Foreword

First of all, thank you for purchasing the DTS series product of SHENZHEN V&T TECHNOLOGIES CO., LTD.

This manual is to be used for the model selection, installation, parameter setting, commissioning and fault diagnosis of the DTS800 AC drive.

To guarantee safe operation of the equipment, please read this manual carefully before connecting power to the AC drive. Keep this manual at hand and distribute to all users for reference.

When using the drive together with optional products, also read the manuals for those products. Note that this manual and the manual for each optional product to be used should be delivered to the end user.

If you have any questions, please consult our technical support personnel or distributor for help.

Due to continuous improvement of products, the information provided by the company is subject to change without notice.

DTS800 Introduction

DTS800 series product is a drive developed independently by V&T Company, use direct torque control technology, with fast torque response performance and higher speed stability accuracy. DTS800 not only provides precise speed control and torque control with encoder, but also provides precise speed control and torque control without encoder. Even without encoder, the unique DTC control technology, with characteristics of large torque at low frequency and fast torque response, can meet application requirements in most cases.

DTS800 adopt the common DC bus connection mode. It has the advantages of simple installation, convenient connection, reducing control cabinet space and saving energy consumption. This largely saves the wiring, installation and maintenance costs.

DTS800 built-in pre-charge circuit, and does not require additional pre-charge circuit and can be powered directly from the DC power supply.

DTS800 with wide power range and wide voltage range. Single drive power range from 75 kW to 560 kW, input voltage corresponding to 3AC220V, 3AC380V and 3AC690V for Rectifier Bridge.

DTS800 maximum power can reach to 2200kW in parallel connection.

DTS800 has rich HMI function, not only full series product default with LCD keypad (Chinese or English can be select by parameter), but also the parameters can be changed and monitored by browser.

DTS800 with Adaptive Program function, users can directly program their required functions, encryption is also supported.

DTS800 can be used as Active Front End (AFE) via parameter setting, users only need to add LCL filter and pre-charge circuit.

Safety Precaution

DANGER: **Dangerous warning** warns of high voltage which can cause physical injury and/or damage to the equipment, even could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive.

WARNING: **General warning** warns about conditions, other than those caused by electricity, which can result in physical injury and/or damage to the product.

■ USE

DANGER
● This series of drives is used to control the operation of three-phase motors. It cannot be used to control single-phase motors or for other purposes, otherwise it may cause drive fault or fire. ● This series of drives cannot be easily applied to applications such as medical devices that are directly related to personal safety. ● This series of drives is manufactured under a strict quality management system. If a drive fault occurs, it can cause a major accident or loss, safety measures such as redundancy or bypass need to be set, just in case.

■ Arrival Inspection

WARNING
● The drive cannot be installed if is damaged or lack of parts, otherwise an accident may occur.

■ Installation

WARNING
● When handling and installing, please hold the bottom of the product. Do not hold the enclosure only, Otherwise, your feet may be injured and/or the drive may be damaged. ● The drive should be mounted on the fire-retardant surface such as metal, and keep away from flammable objects and keep away from heat producer. ● Do not drop drilling residue into the drive during installation work. Otherwise drive fault may occurs. ● When the drive is installed in the electrical control cabinet, the electrical control cabinet shall be equipped with fan and ventilation port, and air-cooling duct shall be constructed in the cabinet to facilitate heat dissipation.

■ Wiring

DANGER

- Wiring must be performed by a qualified electrical engineer, otherwise there is a risk of electric shock or damage to the drive.
- Make sure that the power is off before wiring, otherwise there is a danger of electric shock or fire.
- The grounding terminal PE must be grounded reliably, otherwise, the drive enclosure may become live.
- Do not touch the main circuit terminals. The main circuit terminals wiring of the drive must not be contacted to the enclosure, otherwise, risk of electric shock may occur.
- The connection terminals of the brake resistor are "+" and "PB". Do not connect terminals other than these, otherwise, risk of fire may occur.
- The leakage current of the drive is greater than 3.5mA, and the specific value is determined by the conditions of use. For safety reasons, the drive and motor must be grounded.

WARNING

- The three-phase power supply cannot be connected to the output terminals U, V, W, otherwise the drive will be damaged.
- It is absolutely prohibited to connect a capacitor or phase lead LC/RC noise filter to the output terminal of the drive, otherwise the internal components of the drive will be damaged.
- Please confirm the number of power phases and rated input voltage match the nameplate, otherwise the drive may be damaged.
- The withstand voltage test cannot be performed on the drive, otherwise the drive may be damaged.
- The main circuit terminal wiring and control circuit terminal wiring of the drive should be arranged separately or vertically, otherwise the control signal will be interfered.
- For the wiring cable of the main circuit terminal, use the cable lug with an insulating sleeve.
- The sectional area of input and output cables should be selected according to the drive power.
- When the cable length between the drive and the motor exceeds 100 meters, it is recommended to use an output reactor to avoid over-current fault caused by excessive distributed capacitance.
- The terminal connection of the main circuit must be reliable, otherwise it may cause fire and/or short circuit.

■ Operation

DANGER

- Only after the drive wiring is completed and the cover is installed, it can be powered. It is forbidden to remove the cover when the power is on, otherwise there is danger of electric shock.
- Before running, confirm that the mechanical installation is reliable, otherwise, it may cause physical injury and/or damage to the equipment.
- Before running, must confirm all personnel are in a safe position, otherwise, it may cause physical injury and/or damage to the equipment.
- If automatic fault reset or automatic start after power ON is set, safety isolation measures should be taken for mechanical equipment, otherwise, it may cause physical injury and/or damage to the equipment.
- After the drive is powered on, even if it is in the stop status, the terminals of the drive are still live. It is forbidden to touch, otherwise it may cause electric shock.
- It can only be reset after confirming the run command has been cut off, otherwise it may cause physical injury and/or damage to the equipment.

WARNING

- Do not start or stop the drive by turning the power supply on or off. Otherwise, the drive may be damaged.
- Before start to RUN, please confirm whether the motor and machinery are within the allowable range of use, otherwise the equipment may be damaged.
- Before start to RUN, please set the motor parameters correctly and start motor parameters auto tune, otherwise, if the default parameter values are not match the motor will cause over-current fault or motor vibration, even damage to the equipment.
- Do not touch heat sink and brake resistor, otherwise there is a danger of burns and/or electric shock.
- When using on a lifting device, such as crane, escalator, elevator, please also configure the mechanical brake.
- Do not change the drive parameters at will. Most of the drive's default value can meet the operation requirements. Just change some necessary parameters value, and arbitrarily modify the parameters may cause damage to the mechanical equipment. Only some necessary parameters need to be set. Modifying the parameters at will may result in damage to the mechanical equipment.

■ Maintenance and Inspection

DANGER

- Do not touch the terminals of the drive while the power is on, otherwise there is a danger of electric shock.
- Make sure turn off the power before remove the cover.
- Wait at least 10 minutes after turn off the power, or confirm that the charging CHARGE indicator is off before performing maintenance and inspection to prevent the residual voltage of the main circuit electrolytic capacitor from injuring people.
- Please designate qualified electrical engineers to do the maintenance, inspection or replace parts.

WARNING

- There are CMOS large-scale integrated circuits on the circuit board. Do not touch them with your hands to prevent static electricity from damaging the circuit board.

■ Others

DANGER

- It is forbidden to modify the drive by yourself, otherwise it will cause personal injury.
- The power of interphone used when close to the drive shall not exceed 8W.
- It is forbidden to use the screws not provided by the manufacturer or specified by the manufacturer, otherwise the structural parts of the drive or the circuit will be damaged due to factors such as too long or too large screws.

CONTENTS

Chapter 1 DTS800 Introductions

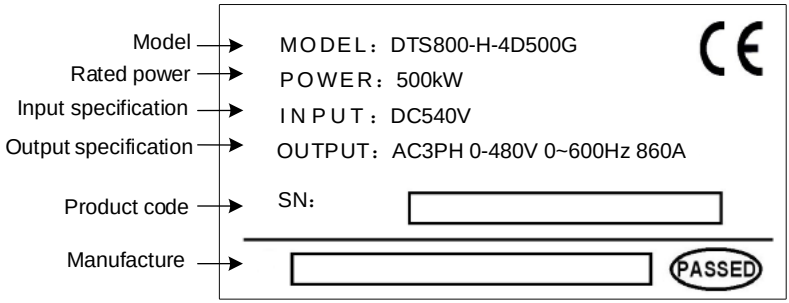
1.1 Product Model Description

The digits and letters in the product model field on the nameplate indicate such information as the drive series, input voltage, power, software version and hardware version.

DTS800 - H - 4 D 500G B - S.* - H.*** - C.****

DTS800	Direct torque control technology platform
H	Universal series
2	DC320V (Corresponding rectifier bridge 3AC 220V)
4	DC540V (Corresponding rectifier bridge 3AC 380V)
6	DC970V (Corresponding rectifier bridge 3AC 690V)
D	DC input
T	Three phase AC input
None	Structure standard version
C.**	Structure non-standard version
None	Hardware standard version
H.**	Hardware non-standard version
None	Software standard version
S.**	Software non-standard version
B	Built-in brake chopper (75 ~ 200kW)
500G	500kW heavy load / constant torque application

1.2 Product Nameplate Description



1.3 Product Series

■ DTS800-H−4D□□□G DC540V constant torque/heavy−load application

Power (kW)		75	90	110	132	160	185	200	220	250	280	315	355	400	450	500
Applicable motor (kW)		75	90	110	132	160	185	200	220	250	280	315	355	400	450	500
Output	Voltage (V)	3 phase 0 to rated input voltage (corresponding rectifier bridge input)														
	Rated current (A)	150	176	210	253	304	350	380	426	470	520	600	650	690	775	860
	Max. current (A)	270	317	378	455	547	630	684	765	846	936	1080	1170	1242	1395	1548
	Over load	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)														
Input	Rated voltage	DC540V														
Brake chopper		Built-in as optional								External						
Protection class		IP20														
Cooling mode		Force air cooling														

■ DTS800-H−6D□□□G DC980V constant torque/heavy−load application

Power (kW)		75	90	110	132	160	185	200	220	250	280	315	355	400	450	500	560
Applicable motor (kW)		75	90	110	132	160	185	200	220	250	280	315	355	400	450	500	560
Output	Voltage (V)	3 phase 0 to rated input voltage (corresponding rectifier bridge input)															
	Rated current (A)	86	98	120	150	176	204	220	245	275	325	350	395	435	490	545	600
	Max. current (A)	154	176	217	270	315	356	392	432	486	576	630	684	783	882	972	1080
	Over load	150% 1 minute, 180% 10 seconds, 200% 0.5 second, interval: 10 minutes (inverse time lag feature)															
Input	Rated voltage	DC 980V															
Brake chopper		Built-in as optional								External							
Protection class		IP20															
Cooling mode		Force air cooling															

Note:

1. If a higher power level product is required, multiple DTS800s can be used for parallel operation. Up to four DTS800s can be used for parallel operation. The maximum power is 500 * 4=2000kW.
2. If lower power products is required, please select VTS series single drive products to support AC input and DC input. For details, please refer to the VTS product manual.

