	★	0507

Parameter group *F5: Input Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
		74 = PID feedback reverse 75 = No Function ... 82 = No Function 83 = Motor switch Bit0 84 = Motor switch Bit1			
F5-08	*DI CMD Control* (Terminal command mode)	0 = No function 1 = 2-wire mode 1 2 = 2-wire mode 2 3 = 3-wire mode 4 = 2-wire mode 1/quick start 5 = 2-wire mode 2/quick start 6 = 3-wire quick start	1	★	0508
F5-09	*Up/Down Key Mode* (UP/DOWN mode selection)	0 = System acceleration and deceleration time 1 = Fixed acceleration/deceleration F5-10 2 = Pulse signal F5-10 3 = External Up/Down input 4 = External Up/Down input 1	0	☆	0509
F5-10	*Up/Down Key SPD Hzms* (UP/DOWN rate of change)	0.001Hzms ... 1.000Hzms	0.001Hzms	☆	050A
F5-11	*Reserved*	0 ... 65535	0		050B
F5-12	*Reserved*	0 ... 65535	0		050C
F5-13	*Reserved*	0 ... 65535	0		050D
F5-14	*Reserved*	0 ... 65535	0		050E
F5-15	DI *Active* level (DI terminal effective logic)	0 ... 65535	0	☆	050F
F5-16	*DI Response time sec* (DI terminal response time)	0.000s ... 30.000s	0.005s	☆	0510
F5-17	*Inter ACT Mix SEL* (Virtual/real DI terminal selection)	0 ... 65535	0	☆	0511
F5-18	*Inter ACT Value* (Virtual terminal status setting)	0 ... 65535	0	☆	0512
F5-19	*Fault Reset OP* (External running selection)	0 = Invalid 1 = Run if there is a run command	0	☆	0513
F5-20	*AI1v/AI1i SEL* (AI1 signal type selection)	0 = 0-10V input selection 1 = 0-20mA input selection	0	☆	0514
F5-21	*AI1 Function Sel* (AI1 function selection)	0 = No function 1 = Frequency setting 2 = Torque setting 3 = Torque compensation setting 4 = PID target value 5 = PID feedback value 6 = Thermistor PTC input 7 = Forward torque limit 8 = Reverse torque limit 9 = Regenerative torque limit 10 = Forward/reverse torque limit 11 = Thermistor PT100 value 12 = Auxiliary frequency setting 13 = PID offset 14 = Tension PID feedback value 15 = Line speed feedback 16 = Reel diameter feedback 17 = Tension PID setting 18 = Tension setting value 19 = Zero speed tension setting 20 = Tension taper setting	1	☆	0515
F5-22	*AI1 Input Bias* (AI1 input offset voltage)	-100.0% ... 100.0%	0.0%	☆	0516

Parameter group *F5: Input Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F5-23	*AI1 Bias Mode* (AI1 offset mode selection)	0 = No offset 1 = Below offset = offset 2 = Above offset = offset 3 = Absolute value offset centered 4 = Offset centered	0	☆	0517
F5-24	*AI1 Input Gain*	-500.0% ... 500.0%	100.0%	☆	0518
F5-25	*AI1 Input LPF* (AI1 filter time)	0.00s ... 20.00s	0.01s	☆	0519
F5-26	*AI2v/AI2i SEL* (AI2 signal type selection)	0 = 0-10V input selection 1 = 0-20mA input selection	0	☆	051A
F5-27	*AI2 Function Sel* (AI2 function selection)	0 = No function 1 = Frequency setting 2 = Torque setting 3 = Torque compensation setting 4 = PID target value 5 = PID feedback value 6 = Thermistor PTC input 7 = Forward torque limit 8 = Reverse torque limit 9 = Regenerative torque limit 10 = Forward/reverse torque limit 11 = Thermistor PT100 value 12 = Auxiliary frequency setting 13 = PID offset 14 = Tension PID feedback value 15 = Line speed feedback 16 = Reel diameter feedback 17 = Tension PID setting 18 = Tension setting value 19 = Zero speed tension setting 20 = Tension taper setting	0	☆	051B
F5-28	*AI2 Input Bias* (AI2 input offset voltage)	-100.0% ... 100.0%	0.0%	☆	051C
F5-29	*AI2 Bias Mode* (AI2 offset mode selection)	0 = No offset 1 = Below offset = offset 2 = Above offset = offset 3 = Absolute value offset centered 4 = Offset centered	0	☆	051D
F5-30	*AI2 Input Gain*	-500.0% ... 500.0%	100.0%	☆	051E
F5-31	*AI2 Input LPF* (AI2 filter time)	0.00s ... 20.00s	0.01s	☆	051F
F5-32	*AI3v/AI3i SEL* (AI3 signal type selection)	0 = 0-10V input selection 1 = 0-20mA input selection	0	☆	0520
F5-33	*AI3 Function Sel* (AI3 function selection)	0 = No function 1 = Frequency setting 2 = Torque setting 3 = Torque compensation setting 4 = PID target value 5 = PID feedback value 6 = Thermistor PTC input 7 = Forward torque limit 8 = Reverse torque limit 9 = Regenerative torque limit 10 = Forward/reverse torque limit 11 = Thermistor PT100 value 12 = Auxiliary frequency setting 13 = PID offset 14 = Tension PID feedback value 15 = Line speed feedback 16 = Reel diameter feedback 17 = Tension PID setting	0	☆	0521

Parameter group *F5: Input Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
		18 = Tension setting value 19 = Zero speed tension setting 20 = Tension taper setting			
F5-34	*AI3 Input Bias* (AI3 input offset voltage)	-100.0% ... 100.0%	0.0%	☆	0522
F5-35	*AI3 Bias Mode* (AI3 offset mode selection)	0 = No offset 1 = Below offset = offset 2 = Above offset = offset 3 = Absolute value offset centered 4 = Offset centered	0	☆	0523
F5-36	*AI3 Input Gain* (AI3 positive gain)	-500.0% ... 500.0%	100.0%	☆	0524
F5-37	*AI3 Input LPF* (AI3 filter time)	0.00s ... 20.00s	0.01s	☆	0525
F5-38	*AI Bias REV Mode* (Analog frequency negative value inversion)	0 = Forward/reverse determined by operation source 1 = Forward/reverse determined by offset	0	☆	0526
F5-39	*Addition of AI* (Analog input addition enable)	0 = Disable 1 = Enable	0	☆	0527
F5-40	*Reserved* (Highest frequency 2)	0.00Hz ... 599.00Hz	60.00Hz	☆	0528
F5-41	*Reserved* (Highest frequency switch delay)	0.000s ... 65.000s	0.000s	☆	0529
F5-42	*Loss of AI Cur* (4-20mA wire break action)	0 = No wire break detection 1 = Maintain frequency before wire break 2 = Decelerate to 0Hz 3 = Immediate fault stop	0	☆	052A
F5-43	*AI Cur Loss Th* (4-20mA wire break threshold)	0.00mA ... 4.00mA	2.00mA	☆	052B

Tab. 5-9 Parameter list – F5: Input Terminals

F6: OUTPUT TERMINALS

PARAMETER LIST

Parameter group *F6: Output Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F6-00	*RY1 Function SEL* (RLY1 terminal function selection)	0 = No function 1 = VFD running 2 = Reached set speed 3 = Reached frequency 1 4 = Reached frequency 2 5 = Zero speed command running 6 = Zero speed command 7 = Over-torque threshold 1 8 = Over-torque threshold 2 9 = VFD ready complete 10 = Low voltage warning 11 = Fault indication 12 = Brake release 13 = Overheat warning 14 = Braking unit action 15 = PID deviation warning 16 = Excessive slip 17 = Set count value reached 18 = Final count value reached 19 = Base block 20 = Fault output 21 = Overvoltage 22 = Overcurrent stall prevention 23 = Overvoltage stall prevention 24 = Operation source other than operator 25 = Forward command 26 = Reverse command 29 = Above F6-08 speed value 30 = Below F6-08 speed value 31 = Motor Y connection command output 32 = Motor D connection command output 33 = Zero operating output frequency 34 = Zero output frequency 35 = Fault option 1 36 = Fault option 2 37 = Fault option 3 38 = Fault option 4 39 = Positioning complete 40 = Reached set frequency STP 41 = Multi-point position positioning complete 42 = Trolley gate opening output 43 = Above F6-09 speed 44 = Low current output 45 = UVW electromagnetic switch enable 46 = dEb action output 47 = No function 48 = No function 49 = Home action completion 50 = CANopen control output 51 = RS485 control output 52 = Communication card control output 66 = STO action output A 67 = Analog setpoint reached output 68 = STO action output B 73 = Over-torque threshold 3	11	☆	0600
F6-01	*RY2 Function SEL* (RLY2 terminal function selection)		1	☆	0601
F6-02	*DO1 Function SEL* (DO1 terminal function selection)		0	☆	0602
F6-03	*DO2 Function SEL* (DO2 terminal function selection)		0	☆	0603

Parameter group *F6: Output Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
		74 = Over-torque threshold 4 75 = Forward running status 76 = Reverse rotation running status			
F6-04	*DO Active level* (DO terminal valid logic)	0 ... 65535	0	☆	0604
F6-05	*DO by AI level* (DO output AI source)	0 = AI1 1 = AI2 2 = AI3 3 = Expansion card terminal AI10 4 = Expansion card terminal AI11	0	☆	0605
F6-06	*AI Upper Level* (DO output AI upper limit value)	-100.00% ... 100.00%	50.00%	☆	0606
F6-07	*AI Lower Level* (DO output AI lower limit value)	-100.00% ... 100.00%	10.00%	☆	0607
F6-08	*Speed Area Set* (DO action frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	0608
F6-09	*Desire RPM* (Motor zero speed judgment threshold)	0rpm ... 65535rpm	0rpm	☆	0609
F6-10	*Reserved*	0 ... 65535	0		
F6-11	*Reserved*	0 ... 65535	0		
F6-12	*Reserved*	0 ... 65535	0		
F6-13	*AO1v/AO1i SEL* (AO1 signal type selection)	0 = 0-10V output selection 1 = 0-20mA output selection	0	☆	060D
F6-14	*AO1 Function Sel* (AO1 output function selection)	0 = Output frequency 1 = Frequency command 2 = Motor running frequency 3 = Output current 4 = Output voltage 5 = DC bus voltage 6 = Power factor 7 = Power 8 = Output torque 9 = AI1 percentage 10 = AI2 percentage 11 = AI3 percentage 12 = Iq current command 13 = Iq current feedback 14 = Id current command 15 = Id current feedback 16 = Vq voltage command 17 = Vd voltage command 18 = Torque command 19 = PG2 frequency command 20 = CANopen analog output 21 = RS485 analog output 22 = Communication card analog output 23 = Fixed voltage output	0	☆	060E
F6-15	*AO1 Gain* (AO1 output gain)	0.0% ... 500.0%	100.0%	☆	060F
F6-16	*AO1 Output Mode* (AO1 reverse enable)	0 = Absolute value output 1 = Negative value output as 0V 2 = 5V as center point	0	☆	0610
F6-17	*AO1 Output Bias* (AO1 output offset)	-100.00% ... 100.00%	0.00%	☆	0611
F6-18	*AO1 OUT-LEVEL* (AO1 output fixed value)	0.00% ... 100.00%	0.00%	☆	0612
F6-19	*AO1 Output LPF*	0.00s ... 20.00s	0.01s	☆	0613

Parameter group *F6: Output Terminals*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(AO1 filter time)				
F6-20	*AO2v/AO2i SEL* (AO2 signal type selection)	0 = 0-10V output selection 1 = 0-20mA output selection	0	☆	0614
F6-21	*AO2 Function Sel* (AO2 output function selection)	0 = Output frequency 1 = Frequency command 2 = Motor running frequency 3 = Output current 4 = Output voltage 5 = DC bus voltage 6 = Power factor 7 = Power 8 = Output torque 9 = AI1 percentage 10 = AI2 percentage 11 = AI3 percentage 12 = Iq current command 13 = Iq current feedback 14 = Id current command 15 = Id current feedback 16 = Vq voltage command 17 = Vd voltage command 18 = Torque command 19 = PG2 frequency command 20 = CANopen analog output 21 = RS485 analog output 22 = Communication card analog output 23 = Fixed voltage output	0	☆	0615
F6-22	*AO2 Gain* (AO2 output gain)	0.0% ... 500.0%	100.0%	☆	0616
F6-23	*AO2 Output Mode* (AO2 reverse enable)	0 = Absolute value output 1 = Negative value output as 0V 2 = 5V as center point	0	☆	0617
F6-24	*AO2 Output Bias* (AO2 output offset)	-100.00% ... 100.00%	0.00%	☆	0618
F6-25	*AO2 OUT-LEVEL* (AO2 output fixed value)	0.00% ... 100.00%	0.00%	☆	0619
F6-26	*AO2 Output LPF* (AO2 filter time))	0.00s ... 20.00s	0.01s	☆	061A
F6-27	*Desire FREQ-1* (Frequency reach 1 detection value)	0.00Hz ... 599.00Hz	50.00Hz	☆	061B
F6-28	*Desire FREQ1 BND Hz* (Frequency reach 1 amplitude)	0.00Hz ... 599.00Hz	2.00Hz	☆	061C
F6-29	*Desire FREQ-2* (Frequency reach 2 detection value)	0.00Hz ... 599.00Hz	50.00Hz	☆	061D
F6-30	*Desire FREQ2 BND Hz* (Frequency reach 2 amplitude)	0.00Hz ... 599.00Hz	2.00Hz	☆	061E

Tab. 5-10 Parameter list – F6: Output Terminals

F7: AUXILIARY FUNCTIONS AND KEYPAD DISPLAY

PARAMETER LIST

Parameter group *F7: Auxiliary Functions and Keypad Display*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F7-00	*JOG Frequency* (JOG frequency setting)	0.00Hz ... 599.00Hz	6.00Hz	☆	0700
F7-01	*JOG ACC Time* (JOG acceleration time)	0.00s ... 600.00s	10.00s	☆	0701
F7-02	*JOG DEC Time* (JOG deceleration time)	0.00s ... 600.00s	10.00s	☆	0702
F7-03	*2nd ACC Time* (Acceleration time 2)	0.00s ... 600.00s	Machine type determination	☆	0703
F7-04	*2nd DEC Time* (Deceleration time 2)	0.00s ... 600.00s	Machine type determination	☆	0704
F7-05	*3rd ACC Time* (Acceleration time 3)	0.00s ... 600.00s	Machine type determination	☆	0705
F7-06	*3rd DEC Time* (Deceleration time 3)	0.00s ... 600.00s	Machine type determination	☆	0706
F7-07	*4th ACC Time* (Acceleration time 4)	0.00s ... 600.00s	Machine type determination	☆	0707
F7-08	*4th DEC Time* (Deceleration time 4)	0.00s ... 600.00s	Machine type determination	☆	0708
F7-09	*Skip FREQ 1UP* (Skip frequency 1 upper limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	0709
F7-10	*Skip FREQ 1Low Hz* (Skip frequency 1 lower limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	070A
F7-11	*Skip FREQ 2Up* (Skip frequency 2 upper limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	070B
F7-12	*Skip FREQ 2Low Hz* (Skip frequency 2 lower limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	070C
F7-13	*Skip FREQ 3UP* (Skip frequency 3 upper limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	070D
F7-14	*Skip FREQ 3Low Hz* (Skip frequency 3 lower limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	070E
F7-15	*PM Up Skip Freq Hz* (Skip frequency 4 upper limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	070F
F7-16	*PM Low Skip Freq Hz* (Skip frequency 4 lower limit)	0.00Hz ... 599.00Hz	0.00Hz	☆	0710
F7-17	*Cooling Fan Way* (Fan control method)	0 = Continuous fan operation 1 = 1 minute stop after shutdown 2 = Stops with the VFD 3 = Starts at 50°C temperature 4 = Stop below 50°C when off	4	☆	0711
F7-18	*Reserved*	0% ... 100%	60%	☆	0712
F7-19	*KPD STOP EN ABLE* (Keyboard STOP key Enable)	0 = Disable 1 = Enable	0	☆	0713
F7-20	*Start up Display* (Startup screen selection)	0 = Setting frequency display 1 = Output frequency display 2 = User-defined display 3 = Output current display	0	☆	0714
F7-21	*User Display* (Page display selection)	0 = Output current 1 = PG card feedback frequency 2 = Actual motor running frequency 3 = DC bus voltage 4 = Output voltage 5 = Power factor	3	☆	0715

Parameter group *F7: Auxiliary Functions and Keypad Display*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
		6 = Output power 7 = Actual motor running speed 8 = Output torque % 9 = PG feedback value 10 = PID feedback value % 11 = AI1 % 12 = AI2 % 13 = AI3 % 14 = IGBT temperature 15 = Ambient temperature 16 = Digital input terminal status 17 = Digital output terminal status 18 = Multi-speed status 19 = CPU input terminal status 20 = CPU output terminal status 21 = Actual motor position 22 = Pulse input frequency value 23 = Pulse input position 24 = Position tracking error 25 = Overload count value 26 = Ground short-circuit current threshold 27 = Bus voltage fluctuation value 29 = PM motor magnetic pole sector 30 = User physical quantity 31 = H-page value multiplied by coefficient K 32 = Encoder Z phase count 33 = Motor pulse count 34 = Reserved 35 = Speed/torque mode 36 = Current carrier frequency 37 = Reserved 38 = VFD status 39 = Output torque Nt-m 40 = Torque command 41 = kWh 42 = PID target value 43 = PID compensation 44 = PID output frequency 45 = Reserved 46 = Auxiliary frequency 47 = Main frequency 48 = Set frequency display 49 = Reserved 50 = Reserved 51 = PMVVC torque compensation amount 52 = AI10 % 53 = AI11 % 54 = Reserved 55 = Current coil diameter 56 = Current line speed 57 = Tension reference value 58 = MI6 count value 59 = U phase current AD value 60 = V-phase current AD value 61 = W phase current AD value			
F7-22	*H page scale* (H page display gain)	0.00 ... 160.00	0.00	☆	0716
F7-23	*Reserved*	0 = Setting frequency display 1 = Output frequency display 2 = User-defined display	0	☆	0717
F7-24	*FDM Gain* (Display frequency gain)	1 ... 55	1	☆	0718
F7-25	*IGBT OH Offset* (IGBT temperature offset)	0.0°C ... 6553.5°C	0.0°C	☆	0719

Parameter group *F7: Auxiliary Functions and Keypad Display*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F7-26	*Power on Counter* (Cumulative power-on count)	0 ... 65535	0	●	071A
F7-27	*Power on Timer* (Cumulative power-on days)	0 ... 65535	0	●	071B
F7-28	*Power on Timer* (Cumulative power-on minutes)	0 ... 1439	0	●	071C
F7-29	*Additive Run Day day* (Cumulative running days)	0 ... 65535	0	●	071D
F7-30	*Additive Run Min min* (Cumulative running minutes)	0 ... 65535	0	●	071E
F7-31	*Accumul Run Hour min* (Motor running time)	0min ... 1439min	0min	☆	071F
F7-32	*Accumul Run-day day* (Motor running days)	0 ... 65535	0	☆	0720
F7-33	*Password Decoder* (Password entry)	0 ... 65535	0	☆	0721
F7-34	*Password Input* (Password setting)	0 ... 65535	0	☆	0722
F7-35	*PowerSave Enable* (Automatic energy saving setting)	0 = Disable 1 = Enable	0	☆	0723
F7-36	*PowerSave Gain* (Energy saving gain)	10 ... 1000	100	☆	0724
F7-37	*Auto Voltage REG* (Automatic voltage regulation)	0 = Activate AVR function 1 = Cancel AVR function 2 = Cancel AVR during deceleration	0	☆	0725
F7-38	*LPF of AMPS Disp sec* (Current display filter)	0.001s ... 65.535s	0.100s	☆	0726
F7-39	*LPF of Display* (Display filter time)	0.001s ... 65.535s	0.100s	☆	0727
F7-40	*SW-RLY Delay CNT* (Soft start switch delay time)	0 ... 65535	7000	☆	0728
F7-41	*OutFreq Dev Band* (Running frequency deviation dead zone)	0.00 ... 599.00	0.00	☆	0729
F7-42	*Rn Dir Toggle* (Output phase sequence switching)	0 = Output phase sequence switching 1 = Output phase sequence switching	0	☆	072A
F7-43	*User COEFF ATT* (User-defined attribute)	0 ... 65535	0	☆	072B
F7-44	*User COEFF MAX* (User-defined maximum value)	0 ... 65535	0	☆	072C
F7-45	*User COEFF SET* (User-defined content value)	0	0	★	072D
F7-46	*Quick Stop Time sec* (CANopen quick stop time)	0.00s ... 600.00s	1.00s	☆	072E
F7-47	*Y-D Switch Hz* (Y-D switching frequency)	0.00Hz ... 599.00Hz	60.00Hz	☆	072F
F7-48	*Y-D Switch SEL* (Y-D switching enable)	0 = Disable 1 = Enable	0	☆	0730
F7-49	*Y-D Switch Delay sec* (Y-D switching time)	0.000s ... 60.000s	0.200s	☆	0731
F7-50	*ICT Testing* (ICT test exclusive)	0 ... 65535	0	☆	0732
F7-51	*MC Check CNT* (Electromagnetic switch check	0 ... 65535	200	☆	0733

Parameter group *F7: Auxiliary Functions and Keypad Display*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	value)				
F7-52	*W-sec Low word* (W-sec low byte)	0.0 ... 6553.5	0.0	●	0734
F7-53	*W-sec High word Wsec* (W-sec high byte)	0.0 ... 6553.5	0.0	●	0735
F7-54	*W-hours* (W-hrs)	0.0 ... 6553.5	0.0	●	0736
F7-55	*kWh Low word* (kWh low byte)	0.0 ... 6553.5	0.0	●	0737
F7-56	*kWh High word* (kWh high byte)	0.0 ... 6553.5	0.0	●	0738
F7-57	*Firmware Version* (Software version (H))	0.00 ... 655.35	\	●	0739
F7-58	S/W 2nd Version (Software version (L))	0.00 ... 655.35	\	●	073A
F7-59	*Date Code* (Software release date)	0 ... 65535	\	●	073B
F7-60	*PG Card Version* (PG card software version)	0.00 ... 655.35	0.00	●	073C
F7-61	*Para Display sel* (Enhanced parameter display selection)	0 ... 1	1	☆	073D

Tab. 5-11 Parameter list – F7: Auxiliary Functions and Keypad Display

F8: COMMUNICATION

PARAMETER LIST

Parameter group *F8: Communication*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F8-00	*MODBUS Baud Rate kbps*	4.8kbps ... 115.2kbps	115.2kbps	☆	0800
F8-01	*MODBUS Protocol* (Communication data format)	0 = 7,N,1 for ASCII 1 = 7,N,2 for ASCII 2 = 7,E,1 for ASCII 3 = 7,O,1 for ASCII 4 = 7,E,2 for ASCII 5 = 7,O,2 for ASCII 6 = 8,N,1 for ASCII 7 = 8,N,2 for ASCII 8 = 8,E,1 for ASCII 9 = 8,O,1 for ASCII 10 = 8,E,2 for ASCII 11 = 8,O,2 for ASCII 12 = 8,N,1 for RTU 13 = 8,N,2 for RTU 14 = 8,E,1 for RTU 15 = 8,O,1 for RTU 16 = 8,E,2 for RTU 17 = 8,O,2 for RTU	12	☆	0801
F8-02	*LMVF Com Address* (Communication address)	1 ... 254	1	☆	0802
F8-03	*Response Delay Tms*	0.0ms ... 200.0ms	2.0ms	☆	0803
F8-04	*MODBUS TimeOut sec* (Communication timeout time)	0.0s to 100.0s	0.0s	☆	0804
F8-05	*MODBUS Fault Way* (Communication error handling)	0 = Warning and continue running 1 = Warn and decelerate to stop 2 = Warn and free stop 3 = No warning	3	☆	0805
F8-06	*Comm Main FREQ* (Communication set frequency)	0.00Hz ... 599.00Hz	50.00Hz	●	0806
F8-07	*Com Decode* (Communication decoding method)	0 = Use 20XX 1 = Use 60XX	1	☆	0807
F8-08	*Com Protocol* (Communication format)	0 = Modbus 485 1 = Internal_communication_slave 1 2 = Internal_communication_slave 2 3 = Internal_communication_slave 3 4 = Internal_communication_slave 4 5 = Internal_communication_slave 5 6 = Internal_communication_slave 6 7 = Internal_communication_slave 7 8 = Internal_communication_slave 8 9 = Reserved 10 = Internal_communication_master 11 = Reserved	0	☆	0808
F8-09	*C_Card Type* (Communication card type)	0 = No communication card 1 = DeviceNet 2 = Profibus-DP 3 = CANopen 4 = Modbus-TCP 5 = EtherNet/IP 6 = EtherCAT 7 = LonWorks 8 = BACNet 9 = Reserved 10 = 24V Power Supply 11 = DMCnet 12 = PROFINET	0	●	0809

Parameter group *F8: Communication*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F8-10	*C_Card Version* (Communication card version)	0 ... 65535	0	●	080A
F8-11	*C_Card ID ADS* (Communication card address)	0 ... 65535	0	●	080B
F8-12	*C_Card Rate* (Communication card rate)	0 ... 65535	0	☆	080C
F8-13	*C_Card Rate Eset* (Rate enable setting)	0 ... 65535	0	☆	080D
F8-14	*CANopen Node Ads* (CANopen node address)	0 ... 127	0	☆	080E
F8-15	*CAN bus Rate* (CAN bus communication rate)	0 = 1Mbps 1 = 500kbps 2 = 250kbps 3 = 125kbps 4 = 100kbps 5 = 50kbps	0	☆	080F
F8-16	*CAN Ext Set*	0 ... 65535	2	☆	0810
F8-17	*CAN Ext Set*	0.00 ... 2.00	1.00	☆	0811
F8-18	*CANopen Warn* (CANopen warning log)	0 ... 65535	0	●	0812
F8-19	*CiA 402 Decode* (CiA402 protocol selection)	0 = Disable 1 = Enable	0	☆	0813
F8-20	*CANopen State* (CANopen communication status)	0 = Node reset status 1 = Communication reset status 2 = Reset complete status 3 = Pre-operational status 4 = Operational status 5 = Stopped status	0	●	0814
F8-21	*CiA402 FSM State* (CiA402 operating status)	0 = Start-up not yet complete status 1 = Run disabled status 2 = Pre-excitation status 3 = Excitation status 4 = Operation enabled status 5 = No function 6 = No function 7 = Quick stop action status 8 = No function 9 = No function 10 = No function 11 = No function 12 = No function 13 = Trigger error action status 14 = Already in error status	0	●	0815
F8-22	*RST CANOp IDX* (CANopen index reset)	0 ... 65535	65535	☆	0816
F8-23	*CANOp ERR Status* (CANopen fault status)	0 ... 65535	0	●	0817
F8-24	*C_Card P Code* (Product code)	0 ... 65535	0	●	0818
F8-25	*C_Card Err Code* (Error code)	0 ... 65535	0	●	0819
F8-26	*C_Card IP CONF* (Communication card DHCP enable)	0 ... 1	0	☆	081A
F8-27	*C_Card IP ADS1* (Communication card IP 1)	0 ... 255	0	☆	081B
F8-28	*C_Card IP ADS2* (Communication card IP 2)	0 ... 255	0	☆	081C