1.4 Technical Specifications of Product

Control characteristics	Control mode	Scarlar control	DTC without encoder	DTC with encoder
	Starting torque	0.50Hz 150%	0Hz 100%; 0.25Hz 200%	0.00Hz 200%
	Range of speed regulation	1:100	1:200	1:1000
	Precision of steady speed	± 0.5%	± 0.2%	± 0.02%
	Torque control	—	Y	Y
	Precision of torque control	—	±5%	±3%
	Torque response time	—	<20ms	<10ms
Product function	Key function	Under-voltage regulation, motor speed tracing, switchover of run command reference, multi−step frequency reference, motor parameter auto-tune, S curve acceleration and deceleration, mechanical brake control logic, PID regulation, current limit, torque limit, switch-over between torque control and speed control, user load curve, master-follower control, adaptive program, use as AFE, etc,.		
	Speed reference source	Digita input, terminal UP/DN, communication, alalog input, multiple combination methods		
	Frequency range	0.00～600.00Hz		
	Start mode	Auto, Flying start, start after DC magnetization, start after constant time DC magnetization		
	Acceleration time and deceleration time	Multiple acceleration and deceleration time combinations, and S-curve acceleration and deceleration time are available		
	Dynamic braking	With overload capacity estimation		
	DC braking	DC braking start waiting time is not required to achieve fast braking		
	Magnetic flux braking	Active and inactive options, default inactive		
Unique functions	Keypad	LCD keypad (Chinese or English language)		
	Support PC browser	Support use PC browser to monitor and commissioning		
	Multiple IO ports	Up to 13 digital inputs and 6 relay outputs		
	Multiple parameters menu	User parameters, monitoring parameters, non-factory value parameters		
	Parameters copy	The keypad with standard configuration can upload and download parameters		
	Dual 485 communication	The dual 485 communication interface supports Modbus-RTU, and the standard operation panel can realize the remote control box function, up to 500 meters		
	Common DC bus	The full series can realize the common DC bus power supply for multiple drivers		
	Independent air duct	The full series adopts independent air duct design and supports the installation outside the radiator cabinet		
	Power-On-Self-Test (POST)	Realizing the POST of internal and peripheral circuits, including motor grounded, abnormal +10V power supply output, analog input and disconnection, etc.		
	Adaptive program	It does not need PC, and can realize the user-defined programming function, and can encrypt the user-defined programming		
	AFE	Rectification and feedback functions can be realized		

Protection	Power supply under-voltage, over-current protection, over-voltage protection, interference protection, abnormal comparison level, motor data identification failure, module(IPM) protection, heat-sink over temperature protection, drive overload protection, motor overload protection, peripheral protection, abnormal current detection, output short circuit to ground, abnormal input power, output phase loss, abnormal EEPROM protection, abnormal pre-charging contactor detection, temperature sampling disconnection, encoder disconnection, abnormal +10V power supply, abnormal analog input, motor over temperature protection(PTC), abnormal communication, abnormal software version compatibility, abnormal copying, hardware overload protection, over speed protection
Efficiency	At rated power: 75kW and above power class ≥98%
Operating site	Install vertically in a well-ventilated electrical cabinet. Horizontal or other installation are not allowed. The cooling medium is air. Installed in an environment free from direct sunlight, dust, corrosive gases, flammable gases, no oil mist, no steam, no dripping.
Ambient temperature	−10～+40℃, derating use when the temperature between 40 to 50℃, the rated output current is reduced by 1% for every 1 °C increasing.
Humidity	5～95%, no condensation is allowed.
Altitude	0～2000 meters, derating use when the altitude over 1000 meters, the rated output current is reduced by 1% for every 100-meter rising.
Vibration	3.5 m/s^2, 2～9Hz; 10 m/s^2, 9～200Hz; 15 m/s^2, 200～500Hz
Storage temperature	−40～+70℃

1.5 Brake Resistor

Model	Brake chopper	Brake resistor	
		Power (kW)	Resistance (Ω)
DTS800-H−4D75GB	Built-in as optional	15.0	7.5
DTS800-H−4D90GB		18.0	7.5
DTS800-H−4D110GB		22.0	7.5
DTS800-H−4D132GB		27.0	4.5
DTS800-H−4D160GB		32.0	4.0
DTS800-H−4D185GB		38.0	3.5
DTS800-H−4D200GB		40.0	3.0
DTS800-H−4D220G	External	Please select according to the actual requirements	Please select according to the actual requirements and brake unit
DTS800-H−4D250G			
DTS800-H−4D280G			
DTS800-H−4D315G			
DTS800-H−4D355G			
DTS800-H−4D400G			
DTS800-H−4D450G			
DTS800-H−4D500G			

Note:

- The brake resistor power in the table is calculated with the braking duration within 30s. If the braking duration is longer, the brake resistor power must be larger. Please determine the appropriate brake resistor power according to the actual situation.
- The selection of brake resistor and brake chopper is related to system inertia, deceleration time, descent distance, time (i.e. potential energy). To select the model according to the actual situation. If the system inertia is larger, the deceleration time is shorter, and the braking is more frequent, the brake resistor needs higher power and smaller resistance value.

Chapter 2 Mechanical Installation

2.1 Installation Environment

- Avoid installing in areas with oil mist, metal dust and dust.
- Avoid installing in areas with harmful gases, liquids, corrosive, flammable or explosive gases.
- Avoid installing in places with a lot of salt.
- Do not install in direct sunlight.
- Do not install on flammable objects such as wood.
- Never leave drilling residues inside the drive during installation work.
- Please install it vertically in the electric control cabinet, and install a cooling fan or cooling air conditioner to prevent the ambient temperature from rising above 45 °C.
- For the harsh installing environment, it is recommended to mount the drive heat sink outside the cabinet.

2.2 Mounting Direction and Space

In order not to reduce the cooling effect, be sure to install it vertically, as shown below, and make sure that there is some space.

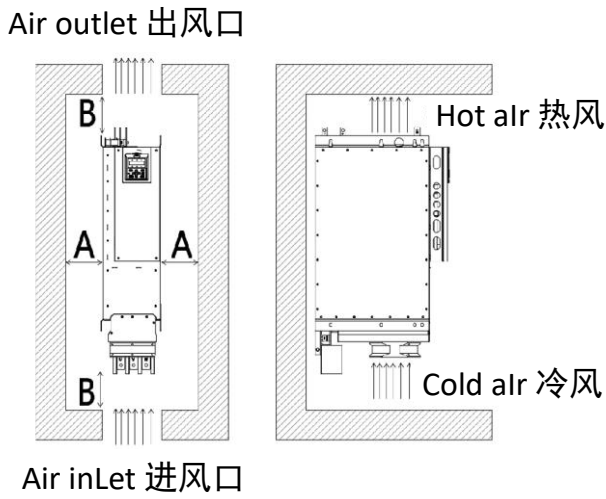


Figure 2−1 Mounting direction and space

Power	Dimension A	Dimension B
From 75kW to 560kW	A≥100mm	B≥200mm

2.3 Keypad Mounting Dimensions

■ Keypad Outline and Mounting Dimension

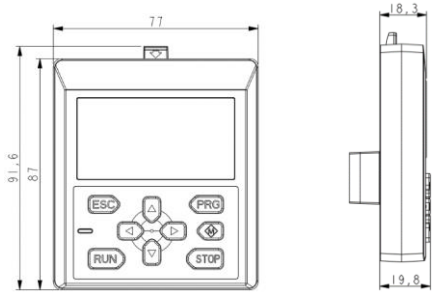


Figure2−2 Keypad outline and mounting dimension

■ Installation Dimension of Keypad Directly Installed on Electric Control Cabinet

The keypad can be directly led to the electric control cabinet for installation. The keypad back mounting dimensions are as follows:

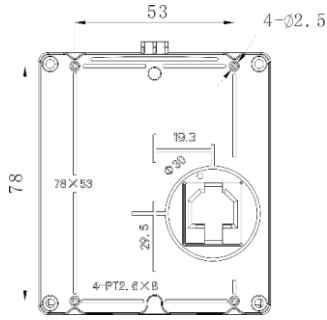


Figure2−3 Installation dimension of keypad directly installed on electric control cabinet

■ Pallet Outline and Mounting Dimension

The keypad can also be installed on the mounting pallet. VTS-DP05 is the mounting pallet when the operation panel is to install on the electric control cabinet. The outline and dimension are as follows:

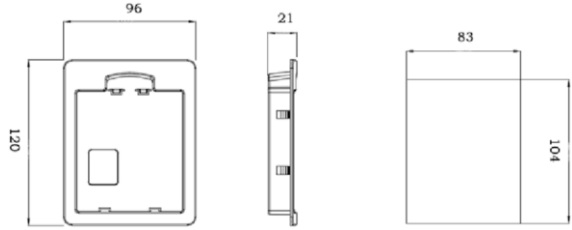


Figure2−4 Pallet outline and mounting dimension

2.4 Mounting Dimensions

■ Product Outline

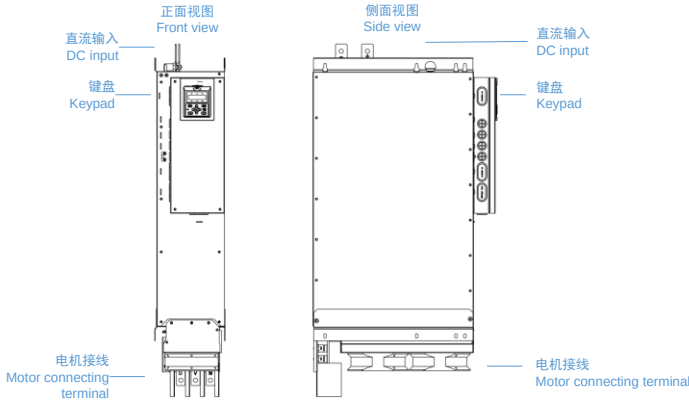


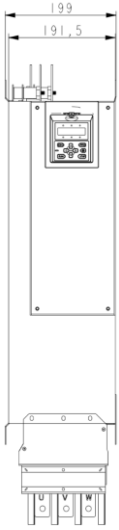
Figure2−2 DTS800 series product component name