Parameter group *F8: Communication*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F8-29	*C_Card IP ADS3* (Communication card IP 3)	0 ... 255	0	☆	081D
F8-30	*C_Card IP ADS4* (Communication card IP 4)	0 ... 255	0	☆	081E
F8-31	*C_Card IP MASK ADS1* (Communication card mask 1)	0 ... 255	0	☆	081F
F8-32	*C_Card IP MASK ADS2* (Communication card mask 2)	0 ... 255	0	☆	0820
F8-33	*C_Card IP MASK ADS3* (Communication card mask 3)	0 ... 255	0	☆	0821
F8-34	*C_Card IP MASK ADS4* (Communication card mask 4)	0 ... 255	0	☆	0822
F8-35	*C_Card Gway ADS1* (Communication card gateway 1)	0 ... 255	0	☆	0823
F8-36	*C_Card Gway ADS2* (Communication card gateway 2)	0 ... 255	0	☆	0824
F8-37	*C_Card Gway ADS3* (Communication card gateway 3)	0 ... 255	0	☆	0825
F8-38	*C_Card Gway ADS4* (Communication card gateway 4)	0 ... 255	0	☆	0826
F8-39	*C_Card Pssword L* (Communication card low byte password)	0 ... 99	0	☆	0827
F8-40	*C_Card Pssword H* (Communication card upper byte password)	0 ... 99	0	☆	0828
F8-41	*C_Card RECOV* (Communication card reset)	0 ... 65535	0	☆	0829
F8-42	*C_Card EXT SET* (Communication card setting)	0 ... 65535	0	☆	082A
F8-43	*C_Card Status* (Communication card status)	0 ... 65535	0	●	082B
F8-44	*Reserved*	0 = Disable 1 = Enable	0	☆	082C
F8-45	*Reserved*	0 ... 127	100	☆	082D
F8-46	*Reserved*	0 ... 65535	0	●	082E
F8-47	*Reserved*	0 ... 65535	1	☆	082F
F8-48	*CommCard Test Pr* (Communication card commissioning parameters)	0 ... 65535	0	☆	0830

Tab. 5-12 Parameter list – F8: Communication

F9: PROTECTION & FAULTS

PARAMETER LIST

Parameter group *F9: Protection & Faults*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
F9-00	*Protect Bit* (Protection control bit)	0 ... 65535	0	☆	0900
F9-01	*Thermal RLY1 SEL* (Motor 1 overload protection)	0 = Constant torque output motor 1 = Variable torque output motor 2 = No motor overload protection	2	☆	0901
F9-02	*Thermal RLY1 T* (Motor 1 overload time)	30.0s ... 600.0s	60.0s	☆	0902
F9-03	*STALL V MODE* (Overvoltage stall mode)	0 = Overvoltage stall mode 0 1 = Overvoltage stall mode 1	1	☆	0903
F9-04	*OV STALL Vlt LvlV* (Overvoltage stall threshold)	0.0V ... 900.0V	760.0V	☆	0904
F9-05	*STALL V DEC Time sec* (Overvoltage stall deceleration time)	0.00s ... 655.35s	600.00s	☆	0905
F9-06	*Lux Auto Reset* (Undervoltage fault auto clear)	0 = Disable 1 = Enable	0	☆	0906
F9-07	*Current Limit* (Maximum current limit)	0% ... 250%	150%	☆	0907
F9-08	*OCA Cur Level* (OC stall threshold during acceleration)	0% ... 200%	180%	☆	0908
F9-09	*Stall Level Limit%* (Overcurrent stall limit threshold)	0% ... 100%	100%	☆	0909
F9-10	*OCN Level* (OC stall threshold during operation)	0% ... 200%	180%	☆	090A
F9-11	*Stall ACCDEC SEL* (Constant speed OC acceleration and deceleration selection)	0 = System acceleration and deceleration time 1 = First acceleration and deceleration time 2 = Second acceleration and deceleration time 3 = Third acceleration and deceleration time 4 = Fourth acceleration and deceleration time 5 = Automatic acceleration and deceleration time	0	☆	090B
F9-12	*IN-PHL Act sel* (Input phase loss action selection)	0 = Warning and decelerate to stop 1 = Warning and coast to stop	0	☆	090C
F9-13	*IN-PHL LPF* (Input phase loss filter time)	0.00s ... 600.00s	0.20s	☆	090D
F9-14	*PHL Vdc-Ripple %Vdc* (Input phase loss voltage threshold)	0.0V ... 320.0V	60.0V	☆	090E
F9-15	*Out-PHL Act sel* (Output phase loss action selection)	0 = Warning and continue running 1 = Warn and decelerate to stop 2 = Warn and free stop 3 = No warning	3	☆	090F
F9-16	*OPL Detection T sec* (Output phase loss detection time)	0.000s ... 65.535s	0.500s	☆	0910
F9-17	*OPL Curren Band %* (Output phase loss current threshold)	0.00% ... 100.00%	2.00%	☆	0911
F9-18	*DCI Time for OPL sec* (Output phase loss braking time)	0.000s ... 65.535s	0.000s	☆	0912
F9-19	*Before Run CNTS* (Ground fault test count)	1 ... 20	10	☆	0913
F9-20	*GFF Detect Level%* (GFF current threshold)	0.0% ... 6553.5%	60.0%	☆	0914
F9-21	*GFF LPF Gain*	0.00s ... 655.35s	0.10s	☆	0915

	(GFF filter time)				
F9-22	*Under AMP Level %* (Low current setting threshold)	0.0% ... 100.0%	0.0%	☆	0916
F9-23	*Under AMP DET* (Low current detection time)	0.00s ... 360.00s	0.00s	☆	0917
F9-24	*Under AMP TRET* (Low current action mode)	0 = No function 1 = Alarm and coast to stop 2 = Alarm and second deceleration to stop 3 = Alarm and continue operation	0	☆	0918
F9-25	*Slip Deviation L%* (Excessive slip detection value)	0.0% ... 100.0%	0.0%	☆	0919
F9-26	*Slip Deviation T sec* (Excessive slip detection time)	0.0s ... 10.0s	1.0s	☆	091A
F9-27	*Over Slip Way* (Excessive slip action selection)	0 = Warning and continue running 1 = Warn and decelerate to stop 2 = Warn and free stop 3 = No warning	0	☆	091B
F9-28	*PG FBK Loss Way* (PG feedback error action)	0 = Warn and continue running 1 = Warning and decelerate to stop 2 = Warning and free stop	2	☆	091C
F9-29	*PG FBK Loss Det.sec* (PG feedback error time)	0.0s ... 10.0s	1.0s	☆	091D
F9-30	*OverSPD Level* (PG feedback overspeed threshold)	0% ... 120%	115%	☆	091E
F9-31	*OverSPD DET Time sec* (PG feedback overspeed time)	0.0s ... 2.0s	0.1s	☆	091F
F9-32	*OverSPD Treat* (PG feedback overspeed action)	0 = Warn and continue running 1 = Warning and decelerate to stop 2 = Warning and free stop	2	☆	0920
F9-33	*Deviation Level %* (PG feedback deviation range)	0% ... 50%	50%	☆	0921
F9-34	*Deviation DET* (PG feedback deviation time)	0.0s ... 10.0s	0.5s	☆	0922
F9-35	*Deviation Treat* (PG feedback deviation action)	0 = Warn and continue running 1 = Warning and decelerate to stop 2 = Warning and free stop	2	☆	0923
F9-36	*Over TQC1 Method* (Over-torque selection 1)	0 = Detection disabled 1 = Detection when n = n* & continue operation 2 = Detection when n = n* & Stop 3 = Detection when run & continue operation 4 = Detection when run & Stop	0	☆	0924
F9-37	*Over TQC1 Level %* (Over-torque threshold 1)	10% ... 250%	120%	☆	0925
F9-38	*Over TQC1 Time* (Over-torque time 1)	0.1s ... 60.0s	0.1s	☆	0926
F9-39	*Reserved*	0 ... 65535	0	●	0927
F9-40	*Reserved*	0 ... 65535	0	★	0928
F9-41	*Reserved* (Over temperature warning threshold)	0.0℃ ... 110.0℃	90.0℃	☆	0929
F9-42	*Reserved* (dEb deceleration voltage kp)	0 ... 65535	8	☆	092A
F9-43	*Reserved* (dEb deceleration voltage kd)	0 ... 65535	5	☆	092B
F9-44	*Reserved* (dEb deceleration current kp)	0 ... 65535	8000	☆	092C
F9-45	*Reserved* (dEb deceleration current ki)	0 ... 65535	150	☆	092D

F9-46	*Auto Restart* (Abnormal start count)	0 ... 10	0	☆	092E
F9-47	*Reset Restart CNT sec* (Abnormal restart reset time)	0.0s ... 6000.0s	60.0s	☆	092F
F9-48	*PTC Treatments* (PTC action selection)	0 = Warn and continue running 1 = Warn and decelerate to stop 2 = Warn and free stop 3 = No warning	0	☆	0930
F9-49	*PTC Level* (PTC threshold)	0.0% ... 100.0%	50.0%	☆	0931
F9-50	*PT DET LEVEL 1* (PT detection threshold 1)	0.000V ... 10.000V	5.000V	☆	0932
F9-51	*PT DET LEVEL 2* (PT detection threshold 2)	0.000V ... 10.000V	7.000V	☆	0933
F9-52	*PT DROP FREQ* (PT voltage 1 protection frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	0934
F9-53	*PT TREAT DELAY* (PT action delay time)	0s ... 6000s	60s	☆	0935
F9-54	*STO Latch Func.* ("Safe Torque Off (STO)" lock function)	0 = Locked 1 = Unlocked	0	☆	0936
F9-55	*Reserved*	0 ... 65535	40	☆	0937
F9-56	*Reserved* (Internal fault delay 1)	3 ... 3000	50	☆	0938
F9-57	*DCI OPL Cur Band%* (Output phase loss threshold 2)	0.00% ... 100.00%	2.00%	☆	0939
F9-58	*OV Stall Ret Lvl V* (Overvoltage stall recovery threshold)	0.0V ... 900.0V	630.0V	☆	093A

Tab. 5-13 Parameter list – F9: Protection & Faults

FA: PID CONTROL

PARAMETER LIST

Parameter group *FA: PID Control*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FA-00	*PID FBK SEL* (PID feedback type selection)	0 = No function 1 = Negative feedback analog input 2 = Negative feedback pulse non-directional 3 = Negative feedback pulse directional 4 = Positive feedback pulse input 5 = Positive feedback pulse non-directional 6 = Positive feedback pulse directional 7 = Negative feedback communication input 8 = Positive feedback communication input	0	☆	0A00
FA-01	*PID REF SEL* (PID setpoint source selection)	0 = Frequency command 1 = Parameter FA-02 2 = RS485 communication 3 = Analog input 4 = CANopen 5 = Reserved 6 = Communication card	0	☆	0A01
FA-02	*PID REF%* (PID setting value)	-100.00% ... 100.00%	50.00%	☆	0A02
FA-03	*PID COMM ACC/DEC sec* (PID setting change time)	0.00s ... 655.35s	0.00s	☆	0A03
FA-04	*PID FBK Filter* (PID feedback filter time)	0.1s ... 300.0s	5.0s	☆	0A04
FA-05	*P Gain of PID* (Proportional coefficient 1)	0.00% ... 100.00%	88.00%	☆	0A05
FA-06	*I Gain of PID* (Integral time 1)	0.00s ... 100.00s	0.05s	☆	0A06
FA-07	*D Gain of PID* (Derivative time 1)	0.00s ... 1.00s	0.00s	☆	0A07
FA-08	*P Gain2 of PID* (Proportional coefficient 2)	0.00 ... 100.00	100.00	☆	0A08
FA-09	*I Gain2 of PID* (Integral time 2)	0.00s ... 100.00s	0.08s	☆	0A09
FA-10	*D Gain2 of PID* (Derivative time 2)	0.00s ... 1.00s	0.00s	☆	0A0A
FA-11	*PID Mode* (PID series-parallel selection)	0 = Kp, Kp*Ki, Kp*Kd 1 = Kp, Ki, Kd	1	☆	0A0B
FA-12	*PID CTRL SEL* (PID control execution cycle)	0 ... 1	0	☆	0A0C
FA-13	*PID Gain2 Sel* (PID parameter switching condition)	0 = No function 1 = Switch based on output frequency 2 = Switch based on PID deviation	0	☆	0A0D
FA-14	*PID Gain2 Err1* (PID parameter switch err1)	0.00% ... 100.00%	10.00%	☆	0A0E
FA-15	*PID Gain2 Err2* (PID parameter switch err2)	0.00% ... 100.00%	40.00%	☆	0A0F
FA-16	*Rev After Start sec* (Allowable PID reversal delay)	0.0s ... 6553.5s	0.0s	☆	0A10
FA-17	*PID Reserve* (PID direction change selection)	0 = Disable 1 = Enable	0	☆	0A11
FA-18	*FBK Slope* (Feedback inhibition deviation rate)	0% ... 65535%	10%	☆	0A12
FA-19	*FBK Slope Gain* (Feedback inhibition gain)	0 ... 1000	800	☆	0A13

Parameter group *FA: PID Control*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FA-20	*PID Offset Way* (PID compensation selection)	0 = Parameter setting 1 = Analog input	0	☆	0A14
FA-21	*PID Offset* (PID compensation value)	-100.0 ... 100.0	0.0	☆	0A15
FA-22	*PID out Band* (PID dead zone limit)	0.00% ... 100.00%	0.06%	☆	0A16
FA-23	*PID Hold by Err %* (PID control deviation limit)	0.00% ... 100.00%	0.00%	☆	0A17
FA-24	*I Gain Disable* (Integral separation level)	0.00% ... 100.00%	0.00%	☆	0A18
FA-25	*Up Limit for I* (Integral upper limit)	0.00% ... 100.00%	100.0%	☆	0A19
FA-26	*I Limit for Wake%* (Wake-up integral limit)	0.0% ... 200.0%	50.0%	☆	0A1A
FA-27	*AUX PID REV* (Main-auxiliary inversion cut-off frequency)	0.00% ... 100.00%	10.0%	☆	0A1B
FA-28	*PID Out-Limit % %* (PID output forward limit)	0.00% ... 100.00%	100.0%	☆	0A1C
FA-29	*PID Neg.Out Limit%%* (PID output reverse limit)	0.00% ... 100.00%	100.0%	☆	0A1D
FA-30	*PID Base SEL* (PID output frequency reference)	0 ... 1	0	☆	0A1E
FA-31	*PID Out-Filter* (PID output filtering time)	0.0s ... 2.5s	0.0s	☆	0A1F
FA-32	*PID Enable Level%* (Soft start-PID switching value)	0.00% ... 100.00%	5.00%	☆	0A20
FA-33	*Smart Start Freq Hz* (Soft start frequency)	0.00Hz ... 599.00Hz	0.00Hz	☆	0A21
FA-34	*Smart Start Acc sec* (Soft start acceleration time)	0.00s ... 600.00s	3.00s	☆	0A22
FA-35	*Emp Reel Current A* (No-load current)	0.00A ... 655.35A	0.00A	☆	0A23
FA-36	*SmSt Acc Adjust sec* (Soft start acceleration step)	0.00s ... 600.00s	0.10s	☆	0A24
FA-37	*FUZZY PID Enable* (Fuzzy PID tuning enable)	0 = Fuzzy PID tuning disable 1 = Fuzzy PID tuning enable	1	☆	0A25
FA-38	*FUZZY ERR NB* (Deviation fuzzy domain-NB)	0.00 ... 100.00	5.00	☆	0A26
FA-39	*FUZZY ERR NS* (Deviation fuzzy domain-NS)	0.00 ... 100.00	2.00	☆	0A27
FA-40	*FUZZY ERR PS* (Deviation fuzzy domain-PS)	0.00 ... 100.00	2.00	☆	0A28
FA-41	*FUZZY ERR PB* (Deviation fuzzy domain-PB)	0.00 ... 100.00	5.00	☆	0A29
FA-42	*FUZZY D-ERR NB* (Deviation rate fuzzy domain-NB)	0.00 ... 100.00	10.00	☆	0A2A
FA-43	*FUZZY D-ERR NS* (Deviation rate fuzzy domain-NS)	0.00 ... 100.00	5.00	☆	0A2B
FA-44	*FUZZY D-ERR PS* (Deviation rate fuzzy domain-PS)	0.00 ... 100.00	5.00	☆	0A2C
FA-45	*FUZZY D-ERR PB* (Deviation rate fuzzy domain-PB)	0.00 ... 100.00	10.00	☆	0A2D
FA-46	*FUZZY RULE SEL*	0 ... 3	2	☆	0A2E

Parameter group *FA: PID Control*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Fuzzy PID inference rules)				
FA-47	*FUZZY MID KP* (Fuzzy rule midpoint value KP)	0 ... 100	50	☆	0A2F
FA-48	*FUZZY MID KI* (Fuzzy rule midpoint value KI)	0 ... 100	50	☆	0A30
FA-49	*FBK Detec Time sec* (Feedback anomaly detection time)	0.0s ... 3600.0s	0.0s	☆	0A31
FA-50	*PID FBK Loss* (Feedback disconnection action selection)	0 = Warn and continue running 1 = Warning and decelerate to stop 2 = Warning and free stop 3 = Operate at the frequency before disconnection	0	☆	0A32
FA-51	*PID DEV. Level* (PID feedback abnormal deviation)	1.0% ... 50.0%	10.0%	☆	0A33
FA-52	*PID DEV. Time* (Deviation anomaly detection time)	0.1s ... 300.0s	5.0s	☆	0A34
FA-53	*PID CTRL BIT* (PID control flag)	0 ... 65535	2	☆	0A35

Tab. 5-14 Parameter list – FA: PID Control

FB: TENSION CONTROL PARAMETERS

PARAMETER LIST

Parameter group *FB: Tension Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FB-00	*Tension Cont* (Tension control mode selection)	0 ... 4	0	☆	0B00
FB-01	*Reeling mode* (Curling mode)	0 ... 1	0	☆	0B01
FB-02	*Mech. Gear A* (Load-side mechanical gear A)	1 ... 65535	100	☆	0B02
FB-03	*Mech. Gear b* (Load-side mechanical gear B)	1 ... 65535	100	☆	0B03
FB-04	*PID Reference* (PID setpoint source selection)	0 ... 2	0	☆	0B04
FB-05	*Parameter Set* (PID target setpoint)	0.0% ... 100.0%	50.0%	☆	0B05
FB-06	*PID Feedback* (PID feedback source selection)	0 ... 1	0	☆	0B06
FB-07	*PID Adjustment* (PID parameter adjustment basis)	0 ... 3	0	★	0B07
FB-08	*P Gain of PID* (PID proportional coefficient 1)	0.0 ... 1000.0	50.0	☆	0B08
FB-09	*I Gain of PID* (PID integration time 1)	0.00s ... 500.00s	1.00s	☆	0B09
FB-10	*P2 Gain of PID* (PID proportional coefficient 2)	0.0 ... 1000.0	50.0	☆	0B0A
FB-11	*I2 Gain of PID* (PID integration time 2)	0.00s ... 500.00s	1.00s	☆	0B0B
FB-12	*PID Result Dir* (PID output positive and negative selection)	0 ... 1	0	★	0B0C
FB-13	*PID Output Limit%* (PID output forward limit)	0.00% ... 100.00%	20.00%	★	0B0D
FB-14	*PID Out Neg Limit%* (PID output reverse limit)	0.00% ... 100.00%	20.00%	★	0B0E
FB-15	*PID Fdb Up_bond %* (PID feedback upper limit value)	0.0% ... 100.0%	100.0%	★	0B0F
FB-16	*PID Fdb Lo_bond %* (PID feedback lower limit value)	0.0% ... 100.0%	0.0%	★	0B10
FB-17	*Select Line SPD* (Line speed input source)	0 ... 5	0	★	0B11
FB-18	*Max Line Speed* (Maximum line speed)	0.0 ... 6500.0	1000.0	★	0B12
FB-19	*Min Line Speed* (Minimum line speed)	0.0 ... 6500.0	0.0	★	0B13
FB-20	*Pulses Per Meter*	0.0 ... 6500.0	0.0	★	0B14
FB-21	*Present Line Spd* (Current line speed)	0.0 ... 6500.0	0.0	★	0B15
FB-22	*Line Speed LPG* (Line speed filtering time)	0.00s ... 100.00s	0.10s	☆	0B16
FB-23	*LS Ref Acc Time sec* (Line speed acceleration time)	0.00s ... 655.35s	0.00s	☆	0B17
FB-24	*LS Ref Dec Time sec* (Line speed deceleration time)	0.00s ... 655.35s	0.00s	☆	0B18
FB-25	*Reel Diameter Sel*	0 ... 5	0	☆	0B19

Parameter group *FB: Tension Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Roll diameter calculation method selection)				
FB-26	*Max Reel Diam.* (Maximum roll diameter)	1.0mm ... 6000.0mm	500.0mm	☆	0B1A
FB-27	*Emp Reel Diam.* (Empty roll diameter)	1.0mm ... 6000.0mm	100.0mm	☆	0B1B
FB-28	*Init Reel Diam.* (Initial roll diameter selection)	0 ... 1	0	★	0B1C
FB-29	*Init Reel Diam. 0mm* (Initial roll diameter 0)	0.0mm ... 6000.0mm	100.0mm	★	0B1D
FB-30	*Init Reel Diam. 1mm* (Initial roll diameter 1)	0.0mm ... 6000.0mm	100.0mm	★	0B1E
FB-31	*Init Reel Diam. 2mm* (Initial roll diameter 2)	0.0mm ... 6000.0mm	100.0mm	★	0B1F
FB-32	*Pulse Per Rev.* (Pulses per revolution)	1ppr ... 60000ppr	1ppr	★	0B20
FB-33	*Rev. each layer* (Layers per revolution)	1 ... 10000	1	★	0B21
FB-34	*Thickness* (Material thickness)	0.001 ... 65.000	0.001	★	0B22
FB-35	*Reel Diam. LPG* (Roll diameter filtering time)	0.00s ... 100.00s	1.00s	☆	0B23
FB-36	*Reel Diam. Comp.* (Roll diameter compensation enable)	0 ... 1	0	★	0B24
FB-37	*Diam Cal Delay* (Roll diameter calculation delay time)	0.0s ... 6553.5s	0.0s	☆	0B25
FB-38	*Pre Reel Diam.* (Current roll diameter)	1.0 ... 6553.5	100.0	●	0B26
FB-39	*Diam. En Freq.* (Minimum frequency for roll diameter calculation)	0.00Hz ... 599.00Hz	1.00Hz	☆	0B27
FB-40	*Smart Start Fun* (Pre-drive mode selection)	0 ... 2	0	★	0B28
FB-41	*PID Enable Level%* (Pre-drive/PID switching point)	0.0% ... 100.0%	15.0%	★	0B29
FB-42	*Smart Start Freq Hz* (Soft start frequency)	0.00Hz ... 599.00Hz	2.00Hz	★	0B2A
FB-43	*Smart Start Acc sec* (Soft start acceleration time)	0.00s ... 600.00s	3.00s	☆	0B2B
FB-44	*Belt Broken Sel* (Band break detection selection)	0 ... 1	0	☆	0B2C
FB-45	*Belt Bro Low Lim* (Minimum line speed for band break detection)	0.0 ... 3000.0	0.0	★	0B2D
FB-46	*Belt Bro Det Err mm* (Roll diameter change for band break detection)	1.0mm ... 6000.0mm	100.0mm	★	0B2E
FB-47	*Belt Bro Time* (Band break detection time)	0.00s ... 100.00s	1.00s	★	0B2F
FB-48	*PID Feedback Dev%* (Tension feedback precision level)	0% ... 100%	100%	★	0B30
FB-49	*Dev Dec Time* (Tension error detection time)	0.0s ... 10.0s	0.5s	★	0B31
FB-50	*Operation At Dev* (Tension error abnormal handling)	0 ... 2	0	★	0B32
FB-51	*PIDout Limit Gain*	0.0 ... 200.0	100.0	★	0B33
FB-52	*Sel Tension Set* (Tension setpoint source selection)	0 ... 1	0	★	0B34

Parameter group *FB: Tension Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FB-53	*Maximum Tension* (Maximum tension value)	0 ... 65535	0	★	0B35
FB-54	*Tension Set* (Tension setpoint)	0 ... 65535	0	☆	0B36
FB-55	*Sel Ten Set Z* (Zero speed tension setpoint source)	0 ... 2	0	★	0B37
FB-56	*Tension Set Z* (Zero-speed tension setpoint)	0 ... 65535	0	☆	0B38
FB-57	*Tension Change T%* (Zero speed tension precision level)	0.00% ... 100.00%	5.00%	☆	0B39
FB-58	*Friction Comp* (Sliding friction compensation tension)	0.0% ... 100.0%	0.0%	☆	0B3A
FB-59	*String J Comp* (Material inertia compensation coefficient)	0 ... 30000	0	☆	0B3B
FB-60	*Torque Feedfowrd%* (Acceleration inertia compensation gain)	0.0% ... 1000.0%	0.0%	☆	0B3C
FB-61	*Torque FFD LPG* (Inertia compensation filtering time)	0.00 ... 100.00	5.00	☆	0B3D
FB-62	*Torque FFD DEC* (Deceleration inertia compensation gain)	0.0% ... 1000.0%	0.0%	★	0B3E
FB-63	*Taper Curve Sel* (Tension taper curve selection)	0 ... 4	0	★	0B3F
FB-64	*Sel Ten Taper* (Tension taper setpoint source)	0 ... 1	0	★	0B40
FB-65	*Tension Taper* (Taper setpoint value)	0% ... 100%	0%	☆	0B41
FB-66	*Taper Comp.* (Taper curve compensation value)	0.0 ... 6000.0	0.0	★	0B42
FB-67	*Taper Reel Diam1* (Roll diameter 1 for taper calculation)	1.0 ... 6000.0	6000.0	★	0B43
FB-68	*Taper Reel Diam2* (Roll diameter 2 for taper calculation)	1.0 ... 6000.0	6000.0	★	0B44
FB-69	*Tension Taper1* (Multi-stage taper value 1)	0 ... 100	0	☆	0B45
FB-70	*Tension Taper2* (Multi-stage taper value 2)	0 ... 100	0	☆	0B46
FB-71	*Pre-Drive Gain* (Pre-drive frequency gain)	-50.0% ... 50.0%	0.0%	☆	0B47
FB-72	*PreDrive* Acc T (Pre-drive acceleration time)	0.00s ... 655.35s	0.00s	☆	0B48
FB-73	*PreDrive* Dec T (Pre-drive deceleration time)	0.00s ... 655.35s	0.00s	☆	0B49
FB-74	*Spd Limit by LS sec* (Speed limit gain)	0.0s ... 6553.5s	100.0s	☆	0B4A
FB-75	*PreDr/PI SW LS Er%* (Soft start/PI switching LS Err)	0 ... 100	5	★	0B4B
FB-76	*PreDr/PI SW LS1 %* (Soft start/PI switching LS1)	0.0% ... 10.0%	0.4%	★	0B4C
FB-77	*PreDr/PI SW LS2 %* (Soft start/PI switching LS2)	0.0% ... 10.0%	0.7%	★	0B4D
FB-78	*PreDr/PI SW Th1* (Soft start/PI switching 1 setting)	0.0 ... 40.0	2.0	★	0B4E
FB-79	*Unwd PreDr/PI SW* (Unwind soft start PI switching point)	0.0 ... 40.0	5.0	★	0B4F

Parameter group *FB: Tension Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FB-80	*Tension Ctrl bit* (Tension control flag bit)	0 ... 65535	0	☆	0B50

Tab. 5-15 Parameter list – FB: Tension Control Parameters

FC: POSITION CONTROL PARAMETERS

PARAMETER LIST

Parameter group *FC: Position Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FC-00	*P2Position Mode* (P2P position mode	0 = Relative P2P position control 1 = Absolute P2P position control	0	★	0C00
FC-01	*Homing Mode* (Homing mode selection)	0 ... 65535	0	☆	0C01
FC-02	*Source of POS* (Position control command source)	0 = External terminal input 1 = Reserved 2 = RS485 communication 3 = CANopen 4 = Reserved 5 = Communication expansion card	0	☆	0C02
FC-03	*Homing HiSPD 1* (First stage homing speed)	0.00Hz ... 599.00Hz	8.00Hz	☆	0C03
FC-04	*Homing LoSPD 2* (Second stage homing speed)	0.00Hz ... 599.00Hz	2.00Hz	☆	0C04
FC-05	*Reserved* (Home offset position)	-32767CNT ... 32767CNT	0CNT	☆	0C05
FC-06	*Homing Z Attain CNT* (Z-point search error amount)	0 ... 65535	1	☆	0C06
FC-07	*APR ACC Time* (Position control acceleration time)	0.00s ... 655.35s	1.00s	☆	0C07
FC-08	*APR DEC Time* (Position control deceleration time)	0.00s ... 655.35s	3.00s	☆	0C08
FC-09	*Reserved* (APR first deceleration frequency)	0.00Hz ... 655.35Hz	5.00Hz	☆	0C09
FC-10	*Reserved* (APR second deceleration frequency)	0.00Hz ... 655.35Hz	1.00Hz	☆	0C0A
FC-11	*Reserved* (PG disconnection counter)	0 ... 65535	0	☆	0C0B
FC-12	*Reserved* (Low resolution detection gain)	0 ... 65535	30	☆	0C0C
FC-13	*Reserved* (PG digital filter value)	0 ... 65535	111	★	0C0D
FC-14	*Reserved* (PG low-speed filtering)	0Hz ... 2000Hz	1Hz	☆	0C0E
FC-15	*Reserved* (Positioning checkpoint 1 REV)	-30000 ... 30000	0	☆	0C0F
FC-16	*Reserved* (Position checkpoint 1 CNT)	-32767 ... 32767	0	☆	0C10
FC-17	*Reserved* (Position checkpoint 2 REV)	-30000 ... 30000	0	☆	0C11
FC-18	*Reserved* (Position checkpoint 2 CNT)	-32767 ... 32767	0	☆	0C12
FC-19	*Reserved* (Position control error)	0 ... 65535	65535	☆	0C13
FC-20	*PG Homing CNT* (Internal positioning position command)	-32767 ... 32767	0	☆	0C14
FC-21	*PG Attained Home* (Feedback position arrival error)	0 ... 65535	10	☆	0C15
FC-22	*REF Pulse Filter*	0.000 ... 65.535	0.100	☆	0C16

Parameter group *FC: Position Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Pulse input filtering)				
FC-23	*PGREF SPD Mode* (Pulse speed mode)	0 = Electrical frequency 1 = Mechanical frequency (pole pair number)	0	★	0C17
FC-24	*APR Kp* (Position loop proportional coefficient)	0.00 ... 40.00	10.00	☆	0C18
FC-25	*APR FFD Gain* (Position loop feed-forward coefficient)	0 ... 100	30	☆	0C19
FC-26	*Position Curve* (Position curve time)	0.00s ... 655.35s	3.00s	☆	0C1A
FC-27	*P2P MAX FREQ* (P2P highest frequency)	0.00Hz ... 599.00Hz	10.00Hz	☆	0C1B
FC-28	*Pos cmd1(revs)* (Multi-stage position 1 (revs))	-30000 ... 30000	0	☆	0C1C
FC-29	*Pos cmd1(pulse) CNT* (Multi-stage position 1 (pulse))	-32767 ... 32767	0	☆	0C1D
FC-30	*Pos cmd2 (revs)* (Multi-stage position 2 (revs))	-30000 ... 30000	0	☆	0C1E
FC-31	*Pos cmd2 (pulse) CNT* (Multi-stage position 2 (pulse))	-32767 ... 32767	0	☆	0C1F
FC-32	*Pos cmd3 (revs)* (Multi-stage position 3 (revs))	-30000 ... 30000	0	☆	0C20
FC-33	*Pos cmd3 (pulse) CNT* (Multi-stage position 3 (pulse))	-32767 ... 32767	0	☆	0C21
FC-34	*Pos cmd4 (revs)* (Multi-stage position 4 (revs))	-30000 ... 30000	0	☆	0C22
FC-35	*Pos cmd4 (pulse) CNT* (Multi-stage position 4 (pulse))	-32767 ... 32767	0	☆	0C23
FC-36	*Pos cmd5 (revs)* (Multi-stage position 5 (revs))	-30000 ... 30000	0	☆	0C24
FC-37	*Pos cmd5 (pulse) CNT* (Multi-stage position 5 (pulse))	-32767 ... 32767	0	☆	0C25
FC-38	*Pos cmd6 (revs)* (Multi-stage position 6 (revs))	-30000 ... 30000	0	☆	0C26
FC-39	*Pos cmd6 (pulse) CNT* (Multi-stage position 6 (pulse))	-32767 ... 32767	0	☆	0C27
FC-40	*Pos cmd7 (revs)* (Multi-stage position 7 (revs))	-30000 ... 30000	0	☆	0C28
FC-41	*Pos cmd7 (pulse) CNT* (Multi-stage position 7 (pulse))	-32767 ... 32767	0	☆	0C29
FC-42	*Pos cmd8 (revs)* (Multi-stage position 8 (revs))	-30000 ... 30000	0	☆	0C2A
FC-43	*Pos cmd8 (pulse) CNT* (Multi-stage position 8 (pulse))	-32767 ... 32767	0	☆	0C2B
FC-44	*Pos cmd9 (revs)* (Multi-stage position 9 (revs))	-30000 ... 30000	0	☆	0C2C
FC-45	*Pos cmd9 (pulse) CNT* (Multi-stage position 9 (pulse))	-32767 ... 32767	0	☆	0C2D
FC-46	*Pos cmd10 (revs)* (Multi-stage position 10 (revs))	-30000 ... 30000	0	☆	0C2E
FC-47	*Pos cmd10 (pulse) CNT* (Multi-stage position 10 (pulse))	-32767 ... 32767	0	☆	0C2F
FC-48	*Pos cmd11 (revs)* (Multi-stage position 11 (revs))	-30000 ... 30000	0	☆	0C30
FC-49	*Pos cmd11 (pulse) CNT*	-32767 ... 32767	0	☆	0C31

Parameter group *FC: Position Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Multi-stage position 11 (pulse))				
FC-50	*Pos cmd12 (revs)* (Multi-stage position 12 (revs))	-30000 ... 30000	0	☆	0C32
FC-51	*Pos cmd12 (pulse) CNT* (Multi-stage position 12 (pulse))	-32767 ... 32767	0	☆	0C33
FC-52	*Pos cmd13 (revs)* (Multi-stage position 13 (revs))	-30000 ... 30000	0	☆	0C34
FC-53	*Pos cmd13 (pulse) CNT* (Multi-stage position 13 (pulse))	-32767 ... 32767	0	☆	0C35
FC-54	*Pos cmd14 (revs)* (Multi-stage position 14 (revs))	-30000 ... 30000	0	☆	0C36
FC-55	*Pos cmd14 (pulse) CNT* (Multi-stage position 14 (pulse))	-32767 ... 32767	0	☆	0C37
FC-56	*Pos cmd15 (revs)* (Multi-stage position 15 (revs))	-30000 ... 30000	0	☆	0C38
FC-57	*Pos cmd15 (pulse) CNT* (Multi-stage position 15 (pulse))	-32767 ... 32767	0	☆	0C39

Tab. 5-16 Parameter list – FC: Position Control Parameters

FD: MULTI-SPEED & SIMPLE PLC FUNCTION

PARAMETER LIST

Parameter group *FD: Multi-Speed & Simple PLC Function*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FD-00	*Multi-speed 0*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D00
FD-01	*Multi-speed 1*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D01
FD-02	*Multi-speed 2*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D02
FD-03	*Multi-speed 3*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D03
FD-04	*Multi-speed 4*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D04
FD-05	*Multi-speed 5*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D05
FD-06	*Multi-speed 6*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D06
FD-07	*Multi-speed 7*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D07
FD-08	*Multi-speed 8*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D08
FD-09	*Multi-speed 9*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D09
FD-10	*Multi-speed 10*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D0A
FD-11	*Multi-speed 11*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D0B
FD-12	*Multi-speed 12*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D0C
FD-13	*Multi-speed 13*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D0D
FD-14	*Multi-speed 14*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D0E
FD-15	*Multi-speed 15*	0.00Hz ... 599.00Hz	0.00Hz	☆	0D0F

Tab. 5-17 Parameter list – FD: Multi-Speed & Simple PLC Function

FE: TORQUE CONTROL PARAMETERS

PARAMETER LIST

Parameter group *FE: Torque Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FE-00	*Torque Mode SEL* (Torque mode selection)	0 = TQCPG torque control IM 1 = TQCPG torque control PM 2 = IM open loop torque control 3 = SVC open loop torque control	0	★	0E00
FE-01	*Source of TQR* (Torque command source selection)	0 = Digital operator 1 = RS485 communication 2 = Analog signal input 3 = CANopen 4 = Reserved 5 = Communication expansion card	0	☆	0E01
FE-02	*Torque REF* (Torque digital setting)	-100.0% ... 100.0%	0.0%	☆	0E02
FE-03	*TQR +SPD Limit* (Torque forward frequency limit)	0% ... 120%	110%	☆	0E03
FE-04	*TQR -SPD Limit* (Torque reversal frequency limit)	0% ... 120%	110%	☆	0E04
FE-05	*TQR Offset SEL* (Torque bias selection)	0 = No function 1 = Analog input 2 = Input from parameter FE-06 3 = External terminal control	0	☆	0E05
FE-06	*TQR Offset Level%* (Torque bias value)	-100.0% ... 100.0%	0.0%	☆	0E06
FE-07	*TQR Offset High %* (High torque compensation)	-100.0% ... 100.0%	30.0%	☆	0E07
FE-08	*TQR Offset Mid %* (Medium torque compensation)	-100.0% ... 100.0%	20.0%	☆	0E08
FE-09	*TQR Offset Low %* (Low torque compensation)	-100.0% ... 100.0%	10.0%	☆	0E09
FE-10	*TQR MAX Level* (Maximum torque command)	0 ... 500	100	☆	0E0A
FE-11	*SCI F. Motor Tq LIM* (Forward motoring torque upper limit)	0 ... 500	500	☆	0E0B
FE-12	*SCI F. Reg.Tq LIM* (Forward braking torque upper limit)	0 ... 500	500	☆	0E0C
FE-13	*SCI R. Motor Tq LIM* (Reverse motoring torque upper limit)	0 ... 500	500	☆	0E0D
FE-14	*SCI R. Reg. Tq LIM* (Reverse braking torque upper limit)	0 ... 500	500	☆	0E0E
FE-15	*TQR Com Filter* (Torque filter time)	0.000s ... 1.000s	0.000s	☆	0E0F
FE-16	*Torque out LPG* (Torque output filtering gain)	0.000s ... 65.535s	0.200s	☆	0E10
FE-17	*Zo TQC CTRL SEL* (Zero torque mode selection)	0 = Torque mode 1 = Speed mode	0	★	0E11

Tab. 5-18 Parameter list – FE: Torque Control Parameters

FF: MANUFACTURER'S PARAMETERS

PARAMETER LIST

Parameter group *FF: Manufacturer's Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
FF-00	*Reserved*	0 ... 65535	0	○	0F00

Tab. 5-19 Parameter list – FF: Manufacturer's Parameters

U0: FAULT RECORDER

PARAMETER LIST

Parameter group *U0: Fault Recorder*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
U0-00	*1st Fault Record*	0 ... 65535	0	●	1000
U0-01	*2nd Fault Record*	0 ... 65535	0	●	1001
U0-02	*3rd Fault Record*	0 ... 65535	0	●	1002
U0-03	*4th Fault Record*	0 ... 65535	0	●	1003
U0-04	*5th Fault Record*	0 ... 65535	0	●	1004
U0-05	*6th Fault Record*	0 ... 65535	0	●	1005
U0-06	*7th Fault Record*	0 ... 65535	0	●	1006
U0-07	*8th Fault Record*	0 ... 65535	0	●	1007
U0-08	*9th Fault Record*	0 ... 65535	0	●	1008
U0-09	*10th Fault Record*	0 ... 65535	0	●	1009
U0-10	*Fault Option 1* (Fault output 1)	0 ... 65535	0	☆	100A
U0-11	*Fault Option 2* (Fault output 2)	0 ... 65535	0	☆	100B
U0-12	*Fault Option 3* (Fault output 3)	0 ... 65535	0	☆	100C
U0-13	*Fault Option 4* (Fault output 4)	0 ... 65535	0	☆	100D
U0-14	*RPM of Motor REC rpm* (Fault 1-Motor speed)	-32767rpm ... 32767rpm	0rpm	●	100E
U0-15	*Torque REC.* (Fault 1-Torque command)	-3276.7 ... 3276.7	0.0	●	100F
U0-16	*MI Status REC.* (Fault 1-Input terminal)	0 ... 65535	0	●	1010
U0-17	*MI Status REC.* (Fault 1-Output terminal)	0 ... 65535	0	●	1011
U0-18	*INV Status REC.* (Fault 1-VFD status)	0 ... 65535	0	●	1012
U0-19	*CMD FREQ REC* (Fault 1-Frequency command Hz)	0.00Hz ... 655.35Hz	0.00Hz	●	1013
U0-20	*Out FREQ REC* (Fault 1-Output frequency)	0.00Hz ... 599.00Hz	0.00Hz	●	1014
U0-21	*Out Voltage REC V* (Fault 1-Output voltage)	0.0V ... 6553.5V	0.0V	●	1015
U0-22	*DCBus Value REC Vdc* (Fault 1-DC voltage)	0.0V ... 6553.5V	0.0V	●	1016
U0-23	*Isum Value REC*	0.00A ... 655.35A (93kW and below)	0.00A or	●	1017

Parameter group *U0: Fault Recorder*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Fault 1-Output current)	0.0A ... 6553.5A (110kW and above)	0.0A		
U0-24	*IGBT Temp REC* (Fault 1-IGBT temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	1018
U0-25	*Capacity Temp REC °C* (Fault 1-Capacitor temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	1019
U0-26	*Out FREQ REC 2* (Fault 2-Output frequency)	0.00Hz ... 599.00Hz	0.00Hz	●	101A
U0-27	*DCBus Value REC 2 Vdc* (Fault 2-DC voltage)	0.0V ... 6553.5V	0.0V	●	101B
U0-28	*Isum Value REC 2 A* (Fault 2-Output current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	0.00A or 0.0A	●	101C
U0-29	*IGBT Temp REC 2 °C* (Fault 2-IGBT temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	101D
U0-30	*Out FREQ REC 3* (Fault 3-Output frequency)	0.00Hz ... 599.00Hz	0.00Hz	●	101E
U0-31	*DCBus Value REC 3 Vdc* (Fault 3 - DC voltage)	0.0V ... 6553.5V	0.0V	●	101F
U0-32	*Isum Value REC 3 A* (Fault 3-Output current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	0.00A or 0.0A	●	1020
U0-33	*IGBT Temp REC 3 °C* (Fault 3-IGBT temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	1021
U0-34	*Out FREQ REC 4* (Fault 4-Output frequency)	0.00Hz ... 599.00Hz	0.00Hz	●	1022
U0-35	*DCBus Value REC 4 Vdc* (Fault 4 - DC voltage)	0.0V ... 6553.5V	0.0V	●	1023
U0-36	*Isum Value REC 4 A* (Fault 4-Output current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	0.00A or 0.0A	●	1024
U0-37	*IGBT Temp REC 4 °C* (Fault 4-IGBT temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	1025
U0-38	*Out FREQ REC 5* (Fault 5-Output frequency)	0.00Hz ... 599.00Hz	0.00Hz	●	1026
U0-39	*DCBus Value REC 5 Vdc* (Fault 5-DC voltage)	0.0V ... 6553.5V	0.0V	●	1027
U0-40	*Isum Value REC 5 A* (Fault 5-Output current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	0.00A or 0.0A	●	1028
U0-41	*IGBT Temp REC 5 °C* (Fault 5-IGBT temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	1029
U0-42	*Out FREQ REC 6* (Fault 6-Output frequency)	0.00Hz ... 599.00Hz	0.00Hz	●	102A
U0-43	*DCBus Value REC 6 Vdc* (Fault 6-DC voltage)	0.0V ... 6553.5V	0.0V	●	102B
U0-44	*Isum Value REC 6 A* (Fault 6-Output current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	0.00A or 0.0A	●	102C
U0-45	*IGBT Temp REC 6 °C* (Fault 6-IGBT temperature)	-3276.7°C ... 3276.7°C	0.0°C	●	102D
U0-46	*Error REC 1 Day day* (Days since Fault 1 occurred)	0 ... 65535	0	●	102E
U0-47	*Error REC 1 Min min* (Minutes since Fault 1 occurred)	0 ... 1439	0	●	102F
U0-48	*Error REC 2 Day day* (Days since Fault 2 occurred)	0 ... 65535	0	●	1030
U0-49	*Error REC 2Min min* (Minutes since Fault 2 occurred)	0 ... 1439	0	●	1031

Parameter group *U0: Fault Recorder*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
U0-50	*Error REC 3 Day day* (Days since Fault 3 occurred)	0 ... 65535	0	●	1032
U0-51	*Error REC 3 Min min* (Minutes since Fault 3 occurred)	0 ... 1439	0	●	1033
U0-52	*Error REC 4 Day day* (Days since Fault 4 occurred)	0 ... 65535	0	●	1034
U0-53	*Error REC 4 Min min* (Minutes since Fault 4 occurred)	0 ... 1439	0	●	1035
U0-54	*Error REC 5 Day day* (Days since Fault 5 occurred)	0 ... 65535	0	●	1036
U0-55	*Error REC 5 Min min* (Minutes since Fault 5 occurred)	0 ... 1439	0	●	1037
U0-56	*Error REC 6 Day day* (Days since Fault 6 occurred)	0 ... 65535	0	●	1038
U0-57	*Error REC 6 Min min* (Minutes since Fault 6 occurred)	0 ... 1439	0	●	1039

Tab. 5-20 Parameter list – U0: Fault Recorder

U1: STATUS MONITORING 17

PARAMETER LIST

Parameter group *U1: Status Monitoring 17*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
U1-00	*DIx Status* (DI terminal status)	0 ... 65535	0	●	1100
U1-01	*DOx Status* (DO terminal status)	0 ... 65535	0	●	1101
U1-02	*Freq Cmd* (Frequency command (read-only))	0.00Hz ... 599.00Hz	50.00Hz	●	1102
U1-03	*EXT Speed REC* (External frequency record)	0.00Hz ... 599.00Hz	60.00Hz	●	1103
U1-04	*PID Fbk Value* (PID feedback value)	-200.00 ... 200.00	0.00	●	1104
U1-05	*P Gain Monitor* (KP gain monitoring value)	0.00% ... 100.00%	88.00%	●	1105
U1-06	*I Gain Monitor* (KI gain monitoring value)	0.00s ... 100.00s	0.05s	●	1106
U1-07	*D Gain Monitor* (KD gain monitoring value)	0.00 ... 1.00	0.00	●	1107
U1-08	*ID CHG REC CNT* (Machine change record)	0 ... 65535	0	☆	1108
U1-09	*IO Card ID*	0 ... 13	0	●	1109

Tab. 5-21 Parameter list – U1: Status Monitoring 17

H0 - OTHER MOTOR PARAMETERS 18

PARAMETER LIST

Parameter group *H0 - Other Motor Parameters 18*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
H0-00	*Motor 1~4 Sel* (IM motor selection)	1 = Induction motor 1 2 = Induction motor 2 3 = Induction motor 3 4 = Induction motor 4	1	★	1200
H0-01	*MAX Output FREQ2 Hz* (M2 maximum frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	1201
H0-02	*Motor2 Fbase* (M2 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	1202
H0-03	*M2 VOLT Base* (M2 rated voltage)	0.0 ... 510.0V	380.0	★	1203
H0-04	*Motor2 Rated P* (IM2 rated power)	0.00kW ... 655.35kW	Machine type determination	★	1204
H0-05	*Motor2 Poles* (Number of IM2 poles)	2 ... 20	Machine type determination	●	1205
H0-06	*Motor2 Rated A* (IM2 rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	H0-04 confirmation	★	1206
H0-07	*Motor2 Rated* (IM2 rated speed)	0rpm ... 65535rpm	H0-04 confirmation	★	1207
H0-08	*Motor2 No-Load* (IM2 no-load current)	0.00A ... H0-06	Machine type determination	★	1208
H0-09	*Motor2 Rs* (IM2 stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	1209
H0-10	*Motor2 Rr* (IM2 rotor resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	120A
H0-11	*Motor2 Lm* (IM2 mutual inductance)	0.0mH ... 6553.5mH	Machine type determination	★	120B
H0-12	*Motor2 Lx* (IM2 leakage inductance)	0.00mH ... 655.35mH	Machine type determination	★	120C
H0-13	*MAX Output FREQ3 Hz* (M3 maximum frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	120D
H0-14	*Motor3 Fbase* (M3 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	120E
H0-15	*M3 VOLT Base* (M3 rated voltage)	0.0V ... 510.0V	380.0V	★	120F
H0-16	*Motor3 Rated P* (IM3 rated power)	0.00kW ... 655.35kW	Machine type determination	★	1210
H0-17	*Motor3 Poles* (Number of IM3 poles)	2 ... 20	Machine type determination	●	1211
H0-18	*Motor3 Rated A* (IM3 rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	H0-16 confirmation	★	1212
H0-19	*Motor3 Rated* (IM3 rated speed)	0rpm ... 65535rpm	H0-16 confirmation	★	1213
H0-20	*Motor3 No-Load* (IM3 no-load current)	0.00A ... H0-18	Machine type determination	★	1214
H0-21	*Motor3 Rs* (IM3 stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	1215
H0-22	*MAX Output FREQ4 Hz* (M4 maximum frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	1216
H0-23	*Motor4 Fbase* (M4 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	1217

Parameter group *H0 - Other Motor Parameters 18*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
H0-24	*M4 VOLT Base* (M4 rated voltage)	0.0V ... 510.0V	380.0V	★	1218
H0-25	*Motor4 Rated P* (IM4 rated power)	0.00kW ... 655.35kW	Machine type determination	★	1219
H0-26	*Motor4 Poles* (Number of IM4 poles)	2 ... 20	Machine type determination	●	121A
H0-27	*Motor4 Rated A* (IM4 rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	H0-25 confirmation	★	121B
H0-28	*Motor4 Rated* (IM4 rated speed)	0rpm ... 65535rpm	H0-25 confirmation	★	121C
H0-29	*Motor4 No-Load* (IM4 no-load current)	0.00A ... H0-27	Machine type determination	★	121D
H0-30	*Motor4 Rs* (IM4 stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	121E

Tab. 5-22 Parameter list – H0 - Other Motor Parameters 18

H1: OTHER MOTOR VF CONTROL

PARAMETER LIST

Parameter group *H1: Other Motor VF control*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
H1-00	*M2 Mul VF FREQ 1Hz* M2 multi-point VF frequency point 1	0.00Hz ... 599.00Hz	0.50Hz	★	1300
H1-01	*M2 Mul VF VOLT 1V* M2 multi-point VF voltage point 1	0.0V ... 480.0V	2.0V	☆	1301
H1-02	*M2 Mul VF FREQ 2Hz* M2 multi-point VF frequency point 2	0.00Hz ... 599.00Hz	1.50Hz	★	1302
H1-03	*M2 Mul VF VOLT 2V* M2 multi-point VF voltage point 2	0.0V ... 480.0V	10.0V	☆	1303
H1-04	*M2 Mul VF FREQ 3Hz* M2 multi-point VF frequency point 3	0.00Hz ... 599.00Hz	3.00Hz	★	1304
H1-05	*M2 Mul VF VOLT 3V* M2 multi-point VF voltage point 3	0.0V ... 480.0V	22.0V	☆	1305
H1-06	*M2 TQR COMP Gain* M2 torque compensation gain	0 ... 10	1	☆	1306
H1-07	*M2Slip COMP Gain* M2 slip compensation gain	0.00 ... 10.00	0.00	☆	1307
H1-08	*M3 Mul VF FREQ 1Hz* M3 multi-point VF frequency point 1	0.00Hz ... 599.00Hz	0.50Hz	★	1308
H1-09	*M3 Mul VF VOLT 1V* M3 multi-point VF voltage point 1	0.0V ... 480.0V	2.0V	☆	1309
H1-10	*M3 Mul VF FREQ 2Hz* M3 multi-point VF frequency point 2	0.00Hz ... 599.00Hz	1.50Hz	★	130A
H1-11	*M3 Mul VF VOLT 2V* M3 multi-point VF voltage point 2	0.0V ... 480.0V	10.0V	☆	130B
H1-12	*M3 Mul VF FREQ 3Hz* M3 multi-point VF frequency point 3	0.00Hz ... 599.00Hz	3.00Hz	★	130C
H1-13	*M3 Mul VF VOLT 3V* M3 multi-point VF voltage point 3	0.0V ... 480.0V	22.0V	☆	130D
H1-14	*M3 TQR COMP Gain* M3 torque compensation gain	0 ... 10	1	☆	130E
H1-15	*M3Slip COMP Gain* M3 slip compensation gain	0.00 ... 10.00	0.00	☆	130F
H1-16	*M4 Mul VF FREQ 1Hz* M4 multi-point VF frequency point 1	0.00Hz ... 599.00Hz	0.50Hz	★	1310
H1-17	*M4 Mul VF VOLT 1V* M4 multi-point VF voltage point 1	0.0V ... 480.0V	2.0V	☆	1311
H1-18	*M4 Mul VF FREQ 2Hz* M4 multi-point VF frequency point 2	0.00Hz ... 599.00Hz	1.50Hz	★	1312
H1-19	*M4 Mul VF VOLT 2V* M4 multi-point VF voltage point 2	0.0V ... 480.0V	10.0V	☆	1313
H1-20	*M4 Mul VF FREQ 3 Hz* M4 multi-point VF frequency point 3	0.00Hz ... 599.00Hz	3.00Hz	★	1314
H1-21	*M4 Mul VF VOLT 3V* M4 multi-point VF voltage point 3	0.0V ... 480.0V	22.0V	☆	1315
H1-22	*M4 TQR COMP Gain* M4 torque compensation gain	0 ... 10	1	☆	1316
H1-23	*M4Slip COMP Gain* M4 slip compensation gain	0.00 ... 10.00	0.00	☆	1317

Tab. 5-23 Parameter list – H1: Other Motor VF control

H2: OTHER MOTOR VECTOR CONTROL PARAMETERS

PARAMETER LIST

Parameter group *H2: Other Motor Vector Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
H2-00	*Reserved*	0 ... 65535	0	●	1400