-■ DTS800 Dimensions

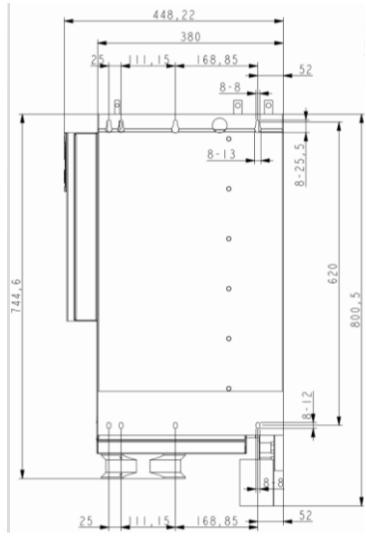
Model	Dimensions（mm）			Approximate weight（KG）
	W	H	D	
DTS800-H−4D75G	199	800	448	40
DTS800-H−4D90G				
DTS800-H−4D110G				
DTS800-H−4D132G	199	959.5	520.5	57.5
DTS800-H−4D160G				
DTS800-H−4D185G				
DTS800-H−4D200G				
DTS800-H−4D220G	247	1485	459.5	136.4
DTS800-H−4D250G				
DTS800-H−4D280G				
DTS800-H−4D315G				
DTS800-H−4D355G	260	1585	576.5	185
DTS800-H−4D400G				
DTS800-H−4D450G				
DTS800-H−4D500G				

■ **75kW ~ 110kW Mounting Dimension**

正面视图
Front view

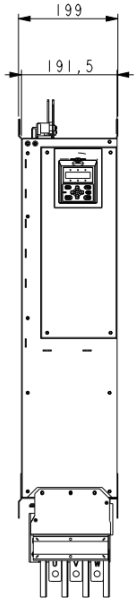


侧面视图
Side view

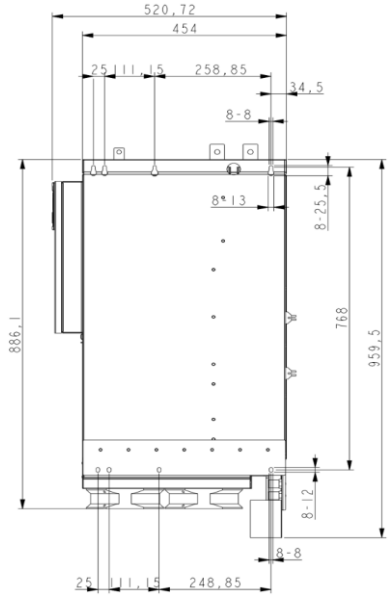


■ **132kW ~ 200kW Mounting Dimension**

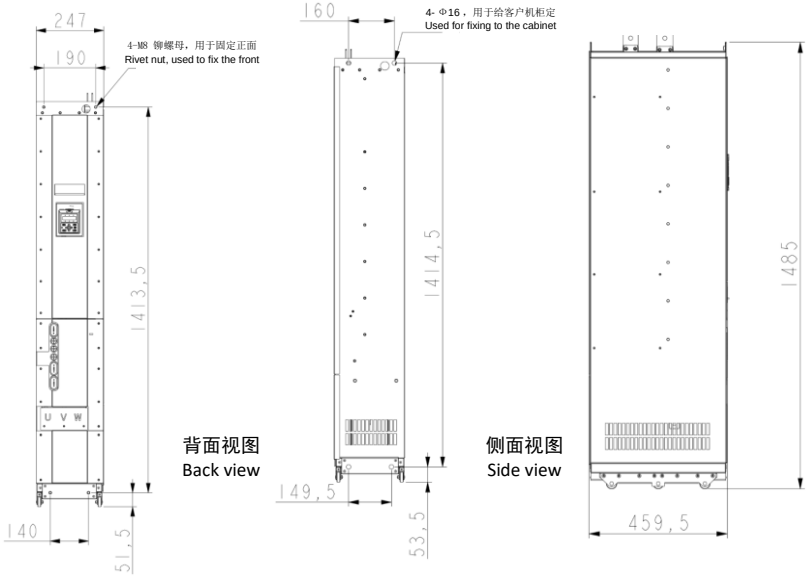
正面视图
Front view



侧面视图
Side view



■ **220kW ~ 315kW Mounting Dimension**

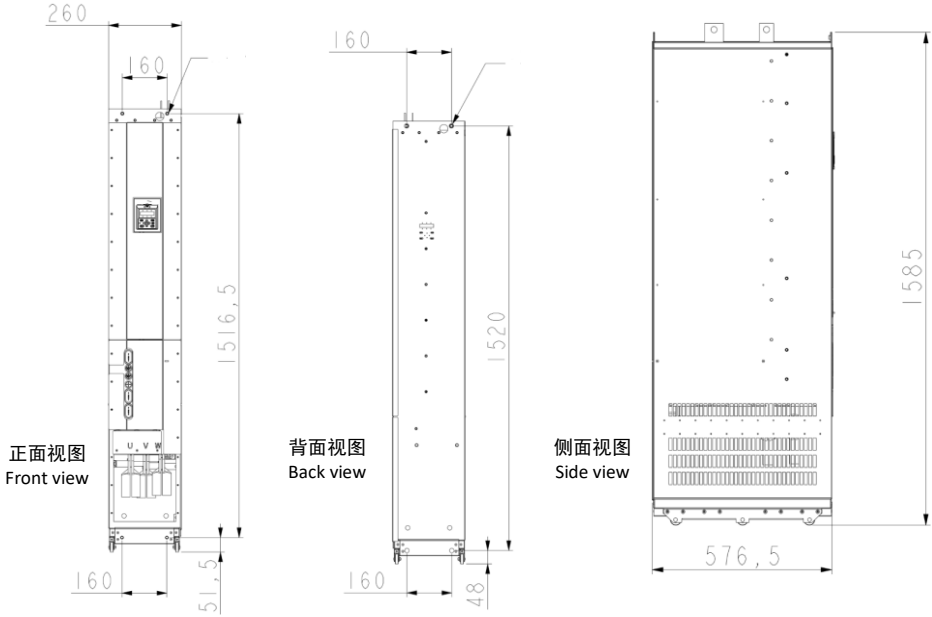


正面视图
Front view

背面视图
Back view

侧面视图
Side view

■ **355kW ~ 500kW Mounting Dimension**



正面视图
Front view

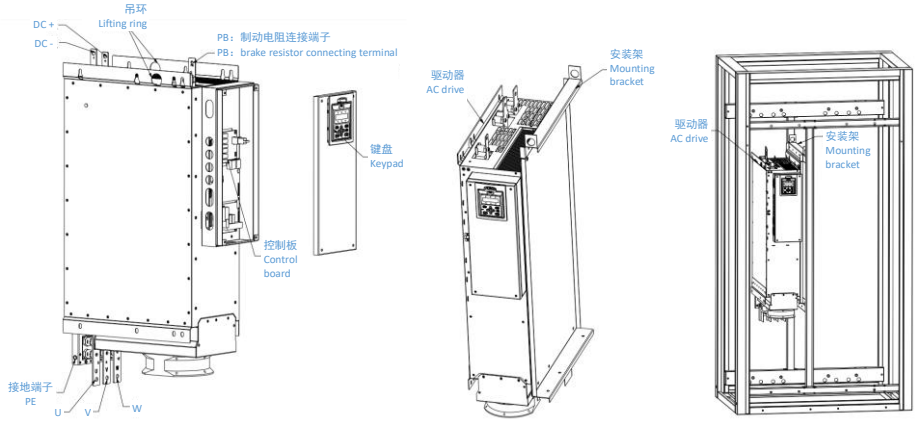
背面视图
Back view

侧面视图
Side view

2.5 Installation

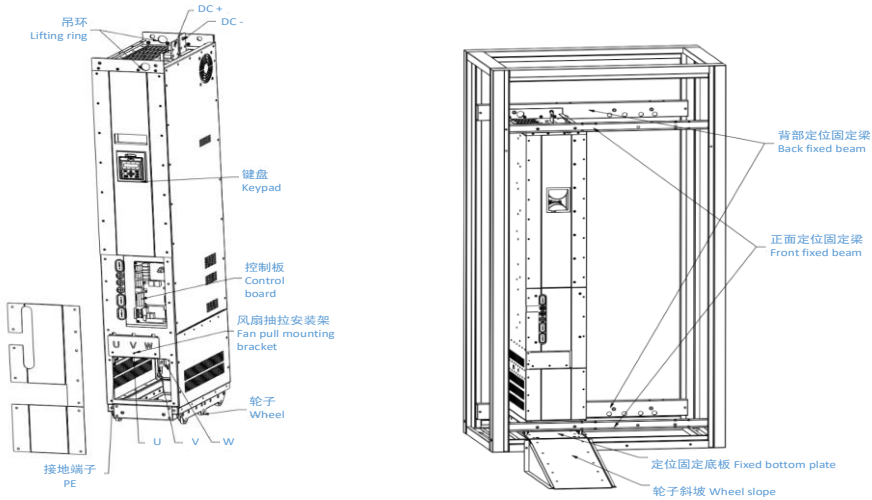
■ Installations from DTS800-H-4D75G to DTS800-H-4D200G

1. Install the drive on the mounting bracket with screws.
2. Hang the mounting bracket with the drive installed on the cabinet beam and fasten it with screws.



■ Installations from DTS800-H-4D220G to DTS800-H-4D560G

1. Push the drive into the cabinet along the wheel slope.
2. Insert the locating pin on the cabinet into the locating hole on the back of the drive.
3. Tighten the screw on the front of the drive.