Tab. 5-24 Parameter list – H2: Other Motor Vector Control Parameters

H3: OTHER MOTOR FAULT PARAMETERS

PARAMETER LIST

Parameter group *H3: Other Motor Fault Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
H3-00	*Over TQC2 Method* (Over torque selection 2)	0 = Detection disabled 1 = Constant speed detection continues operation 2 = Constant speed detection stop operation 3 = Running detection continue operation 4 = Operation detection stop operation	0	☆	1500
H3-01	*Over TQC2 Level %* (Over torque threshold 2)	10% ... 250%	120%	☆	1501
H3-02	*Over TQC2 Time* (Over torque time 2)	0.1s ... 60.0s	0.1s	☆	1502
H3-03	*Thermal RLY2 SEL* (Motor 2 overload selection)	0 = Constant torque output motor 1 = Variable torque output motor 2 = No motor overload protection	2	☆	1503
H3-04	*Thermal RLY2 T* (Motor 2 overload time)	30.0s ... 600.0s	60.0s	☆	1504
H3-05	*Over TQC3 Method* (Over torque selection 3)	0 = Detection disabled 1 = Constant speed detection continues operation 2 = Constant speed detection stop operation 3 = Running detection continue operation 4 = Operation detection stop operation	0	☆	1505
H3-06	*Over TQC3 Level %* (Over torque threshold 3)	10% ... 250%	120%	☆	1506
H3-07	*Over TQC3 Time* (Over torque time 3)	0.1s ... 60.0s	0.1s	☆	1507
H3-08	*Thermal RLY3 SEL* (Motor 3 overload selection)	0 = Constant torque output motor 1 = Variable torque output motor 2 = No motor overload protection	2	☆	1508
H3-09	*Thermal RLY3 T* (Motor 3 overload time)	30.0s ... 600.0s	60.0s	☆	1509
H3-10	*Over TQC4 Method* (Over torque selection 4)	0 = Detection disabled 1 = Constant speed detection continues operation 2 = Constant speed detection stop operation 3 = Running detection continue operation 4 = Operation detection stop operation	0	☆	150A
H3-11	*Over TQC4 Level %* (Over torque threshold 4)	10% ... 250%	120%	☆	150B
H3-12	*Over TQC4 Time* (Over torque time 4)	30.0s ... 600.0s	0.1s	☆	150C
H3-13	*Thermal RLY4 SEL* (Motor 4 overload selection)	0 = Constant torque output motor 1 = Variable torque output motor 2 = No motor overload protection	2	☆	150D
H3-14	*Thermal RLY4 T* (Motor 4 overload time)	30.0s ... 600.0s	60.0s	☆	150E

Tab. 5-25 Parameter list – H3: Other Motor Fault Parameters

L0: SYSTEM CONTROL PARAMETERS

PARAMETER LIST

Parameter group *L0: System Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L0-00	*APP MACRO*	0 ... 65535	0	☆	1600
L0-01	*CONTROL BIT* (System control flag)	0 ... 65535	0	☆	1601
L0-02	*Debug FLAG*	0 ... 65535	0	☆	1602
L0-03	*Debug BIT* (Debug flag 1)	0 ... 65535	40	☆	1603
L0-04	*Reserved*	0 ... 65535	0	☆	1604
L0-05	*SYS CTRL Bit* (System control parameters)	0 ... 65535	0	☆	1605
L0-06	*System Flag* (Special control flag)	0 ... 65535	0	☆	1606
L0-07	*Reserved*	0 ... 65535	0	★	1607
L0-08	*Reserved*	0 ... 65535	0	☆	1608
L0-09	*KPD EnScr Rnw Tim* (KPD auto refresh enable	0 ... 1	0	☆	1609
L0-10	*KPD Renew Tim Set sec* (KPD refresh time setting	0.00s ... 6.00s	0.15s	☆	160A
L0-11	*Low-Speed Debug* (Low speed debug bit	0 ... 65535	1	☆	160B

Tab. 5-26 Parameter list – L0: System Control Parameters

L1: CUSTOMIZATION CODE

PARAMETER LIST

Parameter group *L1: Customization Code*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L1-00	*Hand FREQ Source* (Frequency source selection (HAND))	0 = Digital operator 1 = RS485 communication 2 = Analog input 3 = External Up/Down input 4 = Pulse input without direction 5 = Pulse input with direction 6 = CANopen input 7 = Reserved 8 = Communication card input 9 = PID	0	★	1700
L1-01	*Hand OPER Source* (Run command source (HAND))	0 = Digital operator 1 = External terminal input 2 = RS485 communication input 3 = CANopen input 4 = Reserved 5 = Communication card input	0	★	1701
L1-02	*LOC/REM SEL* (LOC/REM action selection)	0 = Standard HOA operation 1 = L/R do not maintain state 2 = Maintain REM state 3 = Maintain LOC state 4 = Maintain REM/LOC state	0	★	1702

Tab. 5-27 Parameter list – L1: Customization Code

L2: OPTIMIZATION CONTROL PARAMETERS

PARAMETER LIST

Parameter group *L2: Optimization Control Parameters*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L2-00	*PWM Mode* (PWM mode selection)	0 = DPWM modulation mode 1 = Reserved 2 = SVPWM modulation mode	2	★	1800
L2-01	*PWM Mode CH G F* (PWM seven/five segment switching point)	0.00Hz ... 655.35Hz	15.00Hz	☆	1801
L2-02	*PWM Mode* (PWM mode selection)	0 = SVPWM 66% DPWM 1 1 = SVPWM 100% 2 = SVPWM 66% 3 = SPWM-DPWM 100% 4 = SVPWM-DPWM 100% 5 = SPWM 100% 6 = SVPWM 66% ... 100%	0	★	1802
L2-03	*Dead Time Count* (PWM dead time value)	0 ... 666	133	☆	1803
L2-04	*PWM MIN Pulse* (PWM narrow pulse width)	0 ... 333	66	☆	1804
L2-05	*Reserved*	0 ... 1440	180	☆	1805
L2-06	*Mode of DBC* (Dead time compensation mode)	0 ... 65535	4	☆	1806
L2-07	*DeadTime Compen* (Dead time compensation value)	0 ... 65535	180	☆	1807
L2-08	*Volt-Drop Compen* (Tube voltage drop compensation value)	0 ... 65535	5	☆	1808
L2-09	*DBC 4 slope gain* (Dead zone compensation slope 4)	0 ... 65535	200	☆	1809
L2-10	*DBC 5 slope gain* (Dead time compensation slope 5)	0 ... 65535	5000	☆	180A
L2-11	*DBC Fine Tuning %* (Dead time compensation offset value)	-100.0% ... 100.0%	0.0%	☆	180B
L2-12	*DeadTime Band* (Dead time compensation width)	0 ... 65535	512	☆	180C
L2-13	*DBC Switch FREQ Hz* (Dead time compensation switching point)	0.00Hz ... 599.00Hz	0.00Hz	☆	180D
L2-14	*Reserved* (Dead time compensation filter)	0 ... 65535	50000	☆	180E
L2-15	*DBC Tuning Value pu* (Dead time compensation identification Id)	2000pu ... 65535pu	8000pu	☆	180F
L2-16	*DeadTime Tuning* (Dead time compensation identification)	0 ... 1	0	★	1810
L2-17	*Brake res open V Vdc* (Braking resistor activation voltage)	700.0V ... 900.0V	740.0V	☆	1811
L2-18	*Low Voltage* (Under voltage protection value)	250.0V ... 440.0V	360.0V	☆	1812
L2-19	*Select Zero SPD* (Zero speed operation selection)	0 = Await output 1 = Zero speed position control output 2 = Output at minimum frequency	0	★	1813
L2-20	*Ld AutoTune Freq*	0 ... 65535	300	●	1814
L2-21	*Lq AutoTune Freq*	0 ... 65535	300	●	1815
L2-22	*Reserved*	0 ... 65535	0	●	1816
L2-23	*OverModuation Idx* (Overmodulation gain)	80 ... 120	100	☆	1817

Tab. 5-28 Parameter list – L2: Optimization Control Parameters

L3: MASTER/SLAVE CONTROL

PARAMETER LIST

Parameter group ***L3: Master/Slave Control***					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L3-00	*Reserved*	0 ... 65535	0	●	1900

Tab. 5-29 Parameter list – L3: Master/Slave Control

L4: HOLDING BRAKE FUNCTION

PARAMETER LIST

Parameter group *L4:* ***Holding Brake Function***					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L4-00	*Braking Freq* (Braking frequency)	0.00 ... 599.00Hz	0.00	☆	1A00

Tab. 5-30 Parameter list – L4: Holding Brake Function

L5: SLEEP/WAKE-UP FUNCTION

PARAMETER LIST

Parameter group *L5:* ***Sleep/Wake-Up Function***					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L5-00	*Source of Sleep* (Sleep mode reference selection)	0 = PID command reached 1 = PID feedback reached	0	★	1B00
L5-01	*Sleep Point* (Sleep threshold)	0.00Hz ... 599.00Hz	0.00Hz	☆	1B01
L5-02	*Wake Point* (Wake threshold)	0.00Hz ... 599.00Hz	0.00Hz	☆	1B02
L5-03	*Sleep Time* (Sleep delay)	0.0s ... 6000.0s	0.0s	☆	1B03
L5-04	*Wake Delay Time sec* (Wake delay)	0.00s ... 600.00s	0.00s	☆	1B04

Tab. 5-31 Parameter list – L5: Sleep/Wake-Up Function

L6: SWING FREQUENCY & FIXED LENGTH, AND COUNTING

PARAMETER LIST

Parameter group *L6: Swing Frequency & Fixed length, and Counting*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L6-00	*Final Counter* (Final count value setting)	0 ... 65500	0	☆	1C00
L6-01	*Middle Counter* (Intermediate count value setting)	0 ... 65500	0	☆	1C01
L6-02	*Count EF enable* (Count reached EF enable)	0 = Count arrival, no EF 1 = Count arrival, EF	0	☆	1C02

Tab. 5-32 Parameter list – L6: Swing Frequency & Fixed length, and Counting

L7: AI MULTI-POINT CURVE SETTING

PARAMETER LIST

Parameter group *L7: AI Multi-Point Curve Setting*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L7-00	*AI curve select* (AI curve selection)	0 = General curve 1 = AI1 three-point curve 2 = AI2 three-point curve 3 = AI1&AI2 three-point curve 4 = AI3 three-point curve 5 = AI1&AI3 three-point curve 6 = AI2&AI3 three-point curve 7 = AI123 three-point curve	0	☆	1D00
L7-01	*AI1 Low Point* (AI1 lowest input value)	0.00 ... 20.00	0.00	☆	1D01
L7-02	*AI1 Low%* (AI1 lowest percentage)	0.00% ... 100.00%	0.00%	☆	1D02
L7-03	*AI1 Mid Point* (AI1 mid-point input value)	0.00 ... 20.00	5.00	☆	1D03
L7-04	*AI1 Mid%* (AI1 mid-point percentage)	0.00% ... 100.00%	50.00%	☆	1D04
L7-05	*AI1 High Point* (AI1 highest input value)	0.00 ... 20.00	10.00	☆	1D05
L7-06	*AI1 High%* (AI1 highest percentage)	0.00% ... 100.00%	100.00%	☆	1D06
L7-07	*AI2 Low Point* (AI2 lowest input value)	0.00 ... 20.00	0.00	☆	1D07
L7-08	*AI2 Low%* (AI2 lowest percentage)	0.00% ... 100.00%	0.00%	☆	1D08
L7-09	*AI2 Mid Point* (AI2 mid-point input value)	0.00 ... 20.00	5.00	☆	1D09
L7-10	*AI2 Mid%* (AI2 mid-point percentage)	0.00% ... 100.00%	50.00%	☆	1D0A
L7-11	*AI2 High Point* (AI2 highest input value)	0.00 ... 20.00	10.00	☆	1D0B
L7-12	*AI2 High%* (AI2 highest percentage)	0.00% ... 100.00%	100.00%	☆	1D0C
L7-13	*AI3 Low Point* (AI3 lowest input value)	0.00 ... 20.00	0.00	☆	1D0D
L7-14	*AI3 Low%* (AI3 lowest percentage)	0.00% ... 100.00%	0.00%	☆	1D0E
L7-15	*AI3 Mid Point* (AI3 mid-point input value)	0.00 ... 20.00	5.00	☆	1D0F
L7-16	*AI3 Mid%* (AI3 mid-point percentage)	0.00% ... 100.00%	50.00%	☆	1D10
L7-17	*AI3 High Point* (AI3 highest input value)	0.00 ... 20.00	10.00	☆	1D11
L7-18	*AI3 High%* (AI3 highest percentage)	0.00% ... 100.00%	100.00%	☆	1D12

Tab. 5-33 Parameter list – L7: AI Multi-Point Curve Setting

L8: APPLICATION MACRO

PARAMETER LIST

Parameter group *L8: Application Macro*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
L8-00	*Macro selection* (Industry application macro selection)	0 = No function 1 = Custom user 2 = Air compressor 3 = Fan 4 = Water pump 5 = Conveyor belt 6 = Machine tool application 7 = Packaging 8 = Textile application 9 = High-speed drill application 10 = Reserved 11 = PID 12 = PID + auxiliary frequency	0	★	1E00
L8-01	*Macro Par.1* (Application macro parameter 1)	0.00 ... 29.00	0.00	☆	1E01
L8-02	*Macro Par.2* (Application macro parameter 2)	0.00 ... 29.00	0.00	☆	1E02
L8-03	*Macro Par.3* (Application macro parameter 3)	0.00 ... 29.00	0.00	☆	1E03
L8-04	*Macro Par.4* (Application macro parameter 4)	0.00 ... 29.00	0.00	☆	1E04
L8-05	*Macro Par.5* (Application macro parameter 5)	0.00 ... 29.00	0.00	☆	1E05
L8-06	*Macro Par.6* (Application macro parameter 6)	0.00 ... 29.00	0.00	☆	1E06
L8-07	*Macro Par.7* (Application macro parameter 7)	0.00 ... 29.00	0.00	☆	1E07
L8-08	*Macro Par.8* (Application macro parameter 8)	0.00 ... 29.00	0.00	☆	1E08
L8-09	*Macro Par.9* (Application macro parameter 9)	0.00 ... 29.00	0.00	☆	1E09
L8-10	*Macro Par.10* (Application macro parameter 10)	0.00 ... 29.00	0.00	☆	1E0A
L8-11	*Macro Par.11* (Application macro parameter 11)	0.00 ... 29.00	0.00	☆	1E0B
L8-12	*Macro Par.12* (Application macro parameter 12)	0.00 ... 29.00	0.00	☆	1E0C
L8-13	*Macro Par.13* (Application macro parameter 13)	0.00 ... 29.00	0.00	☆	1E0D
L8-14	*Macro Par.14* (Application macro parameter 14)	0.00 ... 29.00	0.00	☆	1E0E
L8-15	*Macro Par.15* (Application macro parameter 15)	0.00 ... 29.00	0.00	☆	1E0F
L8-16	*Macro Par.16* (Application macro parameter 16)	0.00 ... 29.00	0.00	☆	1E10
L8-17	*Macro Par.17* (Application macro parameter 17)	0.00 ... 29.00	0.00	☆	1E11
L8-18	*Macro Par.18* (Application macro parameter 18)	0.00 ... 29.00	0.00	☆	1E12
L8-19	*Macro Par.19* (Application macro parameter 19)	0.00 ... 29.00	0.00	☆	1E13
L8-20	*Macro Par.20*	0.00 ... 29.00	0.00	☆	1E14

Parameter group *L8: Application Macro*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Application macro parameter 20)				
L8-21	*Macro Par.21* (Application macro parameter 21)	0.00 ... 29.00	0.00	☆	1E15
L8-22	*Macro Par.22* (Application macro parameter 22)	0.00 ... 29.00	0.00	☆	1E16
L8-23	*Macro Par.23* (Application macro parameter 23)	0.00 ... 29.00	0.00	☆	1E17
L8-24	*Macro Par.24* (Application macro parameter 24)	0.00 ... 29.00	0.00	☆	1E18
L8-25	*Macro Par.25* (Application macro parameter 25)	0.00 ... 29.00	0.00	☆	1E19
L8-26	*Macro Par.26* (Application macro parameter 26)	0.00 ... 29.00	0.00	☆	1E1A
L8-27	*Macro Par.27* (Application macro parameter 27)	0.00 ... 29.00	0.00	☆	1E1B
L8-28	*Macro Par.28* (Application macro parameter 28)	0.00 ... 29.00	0.00	☆	1E1C
L8-29	*Macro Par.29* (Application macro parameter 29)	0.00 ... 29.00	0.00	☆	1E1D
L8-30	*Macro Par.30* (Application macro parameter 30)	0.00 ... 29.00	0.00	☆	1E1E
L8-31	*Macro Par.31* (Application macro parameter 31)	0.00 ... 29.00	0.00	☆	1E1F
L8-32	*Macro Par.32* (Application macro parameter 32)	0.00 ... 29.00	0.00	☆	1E20
L8-33	*Macro Par.33* (Application macro parameter 33)	0.00 ... 29.00	0.00	☆	1E21
L8-34	*Macro Par.34* (Application macro parameter 34)	0.00 ... 29.00	0.00	☆	1E22
L8-35	*Macro Par.35* (Application macro parameter 35)	0.00 ... 29.00	0.00	☆	1E23
L8-36	*Macro Par.36* (Application macro parameter 36)	0.00 ... 29.00	0.00	☆	1E24
L8-37	*Macro Par.37* (Application macro parameter 37)	0.00 ... 29.00	0.00	☆	1E25
L8-38	*Macro Par.38* (Application macro parameter 38)	0.00 ... 29.00	0.00	☆	1E26
L8-39	*Macro Par.39* (Application macro parameter 39)	0.00 ... 29.00	0.00	☆	1E27
L8-40	*Macro Par.40* (Application macro parameter 40)	0.00 ... 29.00	0.00	☆	1E28
L8-41	*Macro Par.41* (Application macro parameter 41)	0.00 ... 29.00	0.00	☆	1E29
L8-42	*Macro Par.42* (Application macro parameter 42)	0.00 ... 29.00	0.00	☆	1E2A
L8-43	*Macro Par.43* (Application macro parameter 43)	0.00 ... 29.00	0.00	☆	1E2B
L8-44	*Macro Par.44* (Application macro parameter 44)	0.00 ... 29.00	0.00	☆	1E2C
L8-45	*Macro Par.45* (Application macro parameter 45)	0.00 ... 29.00	0.00	☆	1E2D
L8-46	*Macro Par.46* (Application macro parameter 46)	0.00 ... 29.00	0.00	☆	1E2E
L8-47	*Macro Par.47*	0.00 ... 29.00	0.00	☆	1E2F

Parameter group *L8: Application Macro*					
Function code	**Parameter name**	**Setting value/Setting option**	**Default setting**	**Change ability**	**Comm. address**
	(Application macro parameter 47)				
L8-48	*Macro Par.48* (Application macro parameter 48)	0.00 ... 29.00	0.00	☆	1E30
L8-49	*Macro Par.49* (Application macro parameter 49)	0.00 ... 29.00	0.00	☆	1E31
L8-50	*Macro Par.50* (Application macro parameter 50)	0.00 ... 29.00	0.00	☆	1E32

Tab. 5-34 Parameter list – L8: Application Macro

5.3.2 2:QUICK START

1:QUICK START

Menu ***2: Quick Start*** refers to the various *control modes* of the H1 VFD and consists of the following submenus:

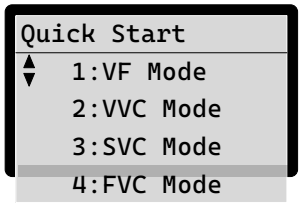


Fig. 5-29 2:Quick Start - Submenus

- V/F Mode (Voltage to Frequency control)
- VVC Mode (Voltage Vector Control)
- SVC Mode (Sensorless Vector Control)
- FVC Mode (Flux Vector Control mode)

5.3.3 3:APPLICATION SELECTION LIST

3:APP SEL LIST

Menu ***3: App Sel List*** refers to the various *load types* of the H1 VFD and provides the following *application macros*:

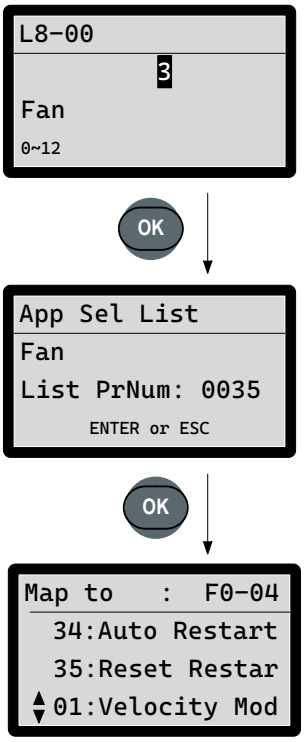


Fig. 5-30 4:Appl Sel List – Application type, e.g. Fan

- 0 Disable
- 1 User Parameter
- 2 Compressor
- 3 Fan
- 4 Pump
- 5 Conveyor
- 6 Machine Tool
- 7 Packing
- 8 Textiles
- 9 High Speed Digging
- 10 Reserved
- 11 PID
- 12 PID + Auxiliary

5.3.4 4:CHANGED LIST

4:CHANGED LIST

Menu ***4: Changed List*** shows the recording of *modified parameters* of the H1 VFD, which is useful during a root cause analyse.

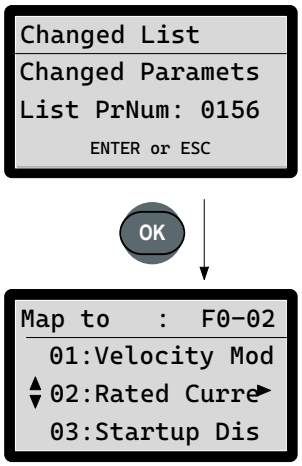


Fig. 5-31 4:Changed List – Modified parameter record, e.g. 0156

5.3.5 5:COPY PARAMETERS

5:COPY PR

Menu ***5:Copy Pr*** refers to the download of *HMI parameters* to the *VFD control unit* and vice versa.

The H1 VFD provides up to *four* parameter sets: *001:* to *004:*.

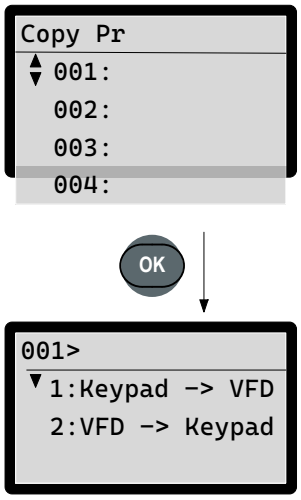


Fig. 5-32 5:Copy Pr – Download parameters

5.3.6 6:FAULT RECORD

6:FAULT RECORD

Menu ***6: Fault Record*** shows the recording of up to 30 *fault events*.

Each fault event is provided by the following record data:

- *Date*: Date of the fault event occurrence [dd/mm/yyyy]
- *Time*: Time of the fault event occurrence [hh:mm:ss]
- *OutFreq*: H1 VFD output frequency [Hz]
- *OutAmp*: H1 VFD output current [A]
- *OutVolt*: H1 VFD output voltage [V]
- *DCBus*: H1 VFD DC bus voltage [V]

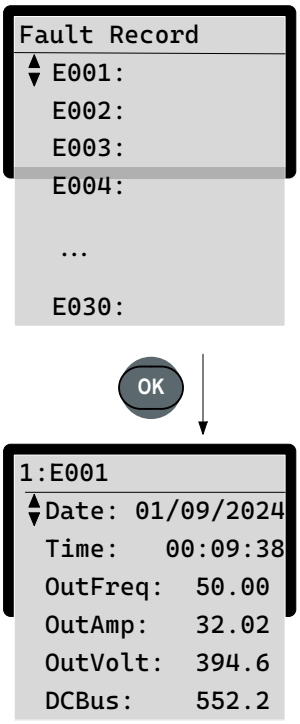


Fig. 5-33 6:Fault Record – Fault event data

5.3.7 7:SET LANGUAGE

7:SET LANGUAGE

Menu ***7:Set Language*** offers the option of switching the *menu language* in the operating unit (HMI).

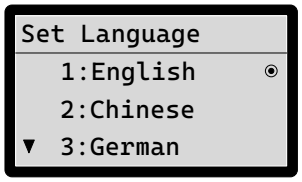


Fig. 5-34 7:Set Language – Menu language of HMI

CHAPTER REFERENCE

➢ For *menu language selection procedure*, refer to chapter "5.2.5 Selecting the Menu Language".

5.3.8 8:SET TIME

8:SET TIME

Menu ***8:Set Time*** shows the actual system time of the H1 VFD.

The *system time* of the H1 VFD real time clock (RTC) shows the following data:

- Actual date [yyyy/mm/dd]
- Actual time [hh:mm:ss]
- Actual weekday

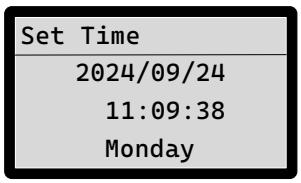


Fig. 5-35 8:Set Time – H1 VFD system time

NOTE

The *Weekday* parameter is automatically determined by the system based on the set year, month and day and does not need to be set by the user.

CHAPTER REFERENCE

- For parameter setting refer to chapter "5.2.4 Changing Parameter Settings (General)".

5.3.9 9:KEYPAD LOCK

9:KEYPAD LOCK

Menu ***9:Keypad Lock*** offers the option of locking the H1 VFD operation via the operating unit (HMI).

INSTRUCTION – Lock and Unlock the Keypad of Operating unit (HMI)

START *USER LEVEL: None*

LOCK HMI

STEP 1: Navigate to menu *9:Keypad Lock*.

- The display shows the instruction to lock the HMI keypad.

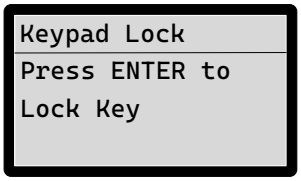


Fig. 5-36 Menu 9:Keypad Lock – Locking instruction

STEP 2: Press *OK* key OK.

- The display automatically shows the *Main screen*.
- The keypad of the HMI is *locked*.
- Only the *Main screen* is in an *unlocked* state. At this time, pressing any key will pop up the prompt "Press ESC key for 3 seconds to unlock the keyboard", and the same applies after power off.

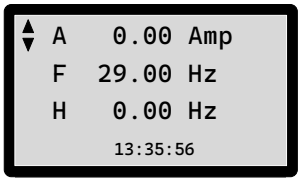


Fig. 5-37 Main screen

STEP 3: Press ESC key ESC for at least 3 s.

- The display shows the menu *9:Keypad lock* for 3 s with the instruction to unlock.

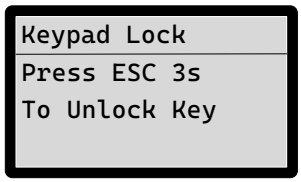


Fig. 5-38 Menu Keypad Lock – Unlocking instruction

- After approx. 3 seconds, the *Main screen* is automatically displayed again.
- The keypad of the HMI is *unlocked*.

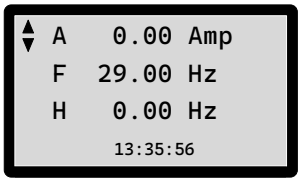


Fig. 5-39 Main screen

END

5.3.10 10:DISPLAY SETUP

10:DISPL SETUP

Menu *10:Displ Setup* offers three parameters for display configuration.

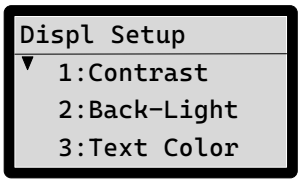


Fig. 5-40 Menu 10:Displ Setup

- *1:Contrast*:

  A positive offset gradually darkens the font, while a negative offset gradually fades the font.

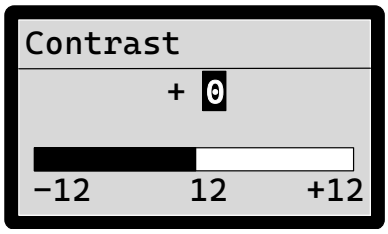


Fig. 5-41 Contrast submenu

- *2:Back-Light*:

  The setting value is given in minutes. The LCD backlight remains on until the set time is reached; after the set time, the backlight turns off. When set to 0, the backlight remains constantly on.