Chapter 3 Electrical Installation

3.1 Peripheral Devices Connection

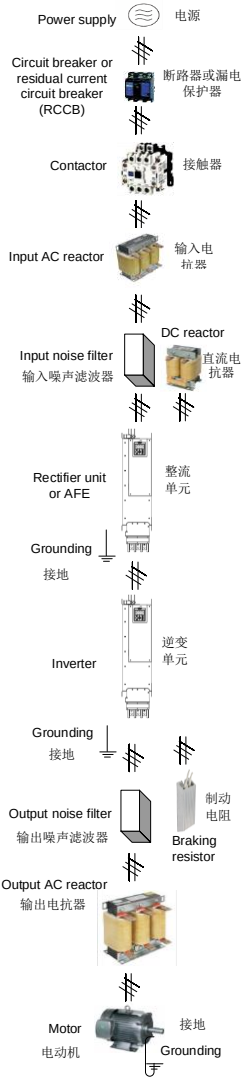


Figure3−1 Connection diagram of the product and peripheral devices

3.2 Descriptions of Peripheral Devices

Device	Model selection reference
Circuit breaker	The circuit breaker capacity should be 1.5 to 2 times of the drive rated current. The time characteristics of the circuit breaker must fully consider the time characteristics of the drive overload protection.
RCCB (Residual current circuit breaker)	The drive output is high-frequency pulse so as generates leakage currents to ground. When installing the RCCB at the input end, please use the specialized RCCB. It is suggested to choose type B RCCB, and set the leakage current value to 300mA.
Contactor	Frequent contactor action will cause drive failure, so the highest frequency for the open and close the contactor shall not exceed 10 times/min. When using a brake resistor, in order to prevent the brake resistor from overheating and damage, please install a thermal protection relay for brake resistor overheating detection, and control the disconnection of the contactor on the power side through the contact of the thermal protection relay.
Input AC reactor or DC reactor	1. The power supply capacity is more than 600kVA or 10 times of the drive capacity. 2. If there is a switch-type reactive compensation capacitor or a thyristor phase-controlled load on the same power supply node. There will be a large peak current flowing into the input power circuit, which will cause damage to the rectifier. 3. When the voltage imbalance of drive's three-phase power supply exceeds 3%, it may cause interference to the system or cause damage to the rectifier. 4. The input power factor of the drive is required to be higher than 90%, and the input AC reactor can improve the power factor of the input side. 5. Improve the input side of the high-order harmonic, prevent damage to other equipment caused by distortion of the voltage waveform. 6. Improve the influence of input side higher harmonics on the drive, and reduce external conduction and radiation interference. If the above requirements exist, please connect an AC reactor at the input side of the driver or install a DC reactor on the DC reactor terminal.
Input noise filter	It can reduce the interference from power supply to the drive and improve the anti-interference ability of the drive. It can reduce the external conduction and radiation interference of the drive.
Thermal protection relay	Although the drive has its own motor overload protection function, when one drive drives two or more motors or drives a multi-poles motor, it is recommended to install a thermal protection relay between the drive and every motor.
Output noise filter	It can reduce the external conduction and radiation interference of the drive.
Output AC reactor	When the cable from the drive to the motor exceeds 100 meters, it is recommended to install an AC output reactor that can suppress high-frequency oscillation to avoid motor insulation damage, excessive leakage current and drive protection.

3.3 Peripheral Devices Models

Voltage	驱动器型号	Circuit breaker（A）	Contactor（A）	+、−、PB、U、V、W			Grounding terminal PE		
				Terminal screw	Tightening torque (N • m)	Cable (mm^2)	Terminal screw	Tightening torque (N·m)	Cable (mm^2)
DC540V	DTS800-H−4D75G(B)	315	250	M8	9.0～10.0	50	M8	9.0～10.0	25
	DTS800-H−4D90G(B)	350	330			70			35
	DTS800-H−4D110G(B)	350	330			100			50
	DTS800-H−4D132G(B)	400	330	M10	17.6～22.5	150	M8	9.0～10.0	75
	DTS800-H−4D160G(B)	500	400			185			100
	DTS800-H−4D185G(B)	630	500		31.4～39.2	240		9.0～10.0	60*2
	DTS800-H−4D200G(B)	630	500			240			60*2
	DTS800-H−4D220G	800	630	M12	31.4～39.2	150*2	M8*2	17.6～22.5	75*2
	DTS800-H−4D250G	1000	630			185*2			100*2
	DTS800-H−4D280G	1000	630			185*2			100*2
	DTS800-H−4D315G	1000	800			250*2			125*2
	DTS800-H−4D355G	1200	800	M16	61.0～80.0	325*2	M8*2	17.6～22.5	150*2
	DTS800-H−4D400G	1500	1000			325*2			150*2
	DTS800-H−4D450G	2000	1500			350*2			175*2
	DTS800-H−4D500G	2000	1500			350*2			175*2
DC980V	DTS800-H−6D75G	160	125	M8	9.0～10.0	25	M8	9.0～10.0	16
	DTS800-H−6D90G	160	125			25			16
	DTS800-H−6D110G	200	160			35			25
	DTS800-H−6D132G	315	250	M10	17.6～22.5	50	M8	9.0～10.0	25
	DTS800-H−6D160G	315	250			50			25
	DTS800-H−6D185G	350	330		31.4～39.2	70		9.0～10.0	35
	DTS800-H−6D200G	350	330			70			35
	DTS800-H−6D220G	400	330	M12	31.4～39.2	70*2	M8*2	17.6～22.5	25*2
	DTS800-H−6D250G	500	400			70*2			25*2
	DTS800-H−6D280G	500	400			100*2			50*2
	DTS800-H−6D315G	630	500			100*2			50*2
	DTS800-H−6D355G	630	500	M16	61.0～80.0	100*2	M8*2	17.6～22.5	50*2
	DTS800-H−6D400G	800	630			100*2			50*2
	DTS800-H−6D450G	1000	630			100*2			50*2
	DTS800-H−6D500G	1000	800			150*2			60*2
	DTS800-H−6D560G	1000	800			150*2			70*2

3.4 Product Terminal Configuration

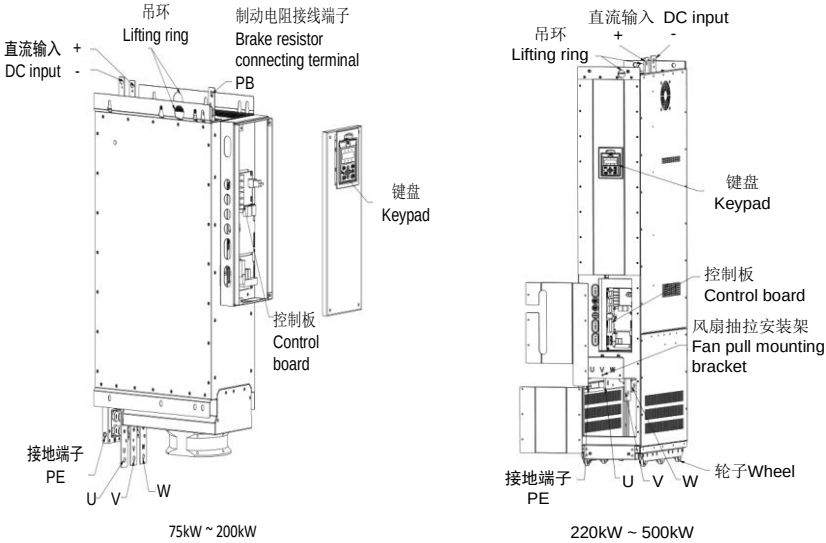


Figure3−2 Product Terminal Configuration

3.5 Functions of Main Circuit Terminal

◆ 75 ~ 200kW: built-in brake chopper as optional

+	-	PB

U	V	W	⏚

Terminal symbol	Function description
+、-	DC power input terminal DC input terminal of external brake chopper
+、PB	Connecting terminal of braking resistor
U、V、W	Three−phase AC output terminal
⏚	Grounding terminal PE

◆ 220 ~ 500kW

+	-

U	V	W	⏚ ⏚

Terminal symbol	Function description
+、-	DC power input terminal DC input terminal of external brake chopper
U、V、W	Three−phase AC output terminal
⏚	Grounding terminal PE

3.6 Attention for Main Circuit Wiring

3.6.1 Power Supply

- ◆ Do not connect the power supply to the output terminal, as this will result in damage to drive.
- ◆ For input side over-current protection and maintenance conveniently, the power supply should be connected to the drive through the breaker or RCCB and contactor.
- ◆ Please confirm the number of phases and rated voltage of power conform to the instructions on the nameplate of the product, otherwise, incorrect power input will lead to product damage.

3.6.2 Motor Wiring

- ◆ Short circuit or grounding of the drive output terminals is prohibited. Otherwise, it will cause damage to the internal components of the drive.
- ◆ Avoid output cables (U/V/W) short circuit or short circuit to enclosure, otherwise will cause electric shock.
- ◆ It is strictly forbidden to connect a capacitor or phase lead LC/RC noise filter to the output of the drive, otherwise the drive will be damaged.
- ◆ When a contactor is installed between the drive and the motor, the contactor open or close action cannot be performed during the operation of the drive. Because the contactor open or close action during the operation of the drive will have a large current flowing into the driver, which is easy to damage the drive.
- ◆ Cable length between drive and motor.

  When the cable between the drive and the motor is too long, the high-order harmonic leakage current at the output will adversely affect the drive and peripheral devices. It is recommended to install an output AC reactor at the drive output side when the motor cable exceeds 100 meters. In addition, refer to the following table for the switching frequency setting.

Length of cable between the inverter and motor	≤ 50m	≤ 100 m	＞ 100m
Switching frequency (PA.00)	＜ 15kHz	＜ 10kHz	＜ 5kHz

3.6.3 Grounding Wiring

- ◆ The drive will produce leakage current. The larger the carrier frequency value is set; the more leakage current will generate. The leakage current of the drive system is more than 3.5mA, and the specific value of the leakage current is determined by the application conditions. To ensure the safety, the drive and the motor must be grounded.
- ◆ The grounding resistance shall be less than 10 ohm. For the grounding wire diameter requirements, refer to "3.3 Peripheral Devices Models".
- ◆ Do not share grounding cable with the welding machine and other power equipment.
- ● When using two or more drives, the grounding cable should not forming a loop.

Correct **Wrong**

Figure 3−3 Grounding wiring

3.6.4 Countermeasures for Conduction and Radiation Interference

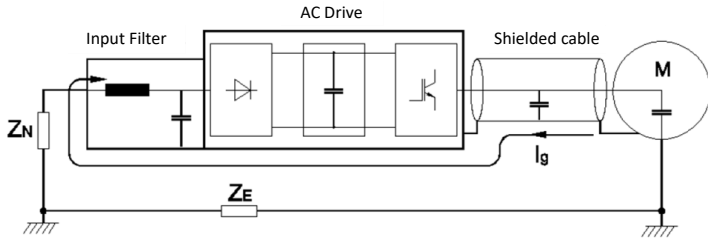


Figure3−4 Noise current illustration

- When installing an input filter, the wiring from the filter to the input power supply of the drive should be as short as possible.
- The housing of the input filter and the installation cabinet shall be reliably connected to the ground in a large area to reduce the return impedance of the noise current Ig.
- The motor cable should be 4-core cable, the cable distance between the drive and the motor should be as short as possible and the cable should be sheathed into a metal tube. One end of the ground wire is connected to the drive PE, another end of the ground wire is connected to the motor housing,
- The input power cable and output motor cable should be as far away as possible.
- The equipment and signal cables that are easy to be interfered shall be installed as far away as possible from the drive.
- Critical signal cables should use shielded cables. It is recommended that the shield layer be grounded by a 360-degree grounding method and inserted into a metal tube. Moreover, critical signal cables should keep away from the input power cable and output motor cable. If the signal cable must cross the input power cable or the output motor cable, Orthogonal routing state should be applied.
- When frequency reference source is analog input (voltage or current signal), use a double-stranded shielded cable and connect the shield layer to the grounding terminal PE of the drive. The signal cable length must less than 50 meters.
- The wiring of the control circuit relay output signal and other control circuit signal should be separated.
- It is strictly forbidden to short-circuit the shield layer with other signal cables and equipment.
- When the drive is connected to an inductive load device (magnetic contactor, relay, solenoid valve, etc.), be sure to use a surge suppressor on the load device coil as shown below.

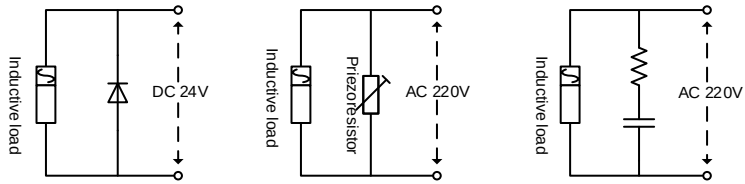


Figure 3−5 Application of inductive load surge suppressor

3.7 Terminal Wiring

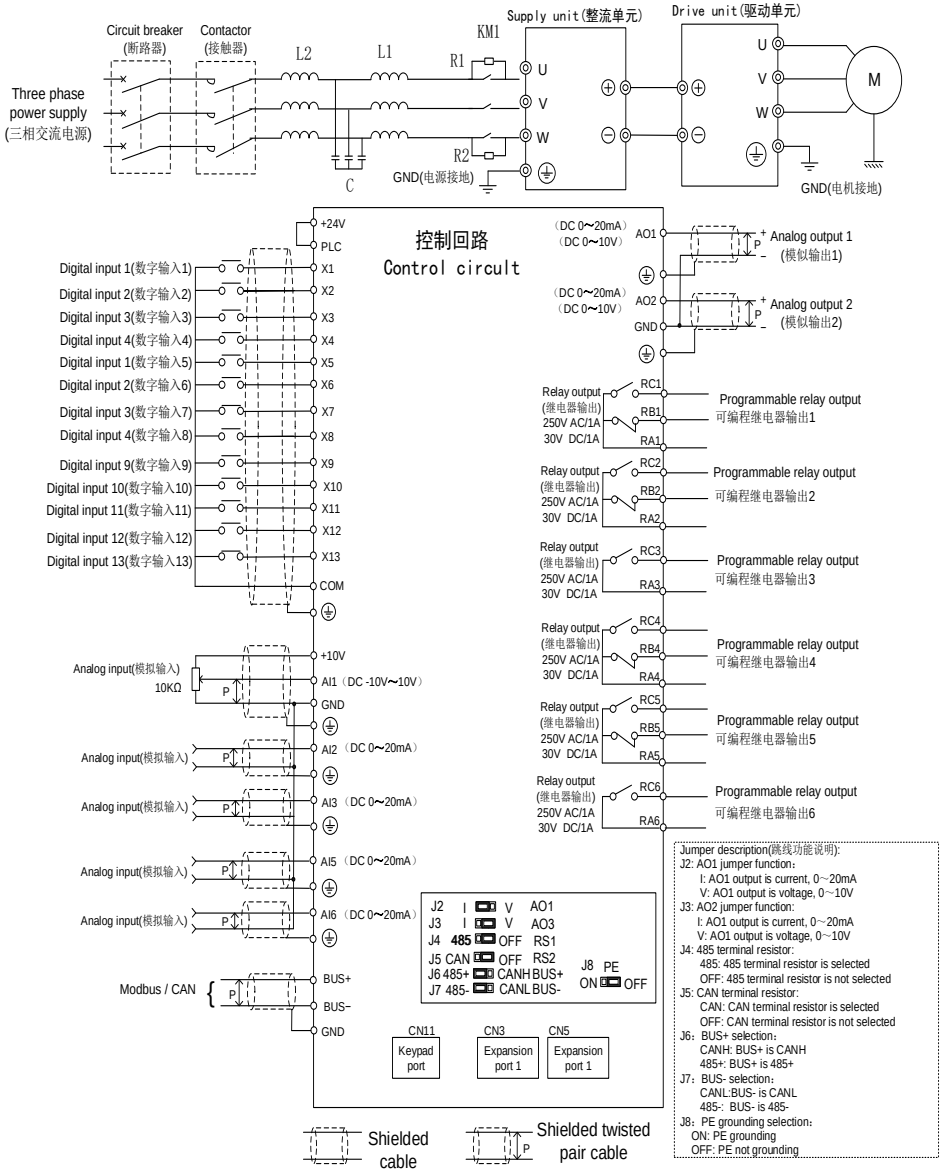


Figure 3−6 Terminal wiring diagram

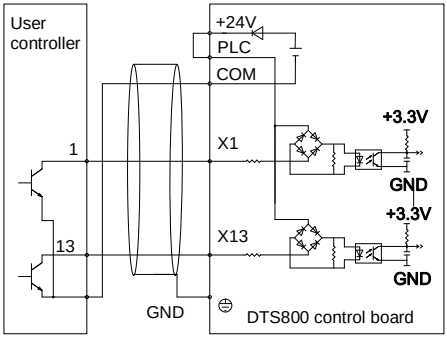
3.8 Functions of Control Circuit Terminals

Type	Terminal	Description	Technical specification
Modbus /CAN	BUS+	RS485+ /CANH	**Modbus-RTU**: • Baud rate: 4800/9600/19200/38400/57600/57600bps • Up to 32 units are connected in parallel. • If more than 32 units are used, repeaters are required. • The maximum distance is 500m (use standard twisted pair shielded cable) **CAN**: • The maximum communication rate is 1Mbps **Note**: 485 or CAN can be selected through jumper
	BUS−	RS485− /CANL	
	GND	Modbus/CAN gnd	Internal isolated with COM
Keypad modbus	CN1	Keypad 485 port	Same as terminal 485 when communication with host computer
			The longest distance of the keypad is 15m (using standard twisted pair shielded network cable)
Digital input	+24V	+24V	24V±10%, Internal isolated with GND, maximum load is 200mA, with overload and short circuit protection
	PLC	Common end of digital input terminal	Short circuit with+24V when leaving factory
	X1～X13	Digital input 1～13	Input specification：24VDC，5mA Frequency range：0～200Hz， voltage range：24V±20%
	COM	The GND of +24V supply	Internal isolated with GND
Relay output	RA1/RB1/RC1	Relay output	RA1−RB1：Normally Closed， RA1−RC1：Normally open Contact rating：250VAC/1A，30VDC/1A
	RA2/RB2/RC2	Relay output	RA2−RB2：Normally Closed， RA2−RC2：Normally open Contact rating：250VAC/1A，30VDC/1A
	RA3/RC3	Relay output	RA3−RC3：Normally open Contact rating：250VAC/1A，30VDC/1A
	RA4/RB4/RC4	Relay output	RA4−RB4：Normally Closed， RA4−RC4：Normally open Contact rating：250VAC/1A，30VDC/1A
	RA5/RB5/RC5	Relay output	RA5−RB5：Normally Closed， RA5−RC5：Normally open Contact rating：250VAC/1A，30VDC/1A
	RA6/RC6	Relay output	RA6−RC6：Normally open Contact rating：250VAC/1A，30VDC/1A
Analog input	+10V	Analog input reference voltage	10V ±3%, internal isolated with COM Max. current 10mA，with short circuit and overload protection *
	AI1	Analog input 1	-10V～10V, input impedance 20kΩ, resolution 12bits（0.025%）
	AI2~AI5	Analog input 2~5	0～20mA, input impedance 500Ω
	GND	Analog input GND	Internal isolated with COM
Anaog output	AO1	Analog output 1	0～20mA: outout allowable impedance 200～500Ω 0～10V: outout allowable impedance ≥10kΩ Output accuracy is 2%，resolution is 10 bits（0.1%）, with short circuit and overload protection. Select 0～20mA or 0～10V analog output through jumper
	AO2	Analog output 2	Same as AO1
	GND	Analog outut GND	Internal isolated with COM

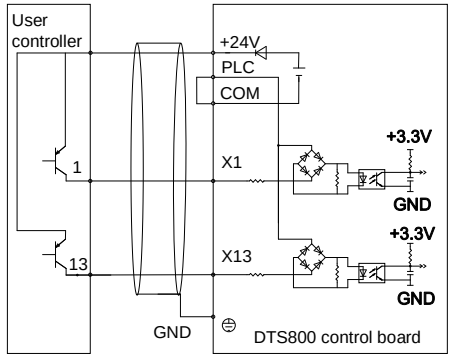
Note: * If the user connects an adjustable potentiometer between+10V and GND, the resistance of the potentiometer should not be less than 5k Ω.

3.9 Wiring Mode of Digital Inputs

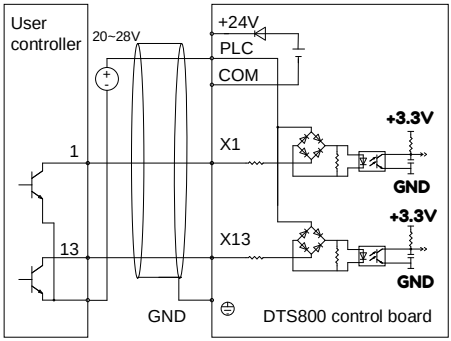
■ Apply internal +24V power supply, wiring in NPN sink current wiring mode



■ Apply internal +24V power supply, wiring in PNP draw-off current wiring mode

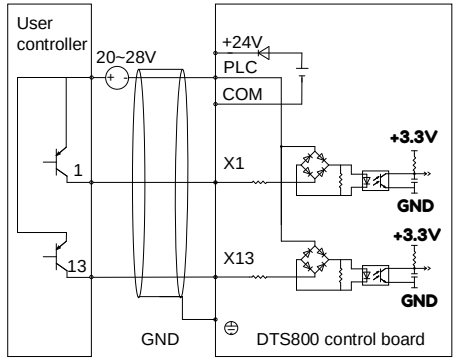


■ Apply external power supply, wiring in NPN sink current wiring mode



Note:
The short-link line between terminal +24V and terminal PLC must be removed.

■ Apply external power supply, wiring in PNP draw-off current wiring mode



Note:
The short-link line between terminal +24V and terminal PLC must be removed.