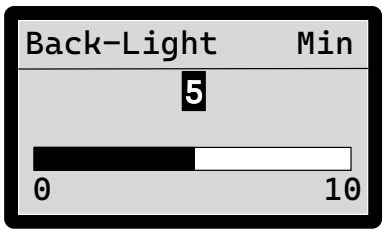
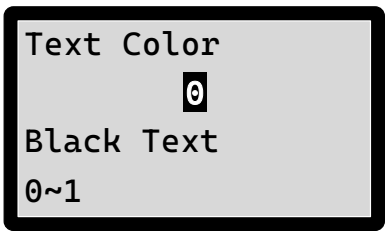


Fig. 5-42 Back-Light submenu

- *3:Text Color*:

  The default LCD setting is white background with black text. If the parameter is set to 1, then it is black background with white text.



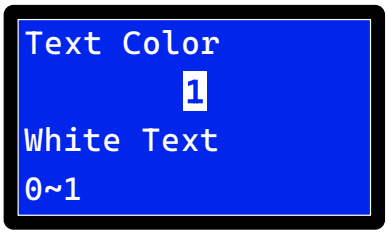


Fig. 5-43 Text Color submenu

NOTE

- For parameter setting, use *UP/DOWN* keys to modify the actual setting.
- For saving the new setting, press *OK* key. The display will then jump back to the upper-level menu *Displ Setup* screen.

5.3.11 11:START-UP

MENU 11:START-UP

Menu ***11:Start-up*** offers three selection options for the individual display during the start-up phase (3 s) of the H1 VFD.

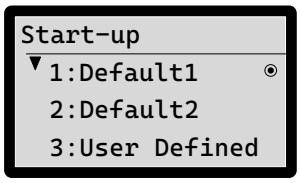


Fig. 5-44 Menu 11:Start-up

- 1:Default 1
- 2:Default 2
- 3:User Defined

CHAPTER REFERENCE

➢ The *Start-up screen selection* procedure is the same as for setting the *menu language* of the HMI. Refer to chapter "5.2.5 Selecting the Menu Language" for exemplary instruction.

6 COMMISSIONING

6.1 INTRODUCTION TO SENSORLESS VECTOR CONTROL (SVC)

SVC is a *sensorless vector control* method that can perform speed or torque control for *asynchronous* motors, *synchronous* motors, and *synchronous reluctance* motors. The following table shows the *parameters related to SVC commissioning*.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-03	*Motor1 F base* (M1 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0403
F4-04	*M1 VOLT Base* (M1 rated voltage)	0.0V ... 510.0V	380.0V	★	0404
Parameter group *F2: V/F Control Parameters 02*					
F2-04	*M1 Min Out FREQ Hz* (M1 multi-point VF frequency point 1)	0.00Hz ... 599.00Hz	0.50Hz	★	0204
F2-05	*M1 Min Out VOLT V* (M1 multi-point VF voltage point 1)	0.0V ... 480.0V	2.0V	★	0205
F2-06	*M1 Mul VF FREQ 2Hz* (M1 multi-point VF frequency point 2)	0.00Hz ... 599.00Hz	1.50Hz	★	0206
F2-07	*M1 Mul VF VOLT 2V* (M1 multi-point VF voltage point 2)	0.0V ... 480.0V	10.0V	★	0207
F2-08	*M1 Mul VF FREQ 3Hz* (M1 multi-point VF frequency point 3)	0.00Hz ... 599.00Hz	3.00Hz	★	0208
F2-09	*M1 Mul VF VOLT 3V* (M1 multi-point VF voltage point 3)	0.0V ... 480.0V	22.0V	★	0209
F2-10	*Slip COMP Filter sec* (Slip compensation filter time)	0.001s ... 10.000s	0.100s	☆	020A
Parameter group *F3: Vector Control Parameters 03*					
F3-29	*TQR COMP Filter sec* (Torque filter time)	0.001 ... 10.000	0.500	☆	031D
Parameter group *F7: Auxiliary Functions and Keypad Display*					
F7-37	*Auto Voltage REG* (Automatic voltage regulation)	0 = Activate AVR function 1 = Cancel AVR function 2 = Cancel AVR during deceleration	0	☆	0725

Tab. 6-1 Parameters for SVC commissioning

6.1.1 BASIC SETTINGS

The basic settings for commissioning asynchronous motors with VF and VVC primarily include setting the:

- *motor nameplate parameters*.

Generally, motor parameter identification is not needed.

CHAPTER REFERENCE

The setup process is shown in the "Annex" as a flow chart: "Figure 2 Basic setting process for SVC of permanent magnet motors (PM) and induction (asynchronous) Motors (IM)".

Basic setting steps for VF and VVC are according to the following instruction.

INSTRUCTION – Basic Settings for VF and VVC

START *USER LEVEL: Keypad Unlock*

PARAMETER RESET

STEP 1: Set parameter *F0-18 Parameter reset = 9*.

➢ The VFD parameters can be restored to factory settings.

MOTOR TYPE SELECTION

STEP 2: Set Parameter *F4-00 Motor Type Selection = 0*.

➢ Setting option "0" is for induction motors.

NAME PLATE PARAMETER SETTING

STEP 3: Set the *motor parameters* according to the actual motor nameplate parameters as shown in the following table.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-00	*Motor Type Sel* (Motor type selection)	0 = Induction motor (IM) 1 = Surface-mounted permanent magnet synch. motor 2 = Interior permanent magnet synchronous motor 3 = Synchronous reluctance motor	0	★	0400
F4-03	*Motor1 F base* (M1 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0403
F4-04	*M1 VOLT Base* (M1 rated voltage)	0.0V ... 510.0V	380.0V	★	0404
F4-05	*Motor1 Rated P* (IM1 rated power)	0.00kW ... 655.35kW	Machine type determination	★	0405
F4-06	*Motor1 Poles* (IM1 number of poles)	2 ... 20	Machine type determination	★	0406
F4-07	*Motor1 Rated A* (IM1 rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Confirmation of F4-05	★	0407
F4-08	*Motor1 Rated* (IM1 rated speed)	0rpm ... 65535rpm	Confirmation of F4-05	★	0408

Tab. 6-2 Motor nameplate parameters

MOTOR PARAMETER IDENTIFICATION

STEP 4: Perform *motor parameter identification* (optional, generally not required); set parameter *F4-01 Auto-Tuning SEL = 6 (IM rotation identification)* or *2 (IM static identification)*.

STEP 5: Start the identification by pressing the *RUN* key.

➢ After completion, the motor parameters shown in Tab. 6-3 will *automatically update*.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-10	*Motor1 No-Load* (IM1 no-load current)	0.00A ... setting value of F4-07	Machine type determination	★	040A
F4-11	*Motor1 Rs* (IM1 stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	040B
F4-12	*Motor1 Rr* (IM1 rotor resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	040C
F4-13	*Motor1 Lm* (IM1 mutual inductance)	0.0mH ... 6553.5mH	Machine type determination	★	040D
F4-14	*Motor1 Lx* (IM1 leakage inductance)	0.00mH ... 655.35mH	Machine type determination	★	040E

Tab. 6-3 Motor parameters after identification

CONTROL MODE

STEP 6: Set the control mode to VF or VVC; set *F0-03 Control Method = 0* for *speed mode* and setting *F0-04 Velocity mode = 0* will set the control mode to *VF control*.

- If F0-*04 Velocity mode = 2*, it will be VVC for an asynchronous motor.

END

6.1.2 NO-LOAD COMMISSIONING

After completing the basic settings, *no-load debugging* can be performed. Control the motor to run at different frequencies, and if the motor vibrates, increase setting of parameter *F2-14 Oscillation Suppression Gain*.

6.1.3 FULL-LOAD COMMISSIONING

After no-load commissioning, proceed with *load commissioning*. If the motor's load capacity is insufficient, try increasing *F2-01 Torque compensation gain*.

Under full load, if the actual motor speed is lower than the set speed, try increasing *F2-11 Slip Compensation Gain*.
Conversely, if the actual motor speed is higher than the set speed, try reducing *F2-11 Slip Compensation Gain*.

6.2 PERMANENT MAGNET MOTOR (PM), VVC – COMMISSIONING

PMVVC is a *sensorless vector control* method for *permanent magnet synchronous motors*. The following table shows the parameters needed for *debugging*.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F1-01	*PM startup way* (Initial position identification method)	0 = No initial angle identification 1 = Attraction method 3 = Pulse injection method 1 4 = Pulse injection method 2	0	☆	0101
F1-36	*Rot Pos Det PLS ms* (PM voltage pulse width)	0.0ms ... 3.0ms	1.0ms	☆	0124
F1-37	*Reserved* (PM high frequency injection frequency)	0Hz ... 1200Hz	500Hz	☆	0125
F1-38	*Reserved* (PM high frequency injection amplitude)	0.0V ... 200.0V	30.0V	☆	0126
Parameter group *F2: V/F Control Parameters 02*					
F2-01	*TQR COMP Gain* (Torque compensation gain)	0 ... 10	1	☆	0201
Parameter group *F3: Vector Control Parameters 03*					
F3-23	*I/F Id Level* (I/F mode current command)	0% ... 150%	40%	☆	0317
F3-24	*IF PMLESS Sw Frq Hz* (IF switching frequency 1)	0.00Hz ... 599.00Hz	20.00Hz	☆	0318
F3-25	*PMLESS-IF Sw Frq Hz* (IF switching frequency 2)	0.00Hz ... 599.00Hz	20.00Hz	☆	0319
F3-29	*TQR COMP Filter sec* (Torque filter time)	0.001 ... 10.000	0.500	☆	031D
F3-41	*VCC Comp Hp* (High-speed observer bandwidth)	0.00s ... 600.00s	5.00s	☆	0329
F3-42	*VCC Comp Gain* (VVC frequency compensation gain)	0.00 ... 655.35	1.00	☆	032A

Tab. 6-4 Parameters for permanent magnet motor VVC commissioning

6.2.1 BASIC SETTINGS

The *basic settings* for PMVVC commissioning include setting the:

- *motor nameplate parameters* and
- *motor parameter identification*.

CHAPTER REFERENCE

The setup process is shown in the "Annex" as a flow chart: "Figure 3 Basic setting process for VVC commissioning of Permanent Magnet Motors (PM)".

Basic setting steps for PMVVC are according to the following instruction.

INSTRUCTION – Basic Settings for PMVVC

START *USER LEVEL: Keypad Unlock*

PARAMETER RESET STEP 1: Set parameter *F0-18 Parameter reset = 9*.

- The VFD parameters can be restored to factory settings.

MOTOR TYPE SELECTION STEP 2: Set parameter *F4-00 Motor Type Selection = 1* or *2*.

- Setting option "1" is for *surface-mounted* permanent magnet synchronous motors (SPM).
- Setting option "2" is for *interior* permanent magnet synchronous motors (IPM).

NAME PLATE PARAMETER SETTING STEP 3: Set motor *nameplate parameters* according to the parameters shown in the following table based on the motor's nameplate.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-00	*Motor Type Sel* (Motor type selection)	0 = Induction motor 1 = Surface-mounted permanent magnet synch. motor 2 = Interior permanent magnet synchronous motor 3 = Synchronous reluctance motor	0	★	0400
F4-03	*Motor1 F base* (M1 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0403
F4-04	*M1 VOLT Base* (M1 rated voltage)	0.0V ... 510.0V	380.0V	★	0404
F4-15	*PM Rated Power* (PM rated power)	0.00kW ... 655.35kW	Machine type determination	★	040F
F4-16	*PM Pole number* (PM number of poles)	0 ... 65535	Machine type determination	★	0410
F4-17	*PM Rated Current A* (PM rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Confirmation of F4-15	★	0411
F4-18	*PM Rated RPM* (PM rated speed)	0rpm ... 65535rpm	Confirmation of F4-15	★	0412

Tab. 6-5 PM Motor nameplate parameters

MOTOR PARAMETER IDENTIFICATION STEP 4: Perform motor parameter identification; set parameter *F4-01 Auto-Tuning SEL = 5 (PM rotation identification)* or *13 (PM static identification).*

STEP 5: Start the identification by pressing the *RUN* key.

- After completion, the motor parameters shown in Tab. 6-6 will automatically update.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-20	*PM Rs* (PM stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	0414
F4-21	*PM Ld* (PM d-axis inductance)	0.00mH ... 655.35mH	Machine type determination	★	0415
F4-22	*PM Lq* (PM q-axis inductance)	0.00mH ... 655.35mH	Machine type determination	★	0416
F4-23	*PM Ke Coefficient V* (PM Ke parameters)	0V ... 65535V	Machine type determination	★	0417

Tab. 6-6 PM motor parameters after identification

- Tab. 6-6 indicates that the *Ke parameter* refers to the effective value of the back electromotive force at 1000 rpm. A *true Ke value* can be obtained during rotation identification, while during static identification, Ke will be estimated based on motor parameters.

- If an error occurs during identification, or if the identification results are not within a reasonable range, identification must be redone. The table below details possible identification errors, and when an error occurs, you can follow the descriptions in Tab. 6-7 to troubleshoot.

Fault code	Description
E040 Motor parameter identification	Motor parameter identification error
E142 No feedback current during	No feedback current
E143 Motor phase loss during motor	Motor phase loss

Tab. 6-7 Identification related errors

CONTROL MODE STEP 6: Set the control mode to PMVVC.

- Setting *F0-03 Control Method = 0 (Speed mode)* and setting *F0-04 Velocity Mode = 2 (VVC voltage vector control)* will configure the control mode to PMVVC.

INITIAL ANGLE IDENTIFICATION STEP 7: Set the required setting option for the initial angle identification method.

- Select the *initial angle identification* method through parameter *F1-01 PM startup way* as shown in "Tab. 6-4 Parameters for permanent magnet motor VVC commissioning".
- If reverse starting is not allowed, prefer options *3* or *4*. If reverse starting is permitted or if *3* and *4* are not effective, setting *1 (attraction method)* may be attempted.

END

6.2.2 NO-LOAD COMMISSIONING

After completing the basic settings, *no-load commissioning* can be performed.

CHAPTER REFERENCE

The no-load commissioning process is shown in the "Annex" as a flow chart: "Figure 4 No-load debugging process for Permanent Magnet Motor (PM), VVC".

For *no-load* commissioning of permanent magnet motor with VVC please note the following instruction.

INSTRUCTION – No-Load Commissioning of Permanent Magnet Motor with VVC

START — *USER LEVEL: Keypad Unlock*

STEP 1: Start the motor and run it up to 1/2 of its rated speed.

- If overcurrent occurs during startup, handle according to the setting of parameter *F1-01 PM startup way*:
  - if *F1-01 = 1 (Attraction Method)*, reduce the current loop bandwidth,
  - if *F1-01 = 3 (Pulse injection method 1)* or *4 (Pulse injection method 2)*, *decrease* setting of parameter *F1-36 PM Voltage Pulse Width*.
- If reverse starting is not permitted and the motor reverses, *increase* setting of parameter *F1-36 PM Voltage Pulse Width*.
- If the no-load current is too high (exceeding 60 % of the rated current), setting of parameter *F2-01 Torque Compensation Gain* can be increased.

STEP 2: Control the motor to run at its rated speed.

- If the motor exhibits *periodic low-frequency fluctuations*, attempt to *increase* setting of parameter *F3-42 VVC Frequency Compensation Gain* or *F3-41 VVC Frequency Compensation High Pass*.
- If the motor experiences *severe vibration*, attempt to *decrease* setting of parameter *F3-42 VVC Frequency Compensation Gain* or *F3-41 VVC Frequency Compensation High Pass*.

STEP 3: Control the motor to run at its maximum speed.

- If loss of control occurs during acceleration, attempt to increase setting of parameter *F3-42 VVC Frequency Compensation Gain*, or *F0-15 Carrier Frequency kHz* (where the carrier frequency generally needs to be more than 10 times the highest output frequency).

END

6.2.3 FULL LOAD COMMISSIONING

After the no-load commissioning is completed, load commissioning can be performed.

CHAPTER REFERENCE

The load commissioning process is shown in the "Annex" as a flow chart: "Figure 5 Full load debugging process for Permanent Magnet Motor (PM), VVC".

By default, I/F control is applied at 1/10 of the rated speed. If I/F control is not used, *F3-25 PMLESS-IF Sw Frq Hz* can be set to zero.

For *full load* commissioning of permanent magnet motor with VVC please note the following instruction.

INSTRUCTION – Full Load Commissioning of Permanent Magnet Motor with VVC

START — *USER LEVEL: Keypad Unlock*

LOW-SPEED LOAD CAPACITY COMMISSIONING

STEP 1: Run the motor at 1/10 of the rated speed.

- If the load capacity of the motor is insufficient, *increase* the setting of parameter *F3-23 I/F Id Level* (I/F Mode Current Command).
- If the low-frequency current is too high, *decrease* the setting of parameter *F3-23 I/F Id Level*.

LOAD TEST DURING ACCELERATION

STEP 2: Accelerate from 1/10 of the rated speed to the rated speed.

- If instability occurs, attempt to increase the setting of parameter *F3-30 VVC VFFD Gain* (VVC Voltage Feedforward Gain).

RATED SPEED LOAD TEST

STEP 3: Run the motor at rated speed.

- If the motor exhibits *periodic low-frequency fluctuations*, attempt to *increase* the setting of parameter *F3-41 VCC Comp Hp* (VVC Frequency Compensation Highpass) or *F3-42 VCC Comp Gain* (VVC Frequency Compensation Gain).
- If the motor experiences *severe vibrations*, attempt to *decrease* the setting of parameter *F3-41 VCC Comp Hp* or *F3-42 VCC Comp Gain*.

END

6.3 INDUCTION MOTORS (IM) AND PERMANENT MAGNET MOTORS (PM), SVC – COMMISSIONING

6.3.1 INTRODUCTION TO SVC

SVC is a *sensorless vector control* method that can perform *speed* or *torque control* for *induction* motors, *synchronous* motors, and *synchronous reluctance* motors. The following table shows the *parameters related to SVC commissioning*.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F3: Vector Control Parameters 03*					
F3-00	*System Control*	0 ... 65535	0	★	0300
F3-01	*ASR1/2 Switch F Hz* (ASR1/2 switching frequency)	5.00Hz ... 599.00Hz	7.00Hz	☆	0301
F3-02	*ASR Band Width* (Zero speed bandwidth)	1Hz ... 40Hz	10Hz	☆	0302
F3-03	*ASR1 Band Width* (ASR1 low-speed bandwidth)	1Hz ... 40Hz	10Hz	☆	0303
F3-04	*ASR2 Band Width* (ASR2 high-speed bandwidth)	1Hz ... 40Hz	10Hz	☆	0304
F3-05	*ASR2 Kp (Zero SPD) Hz* (ASR zero-speed gain)	0Hz ... 40Hz	10Hz	☆	0305
F3-06	*ASR2 Ki (Zero SPD) sec* (ASR zero-speed integral)	0.000s ... 10.000s	0.100s	☆	0306
F3-07	*ASR1 Kp (Low SPD) Hz* (ASR1 low speed gain)	0Hz ... 40Hz	10Hz	☆	0307
F3-08	*ASR1 Ki (Low SPD) sec* (ASR1 low-speed integral time)	0.000s ... 10.000s	0.100s	☆	0308
F3-09	*ASR2 Kp (High SPD) Hz* (ASR2 high-speed gain)	0Hz ... 40Hz	10Hz	☆	0309
F3-10	*ASR2 Ki (High SPD) sec* (ASR2 high-speed integral time)	0.000s ... 10.000s	0.100s	☆	030A
F3-14	*ASR Output LPF* (ASR output filtering time)	0.000s ... 0.350s	0.008s	☆	030E
F3-23	*I/F Id Level* (I/F mode current command)	0% ... 150%	40%	☆	0317
F3-26	*Kp of AMR* (Field weakening proportional coefficient)	0.00 ... 3.00	1.00	☆	031A
F3-27	*Ki of AMR* (Field weakening integral coefficient)	0.00 ... 3.00	0.20	☆	031B
Parameter group *F4: Motor Parameters*					
F4-09	*System Jm* (Inertia per unit value)	1pu ... 65535pu	Machine type determination	★	0409
Parameter group *L2: Optimization Control Parameters*					
L2-09	*DBC 4 slope gain* (Dead zone compensation slope 4)	0 ... 65535	200	☆	1809

Tab. 6-8 Parameters Related to SVC Commissioning

6.3.2 BASIC SETTINGS (INDUCTION MOTORS (IM), SVC)

The basic settings for an *induction motor SVC* include setting the:

- *motor nameplate parameters* and
- *motor parameter identification*.

CHAPTER REFERENCE

The setup process is shown in the "Annex" as a flow chart: "Figure 6 Basic setup process flow chart for Induction Motor (IM), SVC".

Basic setting steps for *Induction Motors SVC* are according to the following instruction.

INSTRUCTION – Basic Settings for Induction Motors (IM), SVC

START *USER LEVEL: Keypad Unlock*

PARAMETER RESET

STEP 1: Set parameter *F0-18 Parameter reset = 9*.

➢ The VFD parameters can be restored to factory settings.

MOTOR TYPE SELECTION

STEP 2: Set parameter *F4-00 Motor Type Selection = 0*.

➢ Setting option *0* is for induction motors (IM).

NAME PLATE PARAMETER SETTING

STEP 3: Set the *motor parameters* according to the actual motor nameplate parameters as shown in the following table.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-03	*Motor1 F base* (M1 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0403
F4-04	*M1 VOLT Base* (M1 rated voltage)	0.0V ... 510.0V	380.0V	★	0404
F4-05	*Motor1 Rated P* (IM1 rated power)	0.00kW ... 655.35kW	Machine type determination	★	0405
F4-06	*Motor1 Poles* (IM1 number of poles)	2 ... 20	Machine type determination	★	0406
F4-07	*Motor1 Rated A* (IM1 rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Confirmation of F4-05	★	0407
F4-08	*Motor1 Rated* (IM1 rated speed)	0rpm ... 65535rpm	Confirmation of F4-05	★	0408

Tab. 6-9 IM Motor nameplate parameters

MOTOR PARAMETER IDENTIFICATION

STEP 4: Check whether the motor is disengaged from the load.

➢ In the case of disengagement, it is recommended to set parameter *F4-01 Auto-Tuning SEL = 6 (IM rotation identification)*.

➢ If disengagement is not possible, set parameter *F4-01 Auto-Tuning SEL = 2 (IM static parameter identification)*.

STEP 5: Press the "RUN" button to start the identification process.

➢ After the motor parameter identification is completed, the motor parameters shown in the following table will be automatically updated.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-10	*Motor1 No-Load* (IM1 no-load current)	0.00A ... setting value of F4-07	Machine type determination	★	040A
F4-11	*Motor1 Rs* (IM1 stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	040B
F4-12	*Motor1 Rr* (IM1 rotor resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	040C
F4-13	*Motor1 Lm* (IM1 mutual inductance)	0.0mH ... 6553.5mH	Machine type determination	★	040D
F4-14	*Motor1 Lx* (IM1 leakage inductance)	0.00mH ... 655.35mH	Machine type determination	★	040E

Tab. 6-10 IM Motor parameters after identification

CONTROL MODE STEP 6: Set the control mode to SVC.

- Setting *F0-03 Control Method = 0 (Speed mode)* and setting *F0-04 Velocity Mode = 6 (SVC open loop vector control)* will configure the control mode to SVC.

FORWARD/REVERSE DIRECTION STEP 7: Set the operating direction of the VFD depending on whether a bidirectional direction is permitted or not.

- If bidirectional operation is *allowed*, set *F0-09 Fwd/Rev Forbid = 0 (Forward and reverse enabled).*
- If bidirectional operation is *not allowed*, set *F0-09 Fwd/Rev Forbid = 1 (Reverse disabled)* or *2 (Forward disabled).*

NOTE

The above parameters refer to the per-phase parameter values. If an error occurs during identification, or if the identification results are not within a reasonable range, identification must be redone.

END

6.3.3 BASIC SETTINGS (PERMANENT MAGNET MOTORS (PM), SVC)

The basic settings for a permanent magnet motor SVC include setting the motor nameplate parameters and motor parameter identification.

CHAPTER REFERENCE

The setup process is shown in the "Annex" as a flow chart: "Figure 7 Basic setup process flow chart for Permanent Magnet Motor (PM), SVC".

Basic setting steps for *Permanent Magnet Motors SVC* are according to the following instruction.

INSTRUCTION – Basic Settings for Permanent Magnet Motors (PM), SVC

START *USER LEVEL: Keypad Unlock*

PARAMETER RESET

STEP 1: Set parameter *F0-18 Parameter reset = 9*.

➢ The VFD parameters can be restored to factory settings.

MOTOR TYPE SELECTION

STEP 2: Set parameter F4-00 Motor Type Selection = 1 or 2.

➢ Setting option "1" is for *surface-mounted* permanent magnet synchronous motors (SPM).

➢ Setting option "2" is for *interior* permanent magnet synchronous motors (IPM).

NAME PLATE PARAMETER SETTING

STEP 3: Set the *motor parameters* according to the actual motor nameplate parameters as shown in the following table.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-03	*Motor1 F base* (M1 rated frequency)	0.00Hz ... 599.00Hz	50.00Hz	★	0403
F4-04	*M1 VOLT Base* (M1 rated voltage)	0.0V ... 510.0V	380.0V	★	0404
F4-15	*PM Rated Power* (PM rated power)	0.00kW ... 655.35kW	Machine type determination	★	040F
F4-16	*PM Pole number* (PM number of poles)	0 ... 65535	Machine type determination	★	0410
F4-17	*PM Rated Current A* (PM rated current)	0.00A ... 655.35A (93kW and below) 0.0A ... 6553.5A (110kW and above)	Confirmation of F4-15	★	0411
F4-18	*PM Rated RPM* (PM rated speed)	0rpm ... 65535rpm	Confirmation of F4-15	★	0412

Tab. 6-11 PM Motor nameplate parameters

MOTOR PARAMETER IDENTIFICATION

STEP 4: Perform motor parameter identification; set parameter *F4-01 Auto-Tuning SEL = 5 (PM rotation identification)* or *13 (PM static identification).*

STEP 5: Start the identification by pressing the *RUN* key.

➢ After completion, the motor parameters shown in Tab. 6-6 will automatically update.

Function code	Parameter name	Setting value/Setting option	Default setting	Change ability	Comm. address
Parameter group *F4: Motor Parameters*					
F4-20	*PM Rs* (PM stator resistance)	0.000Ω ... 65.535Ω	Machine type determination	★	0414
F4-21	*PM Ld* (PM d-axis inductance)	0.00mH ... 655.35mH	Machine type determination	★	0415
F4-22	*PM Lq* (PM q-axis inductance)	0.00mH ... 655.35mH	Machine type determination	★	0416
F4-23	*PM Ke Coefficient V* (PM Ke parameters)	0V ... 65535V	Machine type determination	★	0417
F4-24	*Pmotor Bemf coff* (PM back electromotive force coefficient)	0.0 ... 6553.5	Machine type determination	★	0418
F4-25	*PM TUN I LEVEL* (PM identification current threshold)	0.00% ... 100.00%	Machine type determination	☆	0419
F4-26	*PM Magnetic ANGl DEG* (PM pole angle)	0.0DEG ... 360.0DEG	Machine type determination	★	041A

Tab. 6-12 PM motor parameters after identification

CONTROL MODE STEP 6: Set the control mode to SVC.

- Setting *F0-03 Control Mode = 0 (Speed mode)* and setting *F0-04 Velocity Mode = 6 (SVC open loop vector control)* will configure the control mode to SVC.

INITIAL ANGLE IDENTIFICATION STEP 7: Set the required setting option for the initial angle identification method.