3.10 Control Circuit Peripheral Devices

Terminals	Terminal screw	Tightening torque (N·m)	Cable specification mm²	Wire type
+10V、AI1 ~ AI6、485+、485−、AO1、AO2、GND	M3	0.5～0.6	0.75	Shielded twisted pair cable
+24V、PLC、X1 ~ X13、COM、RO1 ~ RO6	M3	0.5～0.6	0.75	Shielded cable

Chapter 4 Keypad Operation

4.1 Keypad Introduction

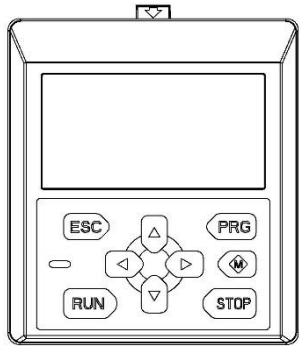


Figure4−1 Keypad

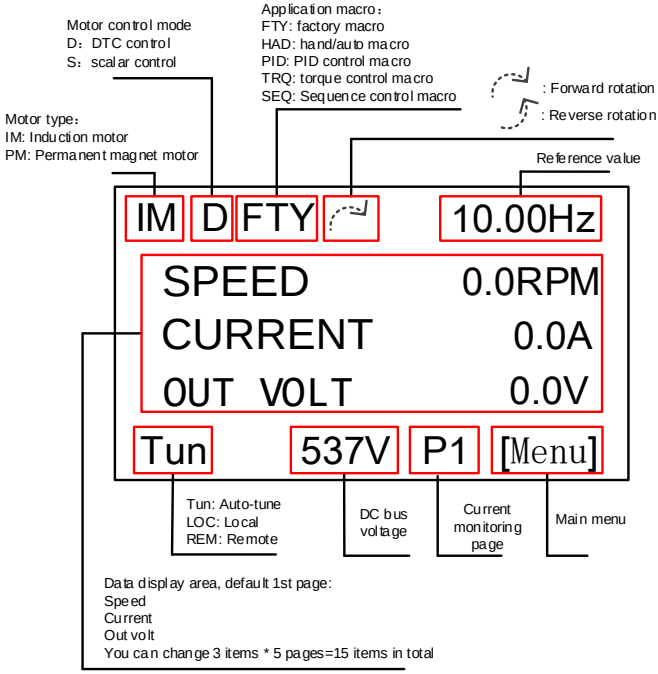
The Keypad has the following features:

- Setting parameters - the parameters can be change by Keypad.
- Motor parameters auto-tune - use the Keypad to set the motor parameters auto-tune mode and start auto-tune.
- Monitoring function - use the Keypad to monitor the parameters value, running state, fault record, etc.
- Start and stop the drive when the run command source is Keypad.
- Reset faults after fault report.
- Copy function - parameters value can be copied to the Keypad memory for later transfer to other drives or for backup.
- The Keypad can be used to reset all the parameters to default values.
- Check which parameters are different from the default values, it is convenient to check whether the parameters are changed correctly.
- Remote control box - the Keypad can be used as remote-control box functions via straight-through wired cable.
- External installing pallet - external installing pallet is available; it is convenient to install a Keypad to an external electrical cabinet.
- The Keypad and drive can be disconnected and connected at any time.
- The display language can be Chinese or English.

4.2 Keypad Keys and Indicator

Key	Name	Function
	Program key	1. Enter the sub-menu. 2. Enter the parameters setting menu. **3.** Data storage confirmation.
	Escape key	1. Return to the previous menu. 2. Abandon the modification of the data.
	Increase key	1. Change the parameter group number or parameter number in parameters display menu. 2. Change the parameter's value in parameter's value setting menu. 3. Change the speed reference in monitoring state when speed reference channel is Keypad.
	Decrease key	
	Shift left key	1. Change the parameter group number or parameter number in parameters display menu. 2. Change the current edit bit in parameter's value setting menu. 3. Switch display monitored value in turn in monitoring menu.
	Shift right key	
	Run key	1. Press RUN key to start the motor when run command is Keypad. 2. Press RUN key to start motor data identification after setting motor data identification function.
	Stop / Reset key	1. Press STOP key to stop the motor when run command is Keypad. 2. Press STOP key to reset the fault when the drive has fault.
	Multi-functional key	Default no function.
	Status indicator	OFF: stop state Green, ON: running state Red, ON: fault state

4.3 Keypad Display Information



4.4 Keypad Menu Mode

Menu name	Parameter visible range
User parameters menu	Users can query and modify all parameters from group 10 to group 99.
Monitoring parameters menu	Users can query all parameters from group 01 to group 09.
Non-factory value parameters menu	Users can query parameters different from factory values.

◆ User parameters menu

User parameters menu includes all the parameters mentioned in this user manual. Except for the special descriptions and monitoring parameters menu, all the descriptions of this manual are in this menu mode.

◆ Monitoring parameters menu

Users can query all parameters from group 01 to group 09.

◆ Non-factory value parameters menu

Users can query parameters different from factory values for the convenience of understanding the parameter settings or on-site problem analysis.

Chapter 5 Parameters list

5.1 Meanings of Item in Parameters List

Item	Meanings
No.	The number of parameter, for example parameter 01.02: "01" indicates parameter group number; "02" indicates parameter index.
Name	The name of parameter, which explains the parameter's meanings.
Description	Describe the parameters and values.
Selection	Parameter selections and related descriptions.
Range	Allowable set parameter value form minimum to maximum.
Unit	/: No unit; Hz: hertz; RPM: rev/min; %: percent; A: ampere; mA: milliampere; V: volt; mV: millivolt; s: second; mS : millisecond; H: hour; KH: kilohour; W: watt; kW: kilowatt; Hp: horsepower; kWh: kilowatt hour; MWh: megawatt hour; Ω: Ohm; mH : millihenry; Wb: weber; uF: microfarad; Nm: Newton metre; ℃: Celsius; F: Fahrenheit; bps: baud rate; Bar: bar; kPa: kilopascal; iHg : inches of mercury; PSI: pounds per square inch; IBS : pound; Kg: kilogram; g: gram; mg: milligram; MPS: meter per second; Feet : feet; LFT: pounds per foot; FPM : feet per minute; m3h: cubic metres per hour; LPS: litres per second; MGD : millions of gallons per day; GPM: gallons per minute; CFM: cubic feet per minute
Attribute	○: This parameter can be changed while the drive is running; ×: This parameter can only be changed in stop status; ☆: This parameter is a read-only parameter and cannot be modified.
Default	The parameter value after reset the default value
FbEq	Fieldbus equivalent: The scaling between the integer used in communication for read/write operation and the value shown on the keypad. Note: The calculation method of the register address corresponding to the parameter: Register address = 400000 + 100 × parameter group + parameter index For example: the modbus address of parameter 01.03 would be mapped to register: 40000 + 01*100 + 03 = 40103 (decimal data format)

5.2 Parameter Groups List

◆ **Summary of Monitoring Parameter Groups**

Group	Contents	Page
Group 01 ACT SIGNALS	Basic signals for monitoring of the drive.	
Group 02 SPD TORQ REF	Speed and torque reference monitoring signals.	
Group 03 DATA WORDS	Data words for monitoring of communication.	
Group 04 PARALLEL INV	Signals for parallel connected inverters.	
Group 05 FAULT MSGS	Fault records.	
Group 09 ACT SIGNALS	Analog parameters and master slave control monitoring signals.	

◆ **Summary of User Parameter Groups**

Group	Contents	Page
Group 10 START/STOP/DIR	The sources selection for start, stop and direction control.	
Group 11 REF SELECT	Keypad reference type; external control location selection; external reference sources selection and limits.	
Group 12 CONSTANT SPEEDS	Constant speed selection and values.	
Group 13 ANALOG INPUTS	The analogue input signal processing.	
Group 14 RELAY OUTPUTS	Relay output functions selection, and the relay operating delays.	
Group 15 ANALOG OUTPUTS	Analog output functions selection.	
Group 16 SYS CTRL INPUTS	Run Enable, parameter lock, Reset etc.	
Group 17 DIGITAL INPUTS	Filtering time and forced selection of digital inputs	
Group 20 LIMITS	Drive operation limits: speed, current, voltage, frequency, power, torque.	
Group 21 START/STOP MODE	Start and stop modes of the motor.	
Group 22 ACCEL/DECEL	Acceleration and deceleration times.	
Group 23 SPEED CTRL	Speed controller parameters setting.	
Group 24 TORQUE CTRL	Ramp up and ramp down time for torque reference	
Group 25 CRITICAL SPEEDS	Speed bands within which the drive is not allowed to operate	
Group 26 MOTOR CONTROL	Settings for advanced functions of motor control	
Group 27 BRAKE CHOPPER	Control of the built-in brake chopper.	
Group 30 PROG FAULTS	Programmable fault protection functions setting	
Group 31 AUTOMATIC RESET	Number of automatic resets and setting of faults that can be reset automatically.	
Group 32 SUPERVISION	Speed, current, torque, setting, PID setting and other monitoring settings.	
Group33 SOFTWARE VER	Software version information.	
Group 34 PROCESS VARIABLE	User variable and unit settings; filtering for the actual signals speed and torque; reset of the run time counter.	
Group 35 MOT TEMP MEAS	Motor temperature measurement and alarm value settings.	
Group 40 PID CONTROL	Process PID; speed and torque reference trimming; sleep and wake-up function.	
Group 42 BRAKE CONTROL	Mechanical brake, used in the Crane industry.	
Group 50 ENCODER MODULE	Encoder parameters setting.	
Group 52 MODBUS-RTU/NET	MODBUS-RTU configuration; ENET configuration	
Group 53 KEYPAD SETTING	Keypad backlight and contrast setting.	
Group 60 MASTER/FOLLOWER	Master/Follower parameters setting	
Group 72 USER LOAD CURVE	The user load curve parameters setting	
Group 83 ADAPT PROG CTRL	Control of the Adaptive Program execution	
Group 84 ADAPTIVE PROG	Selections of the function blocks and their input connections.	
Group 85 USER CONSTANTS	Storage of the Adaptive Program constants and messages.	
Group 95 HARDWARE SPECIF	Control of cooling fan; active IGBT supply unit parameters.	
Group 99 START-UP DATA	Language selection; application macro selection; restore parameters to factory settings; motor control mode; motor parameters setting; motor identification.	

5.3 Parameter listing

01 ACTUAL SIGNALS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
01	ACTUAL SIGNALS	Basic signals for monitoring of the drive.				
01.01	**P VAR**	-3276.8 ~ 3276.7	/	*	0.0	
	Process variable based on settings by parameters 34.01 … 34.03.					1=0.1
01.02	**SPEED**	-3276.7 ~ 3276.7	RPM	*	0.0	
	Calculated motor speed in rpm. Filter time setting by parameter 34.04.					1=0.1rpm
01.03	**OUT FREQ**	-327.68 ~ 327.67	Hz	*	0.00	
	Calculated drive output frequency.					1=0.01Hz
01.04	**CURRENT**	0.0~6553.5	A	*	0.0	
	Measured motor current.					1=0.1A
01.05	**TORQUE**	0.00 ~ 600.00	%	*	0.0	
	Calculated motor torque. 100.00 is the motor nominal torque. Filter time setting by parameter 34.05.					1=0.01%
01.06	**POWER**	0.00 ~ 600.00	%	*	0.0	
	Motor output power. 100.00 is the motor nominal power.					1=0.01%
01.07	**DC VOLT**	0 ~ 2000	V	*	0.0	
	DC BUS voltage.					1=1V
01.08	**SW FREQ**	0 ~ 16000	Hz	*	0.0	
	The switching frequency actually executed by the system.					1=1Hz
01.09	**OUT VOLT**	0.0 ~ 6000.0	V	*	0.0	
	Calculated motor voltage.					1=0.1V
01.10	**CASE TEMP**	0 ~ 150	℃	*	0.0	
	Calculated IGBT temperature.					1=1℃
01.11	**EXT REF1**	0 ~ 65535	RPM	*	0.0	
	External reference REF1 in rpm (Hz if value of parameter 99.04 is SCALAR.)					1=1RPM/ 1=0.01Hz
01.12	**EXT REF2**	0.00 ~ 600.00	%	*	0.0	
	External reference REF2. Depending on the use, 100% is the motor maximum speed, motor nominal torque, or maximum process reference.					1=0.01%
01.13	**CTRL LOC**	LOCAL1, LOCAL2, EXT1, EXT2	/	*	LOCAL1	
	Active control location. (1) LOCAL1; (2) LOCAL1; (3) EXT1; (4) EXT2.					1=1
01.14	**POH**	0 ~ 65535	H	*	0	
	Elapsed time counter. Runs when the control board is powered.					
01.15	**kWh**	0 ~ 65535	KWH	*	0	
	kWh counter. Counts inverter output kWh during operation (motor side - generator side).					
01.16	**APP OUT**	0.00 ~ 650.00	%	*	0.00	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	Application block output signal. E.g. the process PID controller output when parameter 99.02 = PID CTRL.					1=0.01%
01.17	**X7 ~ X1**	0000000 ~ 1111111	/	*		
	Status of digital inputs X7…X1. **Example**: 0000001 = X1 is ON, X7…X2 are OFF.					1=1
01.18	**AI1 ACT**	0.000 ~ 10.000	V	*	0.000	
	Value of analog input AI1.					1=0.001V
01.19	**AI2 ACT**	0.000 ~ 20.000	mA	*	0.000	
	Value of analog input AI2.					1=0.001mA
01.20	**AI3 ACT**	0.000 ~ 20.000	mA	*	0.000	
	Value of analog input AI3.					1=0.001mA
01.21	**RO3 ~ RO1**	000 ~ 111	/	*	000	
	Status of relay outputs RO3…RO1. **Example:** 001=RO1 is energized, RO2 and RO3 are de-energised.					1=1
01.22	**AO1**	0.000 ~ 20.000	mA	*	0.000	
	Value of analog output AO1.					1=0.001mA
01.23	**AO2**	0.000 ~ 20.000	mA	*	0.000	
	Value of analog output AO2.					1=0.001mA
01.24	**PID ACT1**	0.00 ~ 600.00	%	*	0.00	
	Feedback signal for the process PID controller; Feedback signal of speed or torque trim mode.					1=0.01%
01.25	**PID ACT2**	0.00 ~ 600.00	%	*	0.00	
	Feedback signal for the process PID controller; Feedback signal of speed or torque trim mode.					1=0.01%
01.26	**PID ACT**	0.00 ~ 600.00	%	*	0.00	
	Process PID controller actual value. See parameter 40.06.					1=0.01%
01.27	**PID DEV**	0.00 ~ 600.00	%	*	0.00	
	Deviation of the process PID controller, i.e. the difference between the reference value and the actual value. Updated only when parameter 99.02 = PID CTRL.					1=0.01%
01.28	**Reserved**		/	*		
01.29	**Reserved**		/	*		
01.30	**APPL MACRO**	1 ~ 7	/	*	FACTORY	
	Active application macro (value of parameter 99.02).					1=1
01.31	**INV1 TEMP**	0 ~ 150.0	℃	*	0.0	
	Measured heatsink temperature in inverter no. 1.					1=0.1℃
01.32	**INV2 TEMP**	0.0 ~ 150.0	℃	*	0.0	
	Measured heatsink temperature in inverter no. 3 (used only in high power units with parallel inverters).					1=0.1℃
01.33	**INV3 TEMP**	0.0 ~ 150.0	℃	*	0.0	
	Measured heatsink temperature in inverter no. 3 (used only in high power units with parallel inverters).					1=0.1℃

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
01.34	**INV4 TEMP**	0.0 ~ 150.0	℃	*	0.0	
	Measured heatsink temperature in inverter no. 4 (used only in high power units with parallel inverters).					1=0.1℃
01.35	**MOT1 TEMP**	0 ~ 150	℃	*	0	
	Measured temperature of motor 1. See parameter 35.01。					1=1℃
01.36	**MOT2 TEMP**	0 ~ 150	℃	*	0	
	Measured temperature of motor 2. See parameter 35.04.					1=1℃
01.37	**MOT TEMP EST**	0 ~ 150.0	℃	*	0	
	Estimated motor temperature. Signal value is saved at power switch off.					1=0.1℃
01.38	**AI5 ACT**	0.000 ~ 20.000	mA	*	0.000	
	Value of analog input AI5.					1=0.001mA
01.39	**AI6 ACT**	0.000 ~ 20.000	mA	*	0.000	
	Value of analog input AI6.					1=0.001mA
01.40	**X13 ~ X8**	000000 ~ 111111	/	*	000000	
	Status of digital inputs X13 … X8. **Example**: 000001 = X8 is ON. X13 to X9 are OFF.					1=1
01.41	**RO6 ~ RO4**	000 ~ 111	/	*	000	
	Status of ralay outputs RO6…RO4. **Example**: 001 = RO4 is energized, RO6…RO5 are de-energized.					1=1
01.42	**MOTOR SPEED %**	0.0 ~ 6000.0	%	*	0.0	
	Motor actual speed in percent of the Absolute Maximum Speed. If parameter 99.04 = SCALAR, the value is the relative actual output frequency.					1=0.01%
01.43	**MOT RUN TIME**	0 ~ 65535	H	*	0	
	Motor run time counter. The counter runs when the drive modulates. Can be reset by parameter 34.06.					1=1H
01.44	**FAN ON TIME**	0 ~ 65535	H	*	0	
	Running time of the drive cooling fan.					1=1H
01.45	**IGBTJTEMP**	-50 ~ 200	℃	*	0	
	The highest temperature recorded value of IGBT chip.					1=1℃
01.46	**MIN AI1 TUNE**	0.000 ~ 10.000	V	*	0	-
01.47	**MAX AI1 TUNE**	0.000 ~ 10.000	V	*	0	-
01.48	**MIN AI2 TUNE**	0.000 ~ 10.000	V	*	0	-
01.49	**MAX AI2 TUNE**	0.000 ~ 10.000	V	*	0	-
01.50	**MIN AI3 TUNE**	0.000 ~ 10.000	V	*	0	-
01.51	**MAX AI3 TUNE**	0.000 ~ 10.000	V	*	0	-
01.52	**MIN AI5 TUNE**	0.000 ~ 10.000	V	*	0	-
01.53	**MAX AI5 TUNE**	0.000 ~ 10.000	V	*	0	-
01.54	**MIN AI6 TUNE**	0.000 ~ 10.000	V	*	0	-
01.55	**MAX AI6 TUNE**	0.000 ~ 10.000	V	*	0	1=0.001V

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
01.56	**TOT PARA**	0 ~ 6000	/	*	0	-
	0~6000					1=1

02 SPD TORQ REF

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
02	SPD TORQ REF	Speed and torque reference monitoring signals.				
02.01	**SPD REF2**	-32768 ~ 32767	RPM	*	0	
	Speed reference after being limited.					1=1RPM
02.02	**SPD REF3**	-32768 ~ 32767	RPM	*	0	
	Calculated value of motor speed in rpm. The filter time is defined by parameter 34.04.					1=1RPM
02.03	**TRQ REF2**	-327.68 ~ 327.67	%	*	0.00	
	Speed controller output. 100% corresponds to the motor nominal torque.					1=0.01%
02.04	**TRQ REF3**	-327.68 ~ 327.67	%	*	0.0	
	Torque reference. 100% corresponds to the motor nominal torque.					1=0.01%
02.05	**TRQ USED R**	-327.68 ~ 327.67	%	*	0.0	
	Torque reference after frequency, voltage and torque limiters. 100% corresponds to the motor nominal torque.					1=0.01%
02.06	**FLUX REF**	0~60000	%	*	0.0	
	Flux reference in percent. (%).					1=1%
02.07	**SPD EST**	0~600.00	%	*	0.0	
	Estimated motor speed. 100.00% corresponds to the Absolute Maximum Speed of the motor.					1=0.01%
02.08	**SPD MEAS**	0~600.00	%	*	0.0	
	Measured motor actual speed (zero when no encoder is used). 100% corresponds to the Absolute Maximum Speed of the motor.					1=0.01%
02.09	**REF1 UP/DN**	0~60000	RPM	*	0.0	
	Value record of UP/DN adjustment for external reference REF1.					1=1RPM
02.10	**REF2 UP/DN**	0.00 ~ 600.00	%	*	0.0	
	Value record of UP/DN adjustment for external reference REF2.					1=0.01%
02.11	**LOC REF1**	0~65535	/	*	0.0	
	Local reference 1 from keypad.					
02.12	**LOC REF2**	0~65535	/	*	0.0	
	Local reference 2 from keypad.					