- Select the *initial angle identification* method through parameter *F1-01 PM startup way* as shown in "Tab. 6-4 Parameters for permanent magnet motor VVC commissioning".
- Check whether reversal operation is allowed.
  - If reverse starting is not allowed, prefer options *3* or *4*.
  - If reverse starting is permitted check whether heavy load is allowed.
    - If heavy load is not allowed, set *F1-01 PM startup way = 0*.
    - I heavy load is permitted, set *F1-01 PM startup way = 3 or 4.*

END

6.3.4 NO-LOAD COMMISSIONING

After completing the basic settings, *no-load commissioning* can be performed.

CHAPTER REFERENCE

The no-load commissioning process is shown in the "Annex" as a flow chart: "Figure 8 SVC No-load commissioning process flow chart".

6.3.5 LOAD COMMISSIONING

After completing the no-load commissioning, *load commissioning* can be performed.

CAHPTER REFERENCE

The load commissioning process is shown in the "Annex" as a flow chart: "Figure 9 SVC Load commissioning process flow chart".

7 MAINTENANCE

WARNING

Danger due to electric shock!

After switching off the mains supply, dangerous voltage can still be present in the H1 VFD unit.

- *Do not* perform troubleshooting and maintenance on the H1 VFD with power on.
- Ensure you power off the H1 VFD before opening the cabinet door and follow all lock-out/ tag-out safety procedures.
- Apply the five safety rules of electrical engineering (see *Five rules of electrical engineering*).
- Always switch the mains voltage off if it is necessary to open the H1 VFD unit and wait at least 10 minutes to allow the capacitors to discharge.
- Always check the DC-link voltage or wait one hour after the mains voltage has been switched off, before dismantling the H1 VFD unit for maintenance, inspection, or repair.
- Only qualified electrical maintenance personnel should perform maintenance, inspection, or replacement of parts.

The H1 VFD is designed to require minimum of servicing and maintenance. There are however some things which must be checked regularly to optimise product lifetime.

- Keep the H1 unit clean and cooling efficient (clean air inlets, heatsink profile, parts, components, etc.)
- There is an internal fan that should be inspected and cleaned from dust if necessary.
- If H1 VFD is built into cabinets, also check and clean the dust filters of the cabinets regularly.
- Check external wiring, connections, and control signals.
- Check tightening of all terminal screws regularly, especially important are power and motor cable connections.

Preventive maintenance can optimise the product lifetime and secure trouble-free operation without interruptions.
For more information on maintenance, please contact your AuCom service partner.

PRECAUTIONS TO TAKE WITH A CONNECTED MOTOR

NOTE

Refer to motor manufacturers instruction manual for motor maintenance requirements.

If work must be carried out on a connected motor or on the driven machine, the mains voltage must always first be disconnected from the H1 unit.

If the H1 VFD is connected to a PMSM (permanent magnet synchronous motor) it is most important that you also disconnect the motor before performing any maintenance on the H1 unit.

WARNING

Do not work on a drive when a rotating PMSM is connected to it.

A rotating PMSM energizes the H1 VFD including its power terminals.

8 TROUBLESHOOTING

WARNING

Danger due to electric shock!

After switching off the mains supply, dangerous voltage can still be present in the H1 VFD.

- *Do not* perform troubleshooting and maintenance on the H1 VFD with power on.
- Ensure you power off the H1 VFD before opening the cabinet door and follow all lock-out/ tag-out safety procedures.
- Apply the five safety rules of electrical engineering (see *Five rules of electrical engineering*).
- Always switch the mains voltage off if it is necessary to open the H1 VFD and wait at least 10 minutes to allow the capacitors to discharge.
- Always check the DC-link voltage or wait one hour after the mains voltage has been switched off, before dismantling the H1 VFD for maintenance, inspection, or repair.
- Only qualified electrical maintenance personnel should perform maintenance, inspection, or replacement of parts.

8.1 ALARM EVENTS – CAUSES AND REMEDIES

For some errors that have a minor impact on the system, the VFD only issues a warning and continues to operate, while displaying the warning name and corresponding warning code on the LCD panel.
Once the warning reset conditions are met, the warning is automatically cleared, and the motor operates normally. Warning codes and corresponding warning handling are shown in Tab. 8-1 Alarm events – Causes and remedy.

Use this table to troubleshoot when the VFD reports an *alarm* event.

Alarm code	Warning message	Fault description	Possible cause	Reset method and conditions
A001	*Communication command error*	RS485 Modbus, illegal communication command	1. Communication command sent by the host computer is incorrect. 2. Misoperation due to interference and differing communication conditions with the host machine. 3. Communication cable disconnected or poorly connected.	*Reset:* • When parameter F8-05 is set to 0 for "warning" and continues to operate, the warning is *automatically* reset after receiving the correct communication command.
A002	*Communication address error*	RS485 Modbus, illegal communication data address		
A003	*Communication data error*	RS485 Modbus, illegal communication data value		
A004	*VFD unable to handle*	RS485 Modbus, writing data to a read-only address		
A005	*Communication transmission timeout*	RS485 Modbus, transmission timeout	1. The host did not send the communication command within the time set by parameter F8-04 2. Misoperation due to interference 3. Communication conditions differ from those of the host machine 4. Communication cable is disconnected or poorly connected.	*Reset:* • When parameter F8-05 is set to 0 for "warning" and continues operation, it's considered a "warning", which is *automatically* reset after receiving the next communication packet.
A006	*Parameter copy error*	Keypad to Drive COPY function error warning 1	1. Communication anomaly 2. Panel anomaly 3. Control panel anomaly.	*Reset:* • *Manual* reset is required.
A007	*Parameter copy error*	Keypad to Drive COPY function error warning 2	1. Check if new parameters have been added to the VFD software.	*Reset:*

Alarm code	Warning message	Fault description	Possible cause	Reset method and conditions
			2. Misoperation due to interference.	• *Manual* reset is required.
A009	*IGBT overheating Warning*	The VFD detects IGBT temperature too high, exceeding the IGBT overheating warning set point (parameter F9-41, above which no IGBT overheating warning will be issued, instead, an IGBT temperature too high fault will occur directly).	1. Check if the on-site environment or temperature inside the control cabinet is too high, or if the ventilation holes of the cabinet are blocked. 2. Check for foreign objects on the heatsink, and whether the fan is rotating. 3. Insufficient ventilation space for the VFD 4. Check if the load matches the VFD 5. Long time operation at 100% or more than 100% rated output.	*Reset:* • The warning is *automatically* reset when the IGBT temperature falls below 85°C.
A010	*Environmental overheating warning*	The VFD detects internal key component temperatures too high, exceeding the protection setpoint.		*Reset:* • A *manual* reset is possible only after the ambient temperature sensor temperature falls below 45°C.
A011	*PID feedback signal warning*	PID feedback signal loss warning (applicable to analog feedback signals, requires PID function to be enabled)	1. PID feedback wiring loose or disconnected. 2. Feedback device fault 3. Hardware fault.	*Reset:* • When parameter FA-50 is set to 0 or 3, it's considered a "warning". Warning is *automatically* cleared when the feedback signal exceeds 4 mA. • When parameter FA-50 is set to 1 or 2, it's considered a "fault" and requires *manual* reset.
A012	*AI current signal disconnection*	Warning A012 is issued, when 4-20mA disconnection action (parameter F5-42) is set to 1 or 2, any one of the analog input terminals AI1, AI2, or AI1 is of the 4-20mA current signal type, and the analog input function is non-zero, the input current signal at that terminal falls below the 4-20mA disconnection threshold (parameter F5-43).	Analog input current signal is disconnection	*Reset:* • Warning is *automatically* cleared when disconnection warning conditions are not met.
A015	*PG feedback error*	PG Feedback error warning	1. Encoder parameter incorrect setting 2. Disconnection in encoder wiring 3. Damage to PG card or PG encoder 4. Misoperation due to interference.	*Reset:* • This warning is *automatically* cleared after the machine is stopped.
A017	*Overspeed warning*	Excessive speed warning	1. In open loop control, parameter F3-36 speed observer bandwidth is improperly set. 2. Bandwidth setting of ASR speed controller is inappropriate. 3. Incorrect setting of motor parameters 4. Misoperation due to interference	

Alarm code	Warning message	Fault description	Possible cause	Reset method and conditions
A018	*Speed deviation*	Large speed deviation warning	1. Inappropriate setting of feedback deviation anomaly function parameters 2. Inappropriate setting of ASR-related parameters and acceleration/deceleration 3. Acceleration/deceleration time too short 4. Motor jammed 5. Mechanical brake not released 6. Incorrect setting of torque limit related parameters, causing misoperation due to interference.	*Reset:* • A018 warning is *automatically* cleared after the machine is stopped.
A019	*Input phase loss*	VFD input phase loss	1. Input power phase loss occurred. 2. Single-phase power input in a three-phase machine type. 3. Power supply voltage fluctuated. 4. Loose terminals of the input power supply. 5. Check if the input cables of the three-phase power supply have been cut. 6. Unbalanced three-phase input power supply.	
A020	*Over-torque*	Over-torque 1 warning	1. Incorrect parameter setting. 2. Fault on the mechanical side. 3. Excessive load 4. Acceleration/deceleration and duty cycle time too short 5. Voltage too high in V/F control 6. Motor capacity too small 7. Overload during low-speed operation 8. Torque compensation amount too large 9. Inappropriate setting of speed tracking function parameters (including situations of instant power-off restart and abnormal restart).	*Reset:* • A020 warning is *automatically* cleared when the output current is less than the set value of parameter F9-37.
A021	*Over-torque*	Over-torque 2 warning		*Reset:* • A021 warning is *automatically* cleared when the output current is less than the set value of parameter H3-01.
A022	*Motor Overheating*	Motor overheating	1. Motor jam 2. Excessive load 3. High ambient temperature 4. The motor's cooling system/fan is malfunctioning. 5. Frequent use in low-speed operation; 6. Acceleration/ deceleration time and duty cycle time too short 7. Voltage too high in V/F control. 8. Check if the motor's rated current setting matches the motor nameplate 9. Check if the PTC-related settings and wiring are appropriate. 10. Check if the stall prevention action setting is correct. 11. Imbalance in motor three-phase impedance 12. Excessive harmonic components.	*Reset:* • When parameter F9-48 is set to 0 for "warning", A022 warning is *automatically* cleared when the temperature is less than or equal to the set value of parameter F9-49.

Alarm code	Warning message	Fault description	Possible cause	Reset method and conditions
A024	*Excessive slip*	Using the maximum slip (parameter F2-13) as a baseline, when the VFD's output is steady, and either F > H or F < H exceeds the threshold of parameter F9-25 and lasts longer than the set time of parameter F9-26, A024 warning occurs.	1. Verify if the motor parameters are correct. 2. Excessive load 3. Check if the set values of parameters F9-25, F9-26, and F2-13 are appropriate.	*Reset:* • When parameter F9-27 is set to 0 for "warning", the A024 warning is *automatically* cleared when the VFD's output is steady, and the deviation between the setting speed and actual speed no longer exceeds the set value of parameter F9-25.
A025	*Parameter identification in progress*	Automatic parameter identification in progress. When performing automatic parameter measurement, the panel displays warning A025.	The VFD is performing motor parameter identification.	*Reset:* • Parameter identification is completed without errors, this warning is *automatically* cleared.
A028	*Output phase loss warning*	VFD output phase loss	1. Imbalance in the three-phase impedance of the motor 2. Issues with wiring 3. The motor is a single-phase motor 4. Fault in the current sensor 5. VFD capacity significantly exceeds motor capacity.	*Reset:* • When parameter F9-15 is set to 0, the A028 warning is *automatically* cleared after the VFD stops.
A030	*Different model parameter copy error*	Keypad to Drive COPY function error warning 3	Copying parameters to an VFD of a different model.	*Reset:* • *Manual* reset is required.
A031	*Over-torque*	Over-torque 3 warning	1. Incorrect parameter setting 2. Mechanical side failure (e.g., over torque, mechanical lock-up, etc.) 3. Excessive load 4. Acceleration/ deceleration time or duty cycle time too short 5. Voltage too high in V/F control 6. Motor capacity too small 7. Overload during low-speed operation; 8. Torque compensation amount too large 9. Improper setting of speed tracking function parameter 10. (Including situations of momentary power outage restart and abnormal restart).	*Reset:* • A031 warning is *automatically* cleared when the output current is less than the set value of parameter H3-06.
A032	*Over-torque*	Over-torque 4 warning	Same as above	*Reset:* • A032 warning is *automatically* cleared when the output current is less than the set value of parameter H3-11.
A036	*CGd_Fault Canopen Guarding Time out*	CANopen software disconnection 1	1. Communication timeout duration set too short. 2. Misoperation due to interference.	*Reset:* • A *manual* reset signal sent from the host is required.
A037	*CHb_Fault Canopen Heartbeat Time out*	CANopen software disconnection 2	1. Communication timeout duration set too short. 2. Misoperation due to interference 3. Communication cable disconnected or poorly connected.	
A039	*CANopen hardware disconnection*	CAN BUS hardware disconnection	1. Verify if the communication format is correct. 2. Misoperation due to Interference 3. Communication cable disconnected	*Reset:* • A *manual* reset is required: power off and then power on again.

Alarm code	Warning message	Fault description	Possible cause	Reset method and conditions
			or poorly connected.	
A040	*CANopen index error*	CANopen communication index error	Incorrect setting of communication index	*Reset:* • A *manual* reset signal sent from the host is required.
A041	*CANopen node ID error*	CANopen node ID error (only supports 1–127)	Incorrect setting of communication node ID	*Reset:* • When parameter *F0-18 Parameter Reset* is set to 7 (*Reset CAN Slave*), a *manual* reset is required and can be done immediately.
A042	*CANopen memory error*	CANopen memory error	CANopen internal memory error	
A043	*CANopen SDO transmission timeout*	SDO transmission timeout (warning occurs only at the master station)	1. Slave station not connected. 2. Sync cycle set too short. 3. Misoperation due to interference 4. Communication cable is disconnected or poorly connected.	*Reset:* • A043 warning is *automatically* cleared when the master station re-sends an SDO and gets a response.
A044	*CANopen SDO reception overflow*	CANopen internal stack buffer overflow	Host sends too many SDOs at once	*Reset:* • A *manual* reset signal sent from the host is required.
A045	*CANopen startup error*	CANopen startup error warning	1. Severe hardware interference 2. Communication speed set incorrectly 3. Communication card not connected or loosely connected.	*Reset:* • A *manual* reset is required: Turn off CANopen, power off and then power on again.
A046	*CANopen format error*	CANopen protocol error	Host sends incorrect communication packets.	*Reset:* • A *manual* reset signal sent from the host is required.

Tab. 8-1 Alarm events – Causes and remedy

8.2 FAULT EVENTS – CAUSES AND REMEDIES

If a fault occurs during the operation of the system, the VFD will immediately stop outputting to protect the motor from further damage. Simultaneously, the VFD will trigger the corresponding fault relay contact and display the fault code on the control panel for rapid problem diagnosis. There are respective fault types and common solutions corresponding to each fault code, which can be found in "Tab. 8-2 Fault events – Causes and remedy".

Please note that the information listed in the following table is for reference only and should not be altered arbitrarily. If you are unable to resolve the problem, please contact our technical support or product agent for assistance.

Use this table to troubleshoot when the VFD reports a *fault* event.

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
E001	*Overcurrent during acceleration*	During acceleration, the output current exceeds the VFD's overcurrent threshold. When E001 occurs, the VFD immediately stops output, and the motor will coast to a stop.	1. The set acceleration time is too short. 2. Check if poor insulation in the motor wiring is causing a short circuit in the output. 3. Inspect the motor for burnout or insulation aging. 4. The torque compensation amount is too large. 5. The load is too heavy. 6. The V/F curve setting is abnormal. 7. Hardware failure.	*Reset:* • A *manual* reset is possible only after the error has cleared for at least 5 seconds.
E002	*Overcurrent during deceleration*	During deceleration or stopping, the output current exceeds the VFD's overcurrent threshold. When E002 occurs, the VFD immediately stops output, and the motor will coast to a stop.		
E003	*Overcurrent during constant speed*	During the constant speed operation, the output current exceeds the VFD's overcurrent threshold. When E003 occurs, the VFD immediately stops output, and the motor will coast to a stop.		
E004	*Grounding Short circuit*	The VFD detects a ground short circuit at the output end (U, V, W), immediately stops output, and the motor will coast to a stop.	1. The motor is burned out or has insulation aging. 2. Ground short circuit occurs due to cable damage, and the stray capacitance between the cable and terminals is large, causing maloperation, hardware failure.	
E005	*IGBT upper and lower bridge short circuit*	The VFD detects a short circuit between the upper and lower bridges of the IGBT module.	1. IGBT failure 2. Short circuit between the upper and lower bridges of IGBT	
E006	*Overcurrent during stopping*	Overcurrent or hardware circuit anomaly occurs during stopping. After E006 occurs, power off and then power on. If there is a hardware issue, E033, E034, or E035 will appear.	1. Misoperation due to interference 2. Hardware failure	
E007	*Overvoltage during acceleration*	During acceleration, the VFD detects excessive bus voltage. When E007 occurs, the VFD immediately stops output, and the motor will	1. The acceleration is too low (e.g., when accelerating with a lifting load downwards) 2. Check if the stall prevention action setting is less than the no-load	*Reset:* • A *manual* reset is possible only when the bus voltage falls below approximately 90% of the

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
		coast to a stop.	current. 3. The power supply voltage is too high. 4. There is an operation of leading phase capacitors within the same power supply system. 5. The motor is in a power generation state. 6. The acceleration time is too short. 7. The motor experiences a ground short circuit. 8. Incorrect wiring of the braking resistor or braking unit 9. Misoperation due to interference.	overvoltage threshold (810V).
E008	*Overvoltage during deceleration*	During deceleration, the VFD detects excessive bus voltage. When E008 occurs, the VFD immediately stops output, and the motor will coast to a stop.	1. The deceleration time is too short, causing excessive regenerative energy from the load. 2. Check if the stall prevention action setting is less than the no-load current. 3. The power supply voltage is too high. 4. There is an operation of leading phase capacitors within the same power supply system. 5. The motor is in a power generation state. 6. The deceleration time is too short. 7. The motor experiences a ground short circuit. 8. Incorrect wiring of the braking resistor or braking unit 9. Misoperation due to interference.	
E009	*Overvoltage during constant speed*	During constant speed operation, the VFD detects excessive bus voltage. When E009 occurs, the VFD immediately stops output, and the motor will coast to a stop.	1. Rapid load changes 2. Check if the stall prevention action setting is less than the no-load current. 3. The power supply voltage is too high. 4. There is an operation of leading phase capacitors within the same power supply system. 5. The motor is in a power generation state. 6. The motor experiences a ground short circuit. 7. Incorrect wiring of the braking resistor or braking unit 8. Misoperation due to interference.	
E010	*Overvoltage during stopping*	Overvoltage occurs when the VFD is stopping.	1. Power supply voltage too high 2. Operation of leading phase capacitors within the same power supply system 3. Incorrect wiring of the braking resistor or braking unit 4. Hardware failure (voltage sampling circuit anomaly) 5. The motor experiences a ground short circuit.	
E011	*Undervoltage during*	During acceleration, the VFD detects the bus voltage	6. Power outage occurred.	*Reset:*

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
	acceleration	is lower than the value set in parameter L2-18.	7. Power supply voltage fluctuated. 8. Check if there is a large capacity motor starting. 9. Excessive load 10. Shared DC bus 11. Check if a DC reactor has been added.	• A *manual* reset is possible only when the bus voltage is higher than the set value of parameter *L2-18 Low Voltage* + 60 V.
E012	*Undervoltage during deceleration*	During deceleration, the VFD detects the bus voltage is lower than the value set in parameter L2-18.		
E013	*Undervoltage during constant speed*	During constant speed, the VFD detects the bus voltage is lower than the value set in parameter L2-18.		
E014	*Undervoltage during stopping*	During stopping, the VFD detects the bus voltage is lower than the value set in parameter L2-18.		
E015	*Input phase loss protection*	Power supply input phase loss protection.	1. Input power phase loss occurred. 2. Single-phase power input in a three-phase machine type 3. Power supply voltage fluctuations 4. Loose terminals of the input power supply 5. Check if the input cables of the three-phase power supply have been cut. 6. Unbalanced three-phase input power supply.	*Reset:* • *Manual* reset is required.
E016	*IGBT overtemperature*	The VFD detects an excessively high IGBT temperature, exceeding 95°C.	1. Check if the on-site environment or temperature inside the control cabinet is too high, or if the ventilation holes of the cabinet are blocked. 2. Check for foreign objects on the heatsink, and whether the fan is rotating. 3. Insufficient ventilation space for the VFD 4. Check if the load matches the VFD. 5. Operating for a long time at 100% or more than 100% of the rated output.	*Reset:* • A *manual* reset is possible only the IGBT temperature drops below 85°C.
E017	*Too high ambient temperature*	The VFD detects an excessively high temperature of internal critical components, exceeding 55°C.	Too high ambient temperature	*Reset:* • A *manual* reset is possible only after the ambient temperature sensor temperature reads below 45°C.
E021	*VFD overload*	The output current exceeds the VFD's current capacity, rated at 150% for 1 minute.	1. Excessive load 2. Acceleration/deceleration time and duty cycle time too short 3. Voltage too high in V/F control 4. VFD capacity too small 5. Overload occurring during low-speed operation 6. Torque compensation amount too large 7. Check if the stall prevention action setting is correct. 8. Output phase loss 9. Speed tracking function parameter setting is inappropriate.	*Reset:* • A *manual* reset is possible only after the error has cleared for at least 5 seconds.
E022	*Motor 1 overload protection*	Motor 1 overload protection is activated, after which, the	1. Excessive load 2. Acceleration/deceleration time and	*Reset:* • A *manual* reset is possible only

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
		motor will coast to a stop.	duty cycle time too short 3. When using a motor specifically designed for VFDs, set parameter *F9-01 Thermal RLY1 SEL* (motor 1 overload protection) = *0 (Inverter Motor)* for constant torque output motor. 4. Incorrect action value for motor overload 5. The set value for the maximum motor frequency is too low. 6. Driving multiple motors with one VFD 7. Check if the stall prevention action setting is correct. 8. Torque compensation amount too large 9. Motor fan not operating normally. 10. Three-phase impedance imbalance in the motor.	after the error has cleared for at least 5 seconds.
E023	*Motor 2 overload protection*	Motor 2 overload protection is activated, after which, the motor will coast to a stop.	1. When using a motor specifically designed for VFDs, set parameter *H3-03 Thermal RLY2 T* (motor 2 overload protection) *= 0 (Inverter Motor)* for constant torque output motor. 2. Same as items 1-2 and 4-10 above.	
E024	*Motor overheating*	Motor PTC over-temperature warning. When the motor is installed with PTC and this function is activated (parameter *F5-21/27/33 = 6* thermistor PTC input), if the PTC input is higher than the set value in parameter F9-49, it will be handled according to the setting in parameter F9-48.	1. Motor jam 2. Excessive load 3. High ambient temperature 4. The motor's cooling system/fan is malfunctioning. 5. Frequent use in low-speed operation 6. Acceleration/deceleration time and duty cycle time too short 7. Voltage too high in V/F control 8. Check if the setting of the motor's rated current matches the motor nameplate. 9. Check if the PTC-related settings and wiring are appropriate. 10. Check if the stall prevention action setting is correct. 11. Three-phase impedance imbalance in the motor 12. Excessive harmonic components.	Parameter *F9-48 PTC Treatments* setting options: 0: Warning and continue running 1: Fault and decelerate to stop 2: Fault and coast to stop 3: No warning *Reset:* • When parameter F9-48 is set to 0, it's a warning and the message will *automatically* reset when the temperature falls below the set value in parameter F9-49. • When Parameter F9-48 is set to 1 or 2, it's a fault and requires manual reset and can be done immediately.
E026	*Over torque 1*	When the output current exceeds the torque detection value F9-37, and it lasts longer than the over-torque detection time set in parameter F9-38, E026 will be displayed if parameter F9-36 is set to 2 or 4.	1. Incorrect parameter setting 2. Fault on the mechanical side 3. Excessive load 4. Acceleration/deceleration time or duty cycle time too short 5. Voltage too high in V/F control 6. Motor capacity too small 7. Overload during low speed operation 8. Torque compensation amount too large 9. Inappropriate setting of speed tracking function parameters (including situations of instant	Parameter *F9-36 Over TQC1 Method* setting options: 0: Detection disabled 1: Over-torque detection during constant speed operation, continue running 2: Over-torque detection during constant speed operation and stop running 3: Over-torque detection during operation, continue running 4: Over-torque detection during operation and stop running *Reset:*

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
			power-off restart and abnormal restart).	• When parameter F9-36 is set to 1 or 3, it will *automatically* clear when the output current is less than Parameter F9-36. • When parameter F9-36 is set to 2 or 4, *manual* reset is required and can be done immediately.
E027	*Over torque 2*	Error E027 is displayed when the output current exceeds the torque detection threshold (H3-01) and lasts longer than the over torque detection time (H3-02), if parameter H3-00 is set to either 2 or 4.	1. Incorrect parameter setting 2. Fault on the mechanical side 3. Excessive load 4. Acceleration/deceleration time or duty cycle time too short 5. Voltage too high in V/F control 6. Motor capacity too small 7. Overload during low-speed operation; 8. Torque compensation amount too large 9. Inappropriate setting of speed tracking function parameters (including situations of instant power-off restart and abnormal restart).	Parameter *H3-00 Over TQC2 Method* setting options: 0: No detection 1: Over-torque detection during constant speed operation, continue running 2: Over-torque detection during constant speed operation and stop running 3: Over-torque detection during operation, continue running 4: Over-torque detection during operation, stop operation *Reset:* • The fault message is *automatically* cleared when the output current falls below parameter H3-00, for settings 1 or 3. • For settings 2 or 4 of parameter H3-00, a *manual* reset is required and can be done immediately.
E028	*current*	Detection of low current condition	1. Motor cable disconnection 2. Inappropriate setting of the low current protection function 3. Excessively low load.	Parameter *F9-24 Under AMP TREAT* setting options: 0: No function 1: Error and free stop 2: Error with stop based on the second deceleration time 3: Warning and continue operation. *Reset:* • Parameter F9-24 set to 3 indicates a "warning". The fault message is *automatically* cleared when the output current exceeds parameter F9-22 + 0.1 A. • For setting 1 or 2 of parameter F9-24, indicating a "fault", a *manual* reset is required and can be done immediately.
E029	*Limit reached*	In non-PG vector control mode, when the VFD operates in speed mode, this fault is reported after the action of the reverse running prohibition limit or forward running prohibition limit at the DI terminal.	1. Home position mode: If not set to use forward or reverse limit as home, and set to report fault upon reaching the limit, and when input terminal function is set to PL forward limit or NL reverse limit, and the status of that terminal is active, a limit reached fault is reported. 2. Non-home position mode: If input terminal function is set to PL forward limit or NL reverse limit and the status of that terminal is active, a limit reached fault is	*Reset:* • A *manual* reset is required when the limit reached terminal status is invalid.

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
			reported.	
E031	*Memory readout anomaly*	Abnormal EEPROM data readout from memory	Abnormal EEPROM data readout from memory	*Reset:* • A *manual* reset is required and can be done immediately.
E033	*U phase current detection error*	At power-on, the VFD's U-phase current detection circuit is abnormal.	Hardware fault	Power-off required
E034	*V-phase current detection error*	At power-on, the VFD's V-phase current detection circuit is abnormal.		
E035	*W-phase current detection error*	At power-on, the VFD's W-phase current detection circuit is abnormal.		
E036	*cc hardware circuit anomaly*	At power-on, the VFD's cc hardware protection circuit is abnormal.		
E037	*oc hardware circuit anomaly*	At power-on, the VFD's oc hardware protection circuit is abnormal.		
E038	*ov hardware circuit anomaly*	At power-on, the VFD's ov hardware protection circuit is abnormal.		
E040	*Motor parameter identification error*	Motor parameter identification error	1. The STOP button was pressed during self-learning. 2. Incorrect motor capacity (too large or too small) and parameter settings 3. Incorrect motor wiring 4. Motor jammed. 5. Use of output contactor, but the output contactor did not engage. 6. Overload 7. Acceleration/deceleration time too short.	*Reset:* • A *manual* reset is required and can be done immediately.
E041	*PID disconnection*	PID feedback error	1. Check if the analog feedback value is abnormal. 2. Verify if the negative feedback type is set correctly. 3. PID deviation threshold set too low, causing false alarms.	Parameter *FA-50 PID FBK Loss* setting options (feedback signal disconnection handling): 0: Warn and continue running 1: Fault and decelerate to stop 2: Fault and free stop 3: Warning and running at the frequency before disconnection.
E042	*PG feedback setting error*	The actual running direction of the motor is opposite to the frequency command direction.	1. Encoder parameter setting incorrect. 2. Check for disconnection in encoder wiring. 3. Damage to PG card or PG encoder 4. Misoperation due to interference.	Parameter *FA-50 PID FBK Loss* setting options: 0: Warning and continue running 1: Fault and decelerate to stop. 2: Fault and free stop *Reset:* • A *manual* reset is required and can be done immediately.
E043	*PG feedback disconnection*	In PG mode, if parameters F4-27 and F4-29 are not set, pressing RUN will result in error E043.	1. Encoder parameter setting incorrect. 2. Incorrect control mode selection.	*Reset:* • A *manual* reset is required and can be done immediately.
E044	*PG feedback overspeed*	In PG mode, when the motor frequency value exceeds the encoder's stall threshold (parameter F9-30) for a certain duration,	1. Encoder parameter setting incorrect. 2. Parameter F4-02 set too low. 3. Speed loop parameters and	Parameter *F9-32 Over SPD Treat* setting options: 0: Warning and continue running 1: Fault and decelerate to stop.

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
		and the error duration exceeds the encoder timeout detection time (parameter F9-31), error E044 occurs.	acceleration/deceleration settings are inappropriate. 4. PG feedback timeout protection function parameter settings are inappropriate.	2: Fault and free stop *Reset:* • A *manual* reset is required and can be done immediately.
E045	*PG slip anomaly*	In PG mode, when the difference between the output frequency and the motor frequency exceeds the encoder deviation range (parameter F9-33) for a certain duration, and the error duration exceeds the encoder deviation detection time (parameter F9-34), fault E045 occurs.	1. Improper setting of PG feedback deviation anomaly function parameters 2. Speed loop parameters and acceleration/deceleration settings are inappropriate. 3. Encoder parameter settings are incorrect. 4. Acceleration/deceleration time too short 5. Torque limit related parameter settings are incorrect. 6. Motor jammed. 7. Mechanical brake not released.	Parameter *F9-35 Deviation Treat* setting options: 0: Warning and continue running 1: Fault and decelerate to stop. 3: Fault and free stop *Reset:* • When parameter F9-35 is set to 0, it indicates a warning, which is *automatically* cleared when the difference between the output frequency and the motor frequency is less than the encoder deviation threshold. • When parameter F9-35 is set to 1 or 2, it indicates a "fault", and a *manual* reset is required. Can be reset immediately.
E048	*AI current signal disconnection*	When the 4-20mA disconnection action (parameter F5-42) is set to 3, and any one of the AI1, AI2, or AI1 analog input terminals is of the 4-20mA current signal type, with the analog input function set to non-zero, if the input current signal at that terminal falls below the 4-20mA disconnection threshold (parameter F5-43), fault E048 is reported.	Analog input current signal is disconnection	*Reset:* • A *manual* reset is possible when disconnection fault conditions are not met.
E049	*External faults*	External fault, the VFD decelerates according to the setting of parameter F1-23.	DI terminal function = 10 (External fault), and the signal is valid	Parameter *F1-23 EF Stop Select* setting options: 0: Stop with free run 1: According to the first deceleration time 2: According to the second deceleration time 3: According to the third deceleration time 4: According to the fourth deceleration time 5: System deceleration (according to the original deceleration time) 6: Automatic deceleration Manual reset required *Reset:* • A *manual* reset is possible only after the external fault has cleared.
E050	*External terminal emergency stop*	When the DI terminal function is set to "external fault free stop", if the terminal signal is valid, the VFD immediately stops output, and the motor comes to a free stop.	DI terminal function = *28 (External fault free stop)*, and the signal is valid	*Reset:* • A *manual* reset is possible only after the "External Fault Free Stop" signal has cleared.

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
E051	*External interrupt*	When the DI terminal function is set to "Gate Block", the VFD immediately stops output, and the motor comes to a free stop.	DI terminal function = *11 (Gate Block)*, and the signal is valid.	*Reset:* • The fault message is automatically cleared after the "Gate Block signal" disappears.
E052	*Password entered incorrectly three times*	Password decoding failed three consecutive times	Parameter F7-33 password entry error	*Reset:* • A *manual* reset is required after power-off.
E054	*Illegal communication command*	Illegal communication command	1. Communication command sent by the host computer is incorrect. 2. Misoperation due to interference 3. Communication conditions differ from those of the host machine. 4. Communication cable is disconnected or poorly connected.	Parameter *F8-05 MODBUS Fault Way* setting options (Communication error handling methods): 0: Warning and continue running 1: Error and decelerate to stop. 2: Warning and free stop 3: No warning and continue operation *Reset:* • A *manual* reset is required and can be done immediately.
E055	*Illegal communication address*	Illegal communication data address		
E056	*Communication data error*	Illegal communication data value		
E057	*Communication writing to read-only address*	Writing data to a read-only address		
E058	*Modbus transmission timeout*	Modbus transmission timeout	1. The host computer failed to transmit the communication command within the time set by parameter F8-04. 2. Misoperation due to interference 3. Communication conditions differ from those of the host machine. 4. Communication cable is disconnected or poorly connected.	
E062	*Deceleration regenerative braking action*	As long as parameter F1-34 is not zero, and a power glitch or outage causes the bus voltage to drop below the deceleration regenerative braking action threshold, the deceleration regenerative braking function activates, initiating motor deceleration and stopping, during which fault E062 is displayed.	1. Unstable power supply or power outage 2. Other large loads starting in the power system.	Parameter *F1-34 dEb Decel SEL* setting options: 0: Disable 1: Don't Return. 2: Return *Reset:* • When parameter F1-34 is set to 2, the fault message is *automatically* cleared after power is restored. • When parameter F1-34 is set to 1, after the VFD decelerates to 0Hz, the fault message can be *manually* reset.
E063	*Excessive slip*	Slip anomaly, using the maximum slip (parameter F2-13) as a reference. When the VFD's output is steady, and the deviation between the given speed and actual speed exceeds the set value of parameter F9-25, and this deviation lasts longer than the set time of parameter F9-26, fault E063 occurs. Fault E063 only occurs when driving an induction motor.	1. Verify if the motor parameters are correct. 2. Excessive load 3. Check if the set values of parameters F9-25, F9-26, and F2-13 are appropriate.	Parameter *F9-27 Over Slip Way* setting options: 0: Warning and continue running 1: Error and decelerate to stop. 2: Warning and free stop 3: No warning *Reset:* • When parameter F9-27 is set to 0 for "warning," and when the VFD's output is steady, and the deviation between the given speed and actual speed no longer exceeds the set value of parameter "*F9-25 Slip Deviation L%*", the fault message is *automatically* cleared.

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
				• When parameter F9-27 is set to 1 or 2 for "fault", a *manual* reset is required.
E064	*Please reset the machine type code*	Machine type code is incorrectly set	Machine type code is incorrectly set	Set parameter *F0-00 Product identity code* according to the VFD specification sheet
E065	*PG card hardware error*	PG card hardware error	1. Wiring error 2. Encoder parameter selection error 3. Incorrect selection of PG card.	*Reset method:* Manual reset; Reset conditions: The error can be reset only by re-powering.
E069	*Feedback speed divergence*	Feedback speed exceeds the set value: maximum speed value * parameter F9-30.	1. Encoder parameter setting error. 2. Incorrect motor parameters 3. Motor parameter identification not performed	*Reset:* *Manual* reset is required.
E070	*Excessive feedback speed deviation*	Feedback speed difference is too large, estimated value command deviates by ±F9-33.	1. Encoder parameter setting error. 2. Incorrect setting of motor parameters 3. Motor parameter identification not performed	
E072	*STO1 fault*	Anomaly diagnosed in the internal circuit between S1 and +24V	The short circuit line between S1 and +24V is not connected = > Hardware fault	*Reset:* • A hardware error cannot be reset, re-power after power-off. *Reset conditions:* None
E076	*STO*	Safe torque output stop function activated	Switching action of S1 / +24V, S2 / +24V	*Reset:* • Can be *automatically* reset after the STO state disappears when parameter F9-54 is set to 1. • Can be *manually* reset after the STO state disappears when parameter 06-44 is set to 0.
E077	*STO2 fault*	Anomaly diagnosed in the internal circuit between S2 and +24V	The short circuit line between S2 and +24V is not connected Hardware fault	*Reset:* • A hardware error cannot be reset, re-power after power-off. *Reset conditions:* None
E079	*U phase overcurrent*	U-phase short circuit detected before VFD operation	1. Incorrect motor wiring 2. Output short circuit caused by poor insulation of motor wiring. 3. Inspect the motor for burnout or insulation aging. 4. Misoperation due to interference 5. Longer motor cable wiring length 6. Hardware fault.	*Reset:* • A *manual* reset is possible only after the error has cleared for at least 5 seconds.
E080	*V phase overcurrent*	V-phase short circuit detected before VFD operation		
E081	*W phase overcurrent*	W-phase short circuit detected before VFD operation		
E082	*U-phase output phase loss*	U-phase output phase loss	1. Imbalance in the three-phase impedance of the motor 2. Issues with wiring 3. The motor is a single-phase motor. 4. Fault in the current sensor 5. VFD capacity significantly exceeds motor capacity.	Parameter *"F9-15 Out-PHL Act sel"* setting options: 0: Warning and continue running 1: Error and decelerate to stop 2: Error and free stop 3: No warning *Reset:* • A *manual* reset is required and can be done immediately.
E083	*V phase output phase loss*	V phase output phase loss		
E084	*W phase output phase loss*	W phase output phase loss		
E087	*Low frequency overload protection*	Load close to the limit of the power module	Power module overload	*Reset:* • A *manual* reset is required and can be done immediately.
E101	*CANopen disconnection*	CANopen software disconnection 1	1. Communication timeout time set too short.	*Reset:* • A *manual* reset signal sent from

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
E102	*CANopen disconnection*	CANopen software disconnection 2	2. Misoperation due to interference 3. Communication cable disconnected or poorly connected.	the host is required.
E104	*CANopen hardware disconnection*	CANopen hardware disconnection	1. Confirm whether the CANopen card is installed. 2. Confirm whether the communication format is correct. 3. Misoperation due to interference 4. Communication cable disconnected or poorly connected;	*Reset:* • A *manual* reset is required: power off and then power on again.
E105	*CANopen index error*	CANopen communication index error	Incorrect setting of communication index	*Reset:* • A *manual* reset signal sent from the host is required.
E106	*CANopen node ID error*	CANopen communication node ID error (only support 1~127)	Incorrect setting of communication node ID	*Reset:* • When parameter *F0-18 Parameter Reset* is set to 7 (*Reset CAN Slave*), a *manual* reset is required and can be done immediately.
E107	*CANopen memory error*	CANopen memory error	CANopen internal memory error	
E120	*EMS overcurrent*	Output current exceeds the VFD's overcurrent threshold. When EMS overcurrent fault occurs, the VFD immediately stops output, and the motor comes to a free stop.	1. The set acceleration time is too short. 2. Check if poor insulation in the motor wiring is causing a short circuit in the output. 3. Inspect the motor for burnout or insulation aging. 4. The torque compensation amount is too large. 5. The load is too heavy. 6. The V/F curve setting is abnormal. 7. Hardware failure.	*Reset:* • A *manual* reset is possible only after the error has cleared for at least 5 seconds.
E128	*Over torque 3*	Error E128 occurs when the output current exceeds the torque detection value H3-06 and lasts longer than the over torque detection time H3-07, provided that parameter H3-05 is set to either 2 or 4.	1. Incorrect parameter setting 2. Fault on the mechanical side 3. Excessive load 4. Acceleration/deceleration time or duty cycle time too short 5. Voltage too high in V/F control 6. Motor capacity too small 7. Overload during low-speed operation; 8. Torque compensation amount too large 9. Inappropriate setting of speed tracking function parameters (including situations of instant power-off restart and abnormal restart).	Parameter *"H3-05 Over TQC3 Method"* setting options: 0: Detection disabled 1: Over-torque detection during constant speed operation, continue running 2: Over-torque detection during constant speed operation and stop running 3: Over-torque detection during operation, continue running 4: Over-torque detection during operation, stop operation *Reset:* • When parameter H3-05 is set to 1 or 3 for "warning", the warning is *automatically* cleared when the output current falls below the set value of parameter H3-06. • When parameter H3-05 is set to 2 or 4 for "fault", a *manual reset* is required and can be done immediately.
E129	*Over torque 4*	Error E129 occurs when the output current exceeds the torque detection value H3-11 and lasts longer than the over torque	Same as above	Parameter *"H3-05 Over TQC4 Method"* setting options: 0: No detection 1: Over-torque detection during constant speed operation, continue

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
		detection time H3-12, provided that parameter H3-10 is set to either 2 or 4.		running 2: Over-torque detection during constant speed operation and stop running 3: Over-torque detection during operation, continue running 4: Over-torque detection during operation, stop operation *Reset:* • When parameter H3-10 is set to 1 or 3 for "warning", the warning is automatically cleared when the output current falls below the set value of parameter H3-11. • When parameter H3-10 is set to 2 or 4 for "fault", a manual reset is required. and can be reset immediately
E134	*Motor 3 overload protection*	Motor 3 overload protection action, after the action, free stop.	1. Excessive load 2. Acceleration/deceleration time and duty cycle time too short 3. When using a VFD-dedicated motor, parameter H3-08 Motor 3 overload protection selection = 0 constant torque output motor. 4. Incorrect action value for motor overload 5. The set value for the maximum 6. motor frequency is too low. 7. Driving multiple motors with one VFD 8. Check if the stall prevention action setting is correct. 9. Torque compensation amount too large 10. Motor fan not operating normally. 11. Three-phase impedance imbalance in the motor.	*Reset:* • A *manual* reset is possible only after the fault has cleared for at least 5 seconds.
E135	*Motor 4 overload protection*	Motor 4 overload protection action, after action, free stop.	1. When using a VFD-dedicated motor, parameter H3-13 Motor 4 overload protection selection = 0 constant torque output motor 2. The same as above 1 ... 2 and 4 ... 10.	
E141	*Pre-operation grounding fault*	Ground short circuit detected during output wiring detection before VFD operation.	1. Incorrect motor wiring 2. Motor wiring may cause output short circuit due to poor insulation. 3. Inspect the motor for burnout or insulation aging.	*Reset:* • A *manual* reset is possible only after the condition has cleared for at least 5 seconds.
E142	*Parameter identification error 1*	Motor parameter identification with no feedback current error	1. Motor not wired. 2. On the VFD output side (U, V, W) 3. Electromagnetic contactor used as open circuit.	*Reset:* • A *manual* reset is required and can be done immediately.
E143	*Parameter identification error 2*	Motor parameter identification phase loss error during motor identification	1. Incorrect motor wiring 2. Motor fault 3. Electromagnetic contactor used as open circuit on the VFD output side (U, V, W) 4. Anomaly in the motor U/V/W lines.	

Fault code	Fault message	Fault description	Possible cause	Reset method and conditions
E144	*Tension break*	Tension break identified by speed detection	1. Check if the analog feedback value is abnormal. 2. Check if the negative feedback type is set correctly.	*Reset:* • *Manual* reset is required.
E147	*Excessive tension PID deviation*	Tension feedback value deviates significantly from the set value	1. Check if the analog feedback value is abnormal. 2. Improper setting of tension control PID parameters	Parameter *"FB-50 Operation At Dev"* (Tension error handling) setting options: 0: Warn and continue running 1: Warning and free stop 2: Warning and decelerate to stop. *Reset:* • *Manual* reset is required.

Tab. 8-2 Fault events – Causes and remedy

9 DISPOSAL

If the H1 VFD is decommissioned permanently, observe the following preparatory measures for the proper and environmentally friendly disposal of the product.

DISMANTLING AND SCRAPPING

The enclosures of the drives are made from recyclable material as aluminium, iron, and plastic. Each drive contains several components demanding special treatment, for example electrolytic capacitors. The circuit boards contain small amounts of tin and lead. Any local or national regulations in force for the disposal and recycling of these materials must be complied with.

SAFETY INSTRUCTIONS

Always follow the safety instructions in chapter *Safety* when carrying out any work.

ELECTRICAL AND ELECTRONIC COMPONENTS

DISPOSAL NOTE

- Assemblies of the H1 VFD containing electrical or electronic components must be disposed of in accordance with *Directive 2012/19/EU*.
- *Non-EU countries:* Waste electrical equipment must be disposed of in accordance with the locally applicable legal regulations.
- Never dispose of old electrical appliances with household waste.

REACH-REGULATION

Information on article 33

The following substance of very high concern on the REACH Candidate List of 14 June 2023 is present in this product at a concentration of more than 0.1 % by weight:

- Lead; CAS number: 7439-92-1; EC number: 231-100-4

According to the current state of knowledge, it can be assumed that the above-mentioned substance does not pose a risk if this product is used and disposed of as intended.

NON-ELECTRICAL COMPONENTS

Assemblies of the H1 VFD that do not contain electrical components, such as control cabinet equipment, control cabinet enclosures, cabinet doors, etc., must be disposed of in accordance with local regulations. For this purpose, contact your recycling partner or the local authorities.

PACKAGING

The materials used for the packaging of the H1 VFD, such as wood, PVC, and plastic, are recyclable. Contact your recycling partner or local authorities for more information.

10 SPARE PARTS

The use of spare parts and accessories not specified by AuCom may result in material damage to the product.

- You must only use spare parts and accessories specified and approved by AuCom.

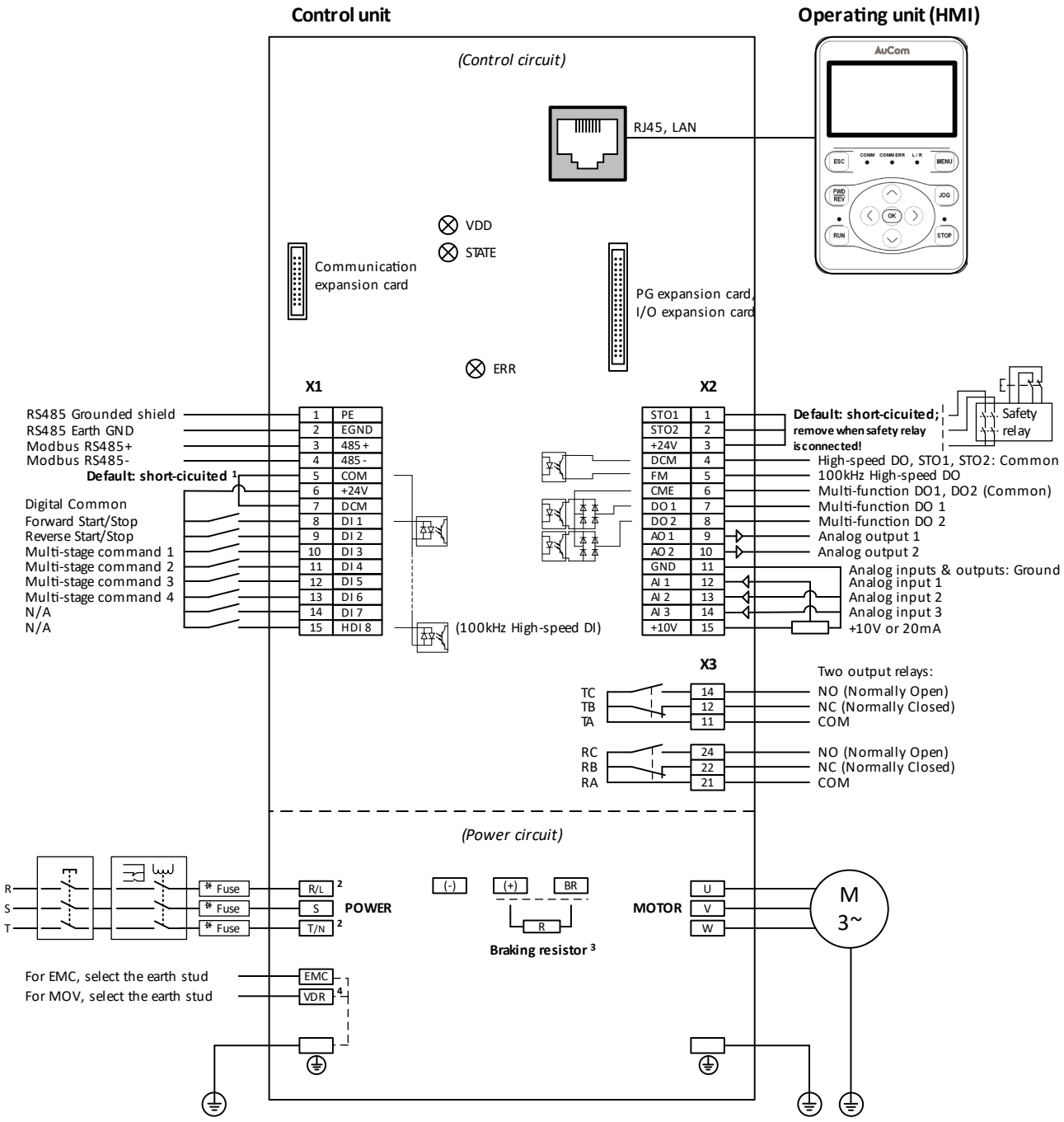
ORDERING INFORMATION

For H1 packages a range of spare parts and accessories are available for the H1 product.

For orders, contact AuCom MCS GmbH & Co. KG or your local supplier.
(For the ordering contact details, see chapter "Introduction" in this manual)

ANNEX

ELECTRICAL WIRING – H1 LV-D CONNECTION DIAGRAM



1 Default wiring method: PNP mode without external power supply.
2 R/L and T/N: 1-phase connection terminals; FS1 to FS3 models only.
3 FS7 to FS10 models do not offer a braking function option.
4 FS1 models do not offer VDR terminal.

Figure 1 H1 Series – LV-D connection diagram

COMMISSIONING OF PM AND IM MOTORS, SVC – BASIC SETTING PROCESS

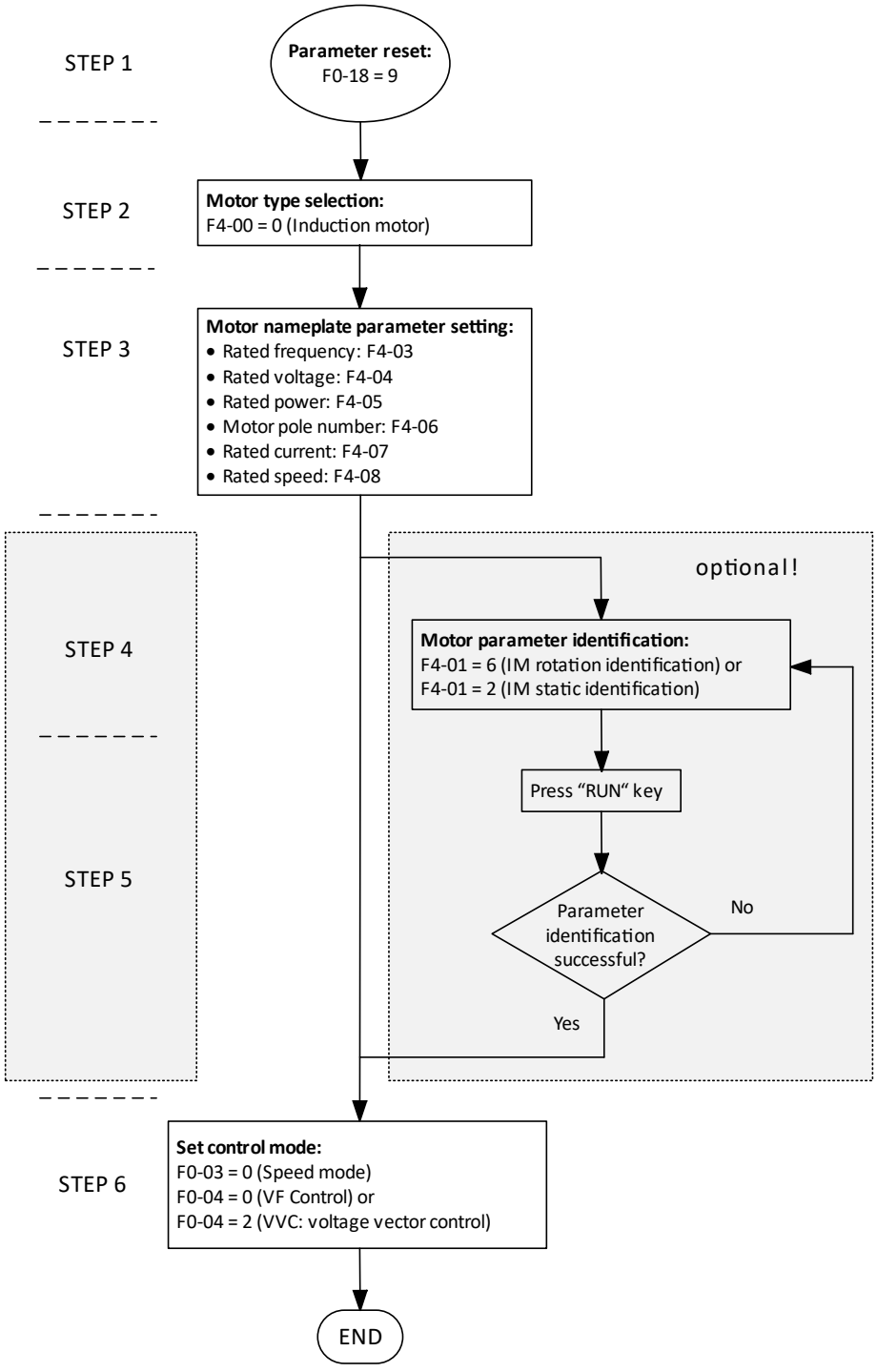


Figure 2 Basic setting process for SVC of permanent magnet motors (PM) and induction (asynchronous) Motors (IM)

CHAPTER REFERENCE

For detailed instruction, refer to chapter "6.1.1 Basic settings".

COMMISSIONING OF PERMANENT MAGNET MOTORS (PM), VVC – BASIC SETTING PROCESS

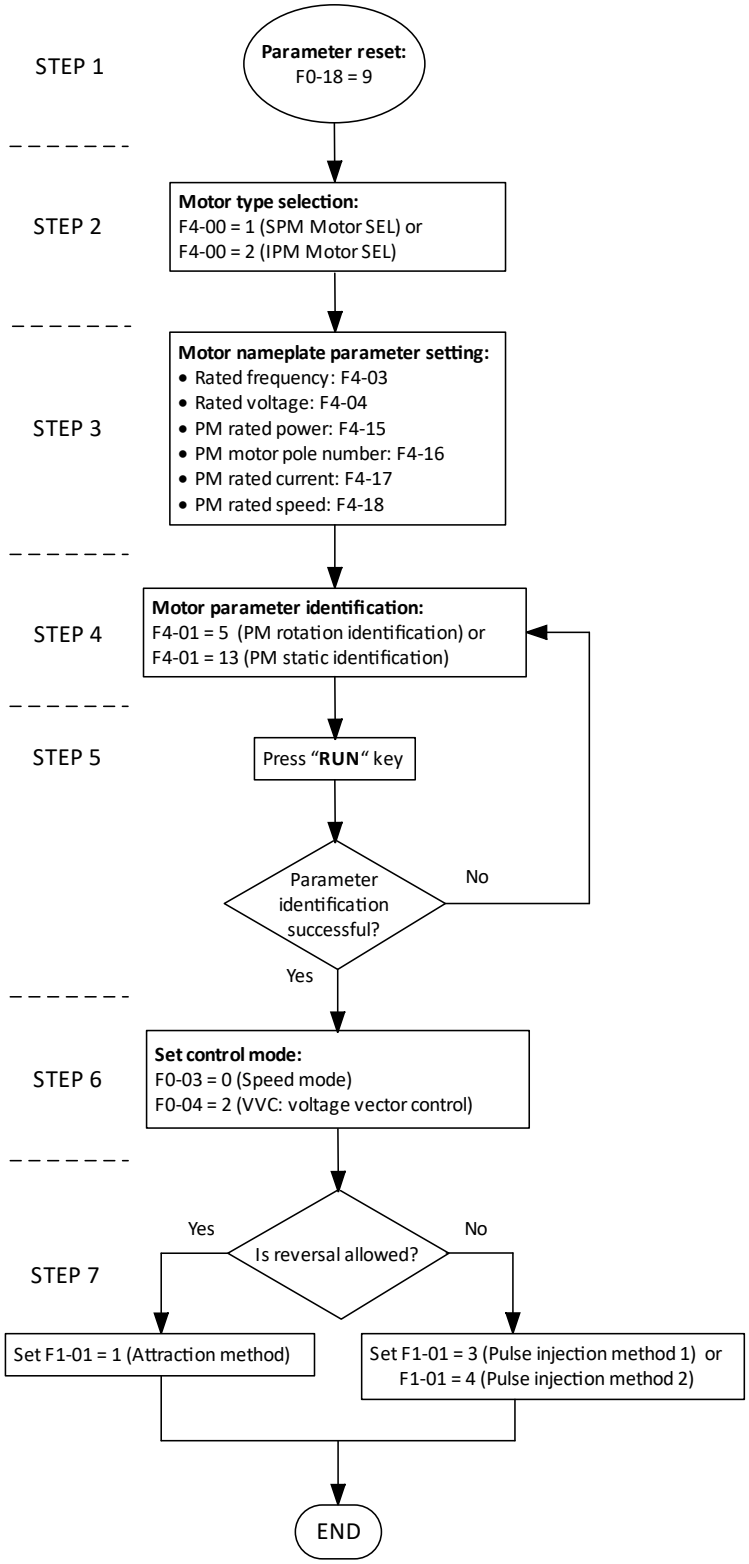


Figure 3 Basic setting process for VVC commissioning of Permanent Magnet Motors (PM)

CHAPTER REFERENCE

For detailed instruction, refer to chapter "6.2.1 Basic Settings".

COMMISSIONING OF PERMANENT MAGNET MOTORS (PM), VVC – NO-LOAD DEBUGGING PROCESS

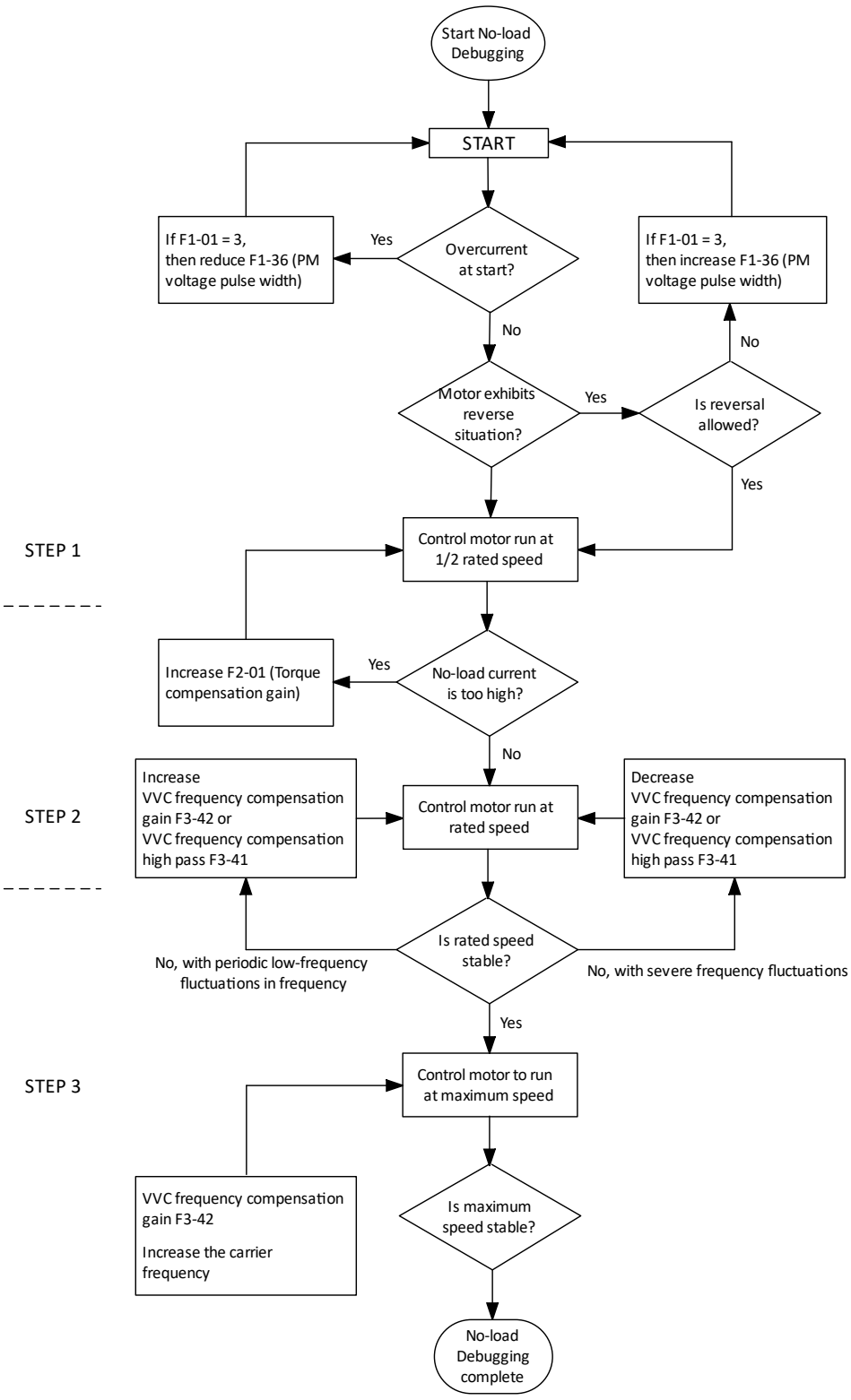


Figure 4 No-load debugging process for Permanent Magnet Motor (PM), VVC

CHAPTER REFERENCE

For detailed instruction, refer to chapter "6.2.2 No-load Commissioning".

COMMISSIONING OF PERMANENT MAGNET MOTOR (PM), VVC – FULL LOAD DEBUGGING PROCESS

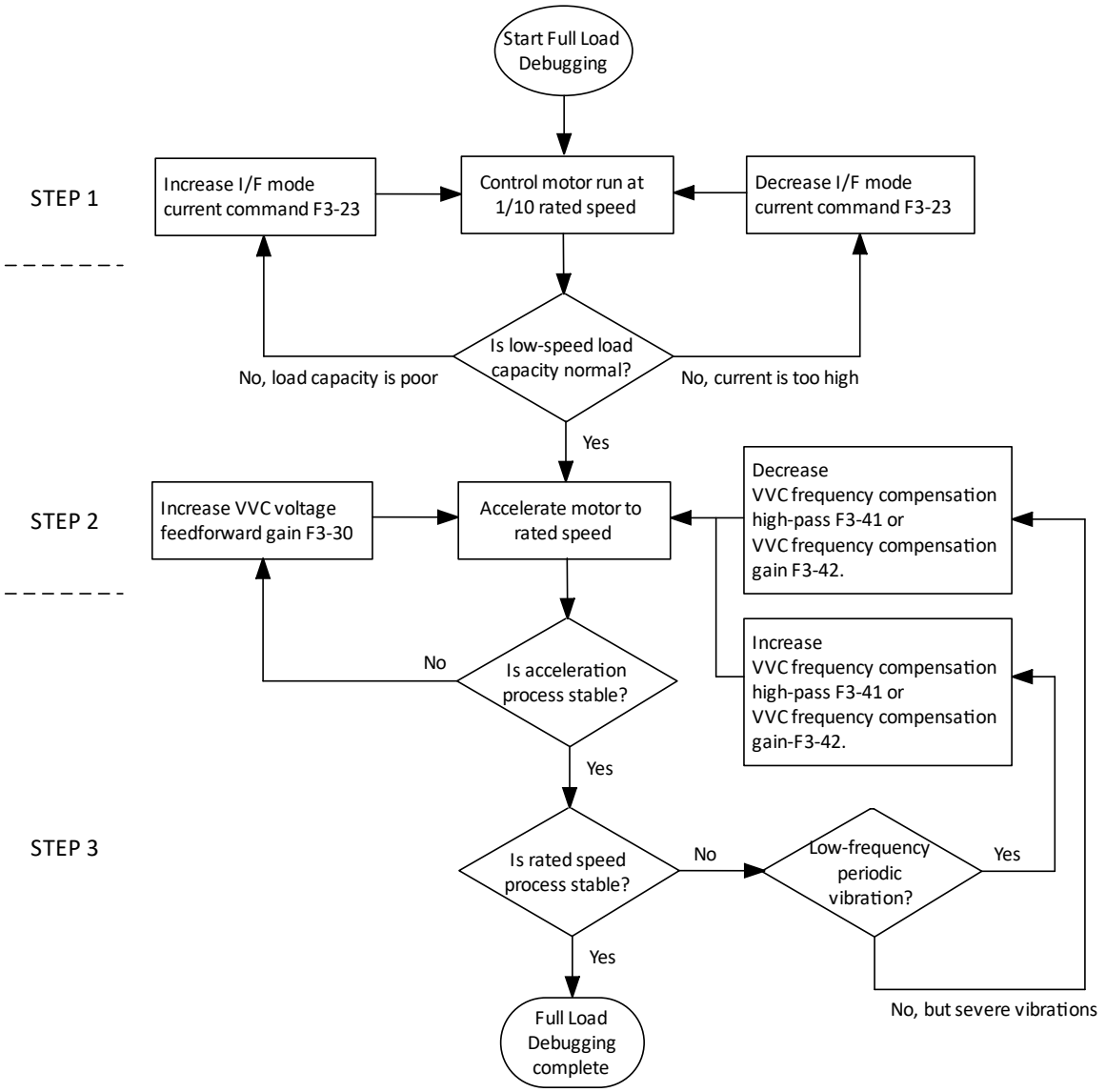


Figure 5 Full load debugging process for Permanent Magnet Motor (PM), VVC

CHAPTER REFERENCE

For detailed instruction, refer to chapter "6.2.3 Full Load Commissioning".

COMMISSIONING OF INDUCTION MOTORS (IM), SVC – BASIC SETTING PROCESS

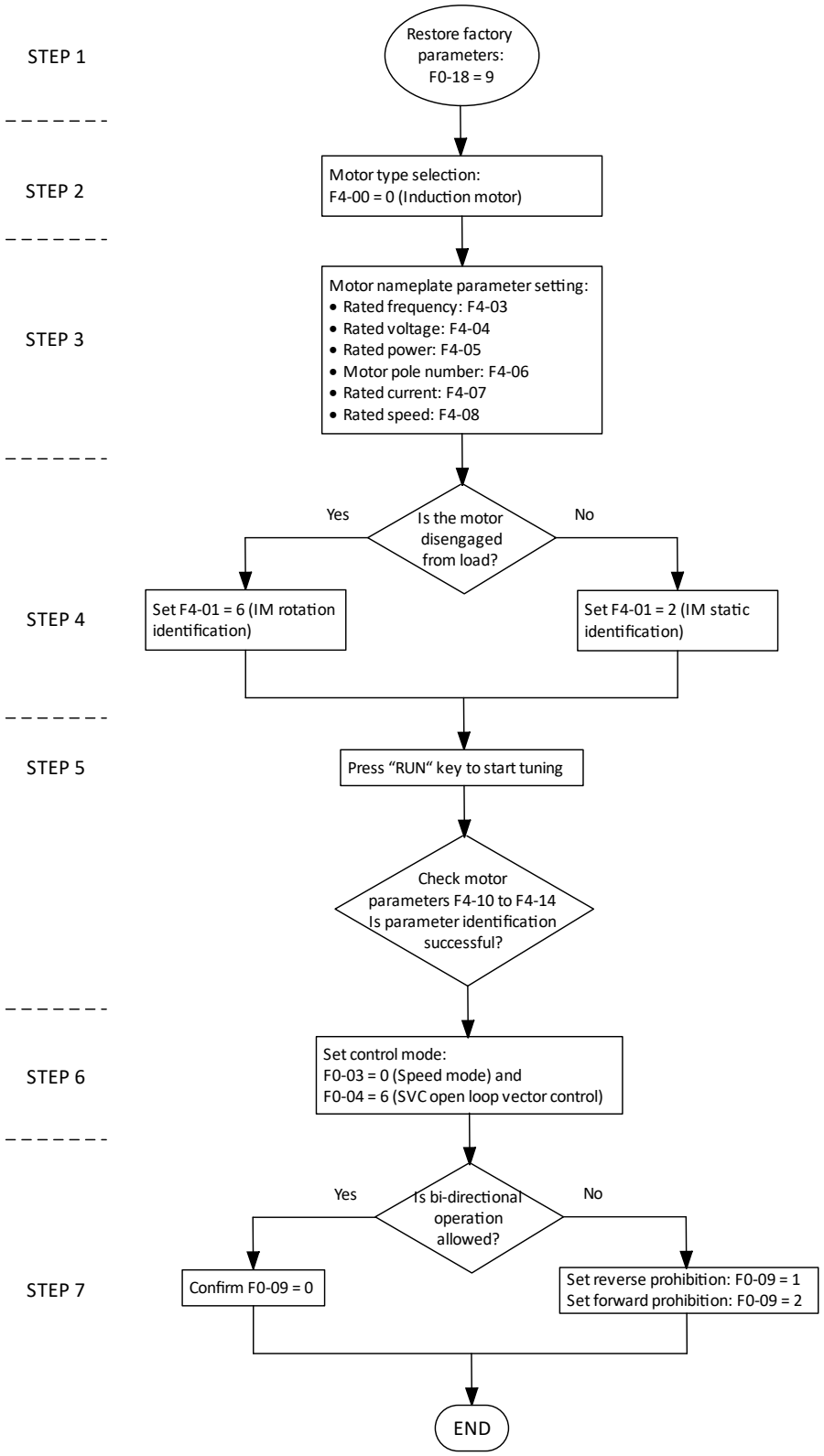


Figure 6 Basic setup process flow chart for Induction Motor (IM), SVC

CHAPTER REFERENCE

For detailed instruction, refer to chapter "6.3.2 Basic Settings (Induction Motors (IM), SVC)".

COMMISSIONING OF PERMANENT MAGNET MOTORS (PM), SVC – BASIC SETTINGS

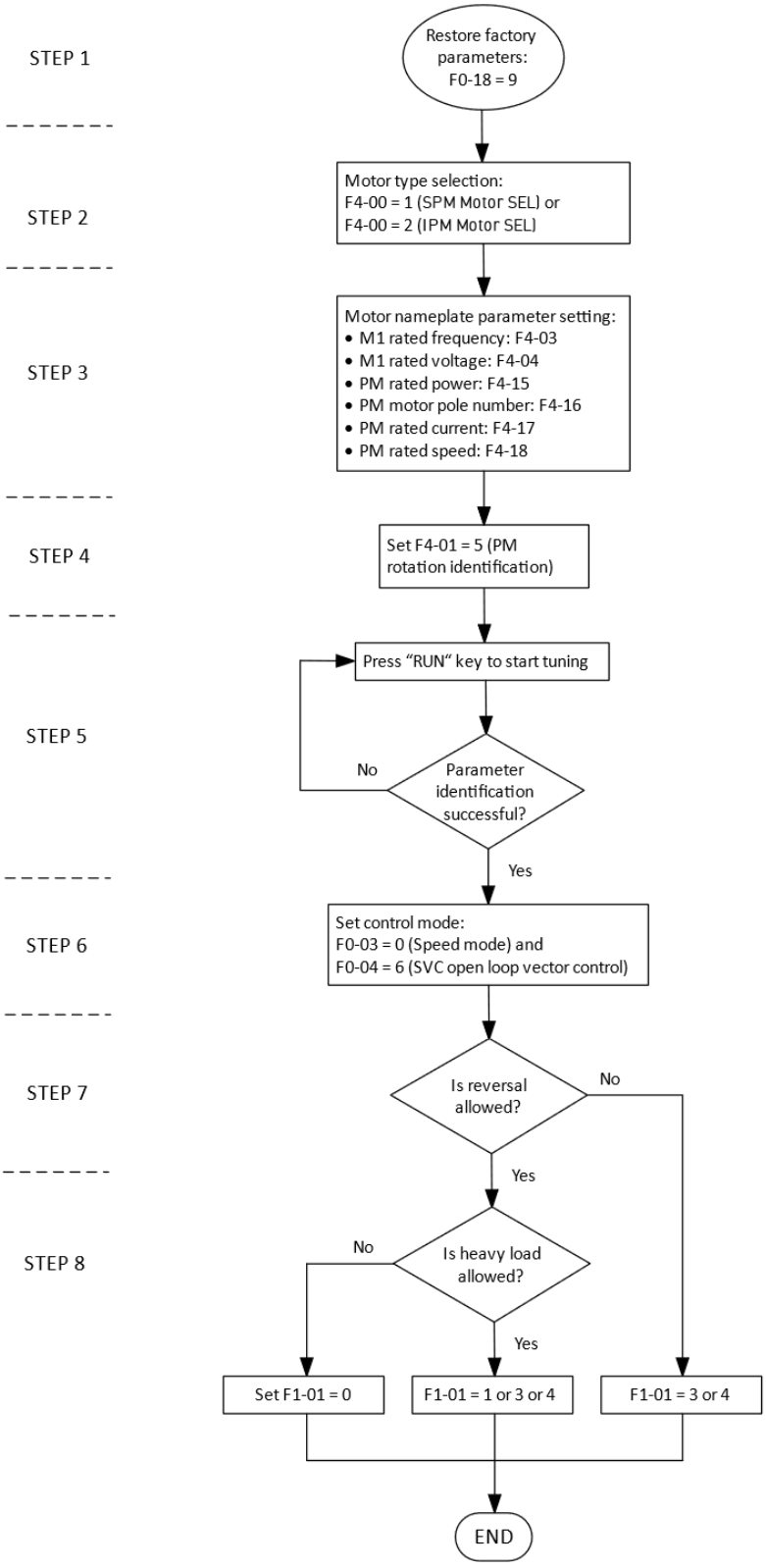


Figure 7 Basic setup process flow chart for Permanent Magnet Motor (PM), SVC

CHAPTER REFERENCE

For detailed instruction, refer to chapter "6.3.3 Basic Settings (Permanent Magnet Motors (PM), SVC)".

COMMISSIONING OF MOTORS (IM, PM) WITH SVC – NO-LOAD DEBUGGING PROCESS

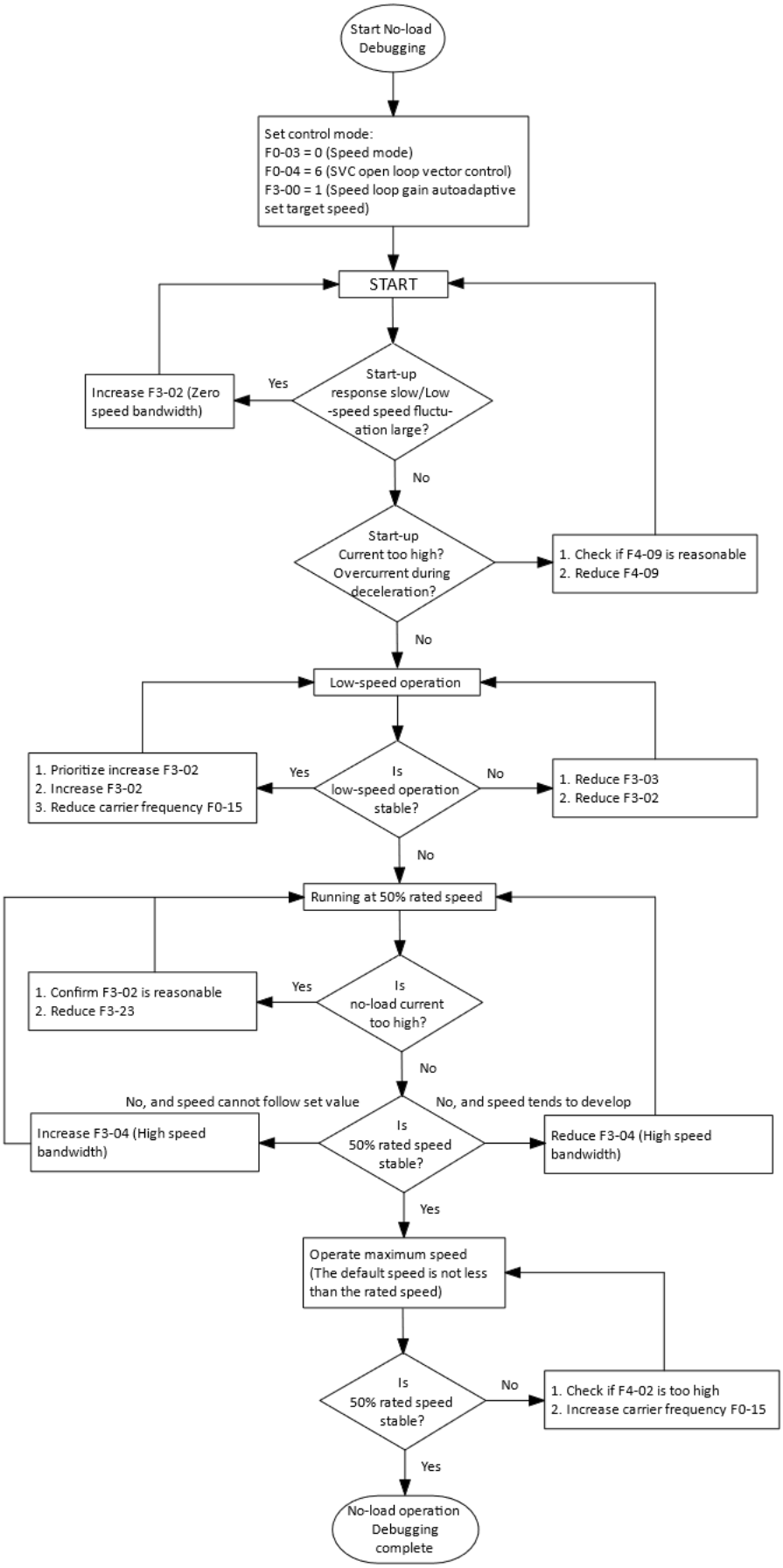


Figure 8 SVC No-load commissioning process flow chart

COMMISSIONING OF MOTORS (IM, PM) WITH SVC – LOAD DEBUGGING PROCESS

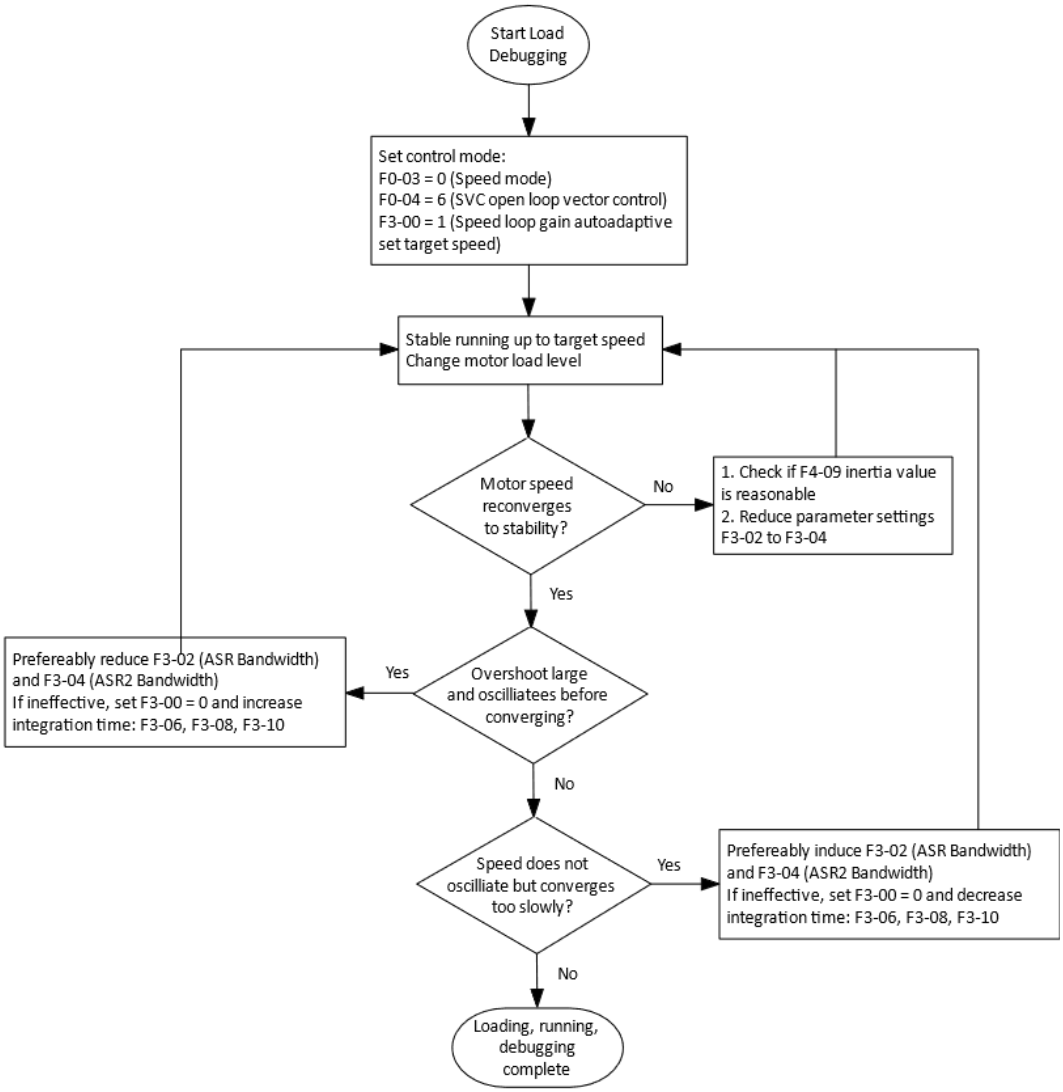


Figure 9 SVC Load commissioning process flow chart

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