03 DATA WORDS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
03	DATA WORDS	Data words for monitoring of communication.				
03.01	**MAIN CW**	0000~FFFF	/	*	0000	1=1

Bit	Name	Enter STATE/Description
0	OFF1 CONTROL	1 = Enter READY TO OPERATE.
		0 = Stop along currently active deceleration ramp (22.03/22.05). Enter OFF1 ACTIVE; proceed to READY TO SWITCH ON unless other interlocks (OFF2, OFF3) are active.
1	OFF2 CONTROL	1 = Continue operation (OFF2 inactive).
		0 = Emergency OFF, coast to stop. Enter OFF2 ACTIVE; proceed to SWITCH-ON INHIBITED.
2	OFF3 CONTROL	1 = Continue operation (OFF3 inactive).
		0 = Emergency stop, stop within time defined by par. 22.07. Enter OFF3 ACTIVE; proceed to SWITCH-ON INHIBITED. Warning: Ensure motor and driven machine can be stopped using this stop mode.
3	OFF3 CONTROL	1 = Enter OPERATION ENABLED. (Note: The Run Enable signal must be active; see parameter 16.01. If par. 16.01 is set to COMM.CW, this bit also activates the Run Enable signal.)
		0 = Inhibit operation. Enter OPERATION INHIBITED.
4	RAMP_OUT_ ZERO	1 = Normal operation. Enter RAMP FUNCTION GENERATOR: OUTPUT ENABLED.
		0 = Force Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).
5	RAMP_HOLD	1 = Force Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).
		0 = Halt ramping (Ramp Function Generator output held).
6	RAMP_IN_ ZERO	1 = Normal operation. Enter OPERATING.
		0 = Normal operation. Enter OPERATING.
7	RESET	0 ⇒ 1 = Fault reset if an active fault exists.
		0 = Continue normal operation.
8	INCHING_1	1 = reserved
		1 ⇒ 0 = reserved
9	INCHING_2	1 = reserved
		1 ⇒ 0 = reserved
10	REMOTE_CMD	1 = reserved
		0 = reserved
11	EXT CTRL LOC	1 = reserved
		0 = reserved
12 … 15	reserved	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
03.02	**MAIN SW**	0000 ~ FFFF	/	*	0000	

Bit	Name	Enter STATE/Description
0	RDY_ON	1 = READY TO SWITCH ON. 0 = NOT READY TO SWITCH ON.
1	RDY_RUN	1 = READY TO OPERATE. 0 = OFF1 ACTIVE.
2	RDY_REF	1 = OPERATION ENABLED. 0 = OPERATION INHIBITED.
3	TRIPPED	1 = Fault. 0 = NO fault.
4	OFF_2_STA	1 = OFF2 inactive. 0 = OFF2 active.
5	OFF_3_STA	1 = OFF3 inactive. 0 = OFF3 active.
6	SWC_ON_INHIB	1 = SWITCH-ON INHIBITED.
7	ALARM	1 = Warning/Alarm. 0 = No warning/Alarm.
8	AT_SETPOINT	1= Actual speed has reached its setpoint (speed error is less than or equal to 10% of the nominal motor speed) 0 = Actual value differs from reference value (= is outside tolerance limits).
9	REMOTE	1 = Active control location: REMOTE (EXT1 or EXT2). 0 = Active control location: LOCAL.
10	ABOVE_LIMIT	1 = Actual speed value equals or exceeds the speed1 limit (see parameters 32.01, 32.02). 0 = Actual speed value is within speed1 limit.
11	EXT CTRL LOC	1 = External Control Location EXT2 selected. 0 = External Control Location EXT1 selected.
12	EXT RUN ENABLE	1 = External Run Enable signal received. 0 = No External Run Enable received.
13	MSG POP-UP	1 = A message poping up to keypad. 0 = No message poping up to keypad.
14	Reserved.	
15	Reserved.	

1=1

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
03.03	**AUX SW**	0000 ~ FFFF	/	*	0000	

Bit	Description
0	Reserved.
1	1 = Speed difference is out of the window (in speed control)
2	1 = Motor ID Run is active.
3	1 = Flux has been formed in the motor.
4	Reserved.
5	1 = Position counter synchronized.
6	1 = Drive has not been started after changing the motor parameters in group 99.
7	1 = Motor ID Run successfully completed.
8	1 = Prevention of unexpected start-up is active.(for multi-drive)
9	1 = Control at a limit. See actual signal 3.04 LIMIT WORD 1 below.
10	1 = Torque reference is followed.
11	1 = Absolute value of motor actual speed is below zero speed limit (4% of synchronous speed).
12	1 = Internal speed feedback followed.
13	1 = Master/Follower communication error.
14	1 = Pre-charge contactor is ON. (Capacitors are completely pre-charged)
15	Reserved.

1=1

03.04	**LIM WORD1**	0000 ~ FFFF	/	*	0000	

Bit	Description
0	1 = Motor torque reaches torque limit.
1	
2	
3	
4	
5	
6	
7	Torque reference reaches torque maximum limit. See parameter 20.11.
8	Torque reference reaches torque maximum limit. See parameter 20.12.
9	
10	
11	
12	DC bus voltage that is lower than under voltage control value.
13	DC bus voltage that is higher than over voltage control value.
14	
15	

1=1

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
03.05	**FLT WORD1**	0000 ~ FFFF	/	*	0000	

Bit	Description
0	1 = Short-circuit in motor cable(s) or motor.
1	1 =Excessive current detected by hardware.
2	1 =DC bus voltage exceeds over voltage value.
3	1 = IGBT temperature exceeds IGBT temperature value.
4	1 = Detects earth faults in the motor or motor cable, see parameter 30.17.
5	1 = Motor thermal model protection, see parameters 30.04…30.07.
6	1 = Motot temperature exceeds fault value defined by 35.03.
7	1 = Module protection.
8	1 = The motor torque falls below underload curve, see parameters 30.13… 30.15.
9	1 = The absolute value of output frequency exceeds minimum/maximum frequency/speed defined by parameters 20.01, 20.02, 20.07, 20.08.
10	1 = EEPROM reading or writing failure.
11	1 = IGBT over load protection.
12	1 = Brake resistor overload protection.
13	Reserved.
14	Reserved.
15	Reserved.

1=1

03.06	**FLT WORD2**	0000 ~ FFFF	/	*	0000	

Bit	Description
0	1 = Input phase loss detection.
1	1 = Incorrect motor parameters setting.
2	1 = DC bus voltage that is lower than under voltage value.
3	1 = Integrated motor current has exceeded load curve defined by user load curve.
4	1 = No Run enable signal received.
5	1 = Pulse encoder signal detected abnormal.
6	1 = Communication error on control board.
7	1 = Control board temperature is too high.
8	1 = External fault from one of programmable digital inputs.
9	1 = Switching frequency is too high.
10	1 = Analog input value falls below the set minimum limit.
11	1 = Parallel inverter comunication fault.
12	1 = Communication fault protection.
13	1 = Operation panel loss protection.
14	1 = Motor stall protection.
15	1 = Motor phase loss protection.

1=1

<table>
<tr><th>No.</th><th>Name/ Description/Selection</th><th>Range</th><th>Unit</th><th>Attribute</th><th>Default</th><th>FbEq</th></tr>
<tr><td>03.07</td><td>SYS FAULT</td><td>0000 ~ FFFF</td><td>/</td><td>*</td><td>0000</td><td></td></tr>
<tr><td></td><td colspan="5"><table>
<tr><th>Bit</th><th>Description</th></tr>
<tr><td>0</td><td>Reserved.</td></tr>
<tr><td>1</td><td>Reserved.</td></tr>
<tr><td>2</td><td>1 = Adaptive program fault.</td></tr>
<tr><td>3</td><td>1 = Unauthorized.</td></tr>
<tr><td>4</td><td>1 = Parallel inverter fault.</td></tr>
<tr><td>5</td><td>1 = Parallel inverter number(s) incorrect.</td></tr>
<tr><td>6 … 15</td><td>Reserved.</td></tr>
</table></td><td>1=1</td></tr>
<tr><td>03.08</td><td>ALM WORD 1</td><td>0000 ~ FFFF</td><td>/</td><td>*</td><td>0000</td><td></td></tr>
<tr><td></td><td colspan="5">See parameter 03.05.</td><td>1=1</td></tr>
<tr><td>03.09</td><td>ALM WORD 2</td><td>0000 ~ FFFF</td><td>/</td><td>*</td><td>0000</td><td></td></tr>
<tr><td></td><td colspan="5">See parameter 03.06.</td><td>1=1</td></tr>
<tr><td>03.10</td><td>RESERVE 1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>03.11</td><td>FOLL MCW</td><td>0000 ~ FFFF</td><td>/</td><td>*</td><td>0000</td><td></td></tr>
</table>

04 PARALLEL INV

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
04	PARALLEL INV	Signals for parallel connected inverters.				
04.01	**MAIN CW**	0000 ~ FFFF	/	*	0	
	A 16-bit data word.					1=1
04.02	**INT SC INFO**	0000 ~ FFFF	/	*	0	
	A 16-bit data word.					1=1

05 FAULT MSGS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
05	**FAULT MSGS**	Fault records.				
05.01	**TRIP 0 CODE**	0 ~ 99	/	*	0	
05.02	**TRIP 0 RUN SPD**	0.0 ~ 6553.5	PRM	*	0	
05.03	**TRIP 0 REF SPD**	0 ~ 65535	RPM	*	0	
05.04	**TRIP 0 DC VOLT**	0 ~ 2000	V	*	0	
05.05	**TRIP 0 CURRENT**	0.0 ~ 6553.5	A	*	0.0	
05.06	**TRIP 0 DI**	0000000 ~ 1111111	/	*	0000000	
05.07	**TRIP 0 DO**	000 ~ 111	/	*	000	
05.08	**TRIP 0 TEMP**	0 ~ 200	℃	*	0	
05.09	**TRIP 0 MAIN SW**	0000 ~ FFFF	/	*	0000	
05.10	**TRIP 0 AUX SW**	0000 ~ FFFF	/	*	0000	
05.11	**TRIP 1 CODE**	0 ~ 99	/	*	0	
05.12	**TRIP 1 RUN SPD**	0.0 ~ 6553.5	PRM	*	0	
05.13	**TRIP 1 REF SPD**	0 ~ 65535	RPM	*	0	
05.14	**TRIP 1 DC VOLT**	0 ~ 2000	V	*	0	
05.15	**TRIP 1 CURRENT**	0.0 ~ 6553.5	A	*	0.0	
05.16	**TRIP 1 DI**	0000000 ~ 1111111	/	*	0000000	
05.17	**TRIP 1 DO**	000 ~ 111	/	*	000	
05.18	**TRIP 1 TEMP**	0 ~ 200	℃	*	0	
05.19	**TRIP 1 MAIN SW**	0000 ~ FFFF	/	*	0000	
05.20	**TRIP 1 AUX SW**	0000 ~ FFFF	/	*	0000	
05.21	**TRIP 2 CODE**	0 ~ 99	/	*	0	
05.22	**TRIP 2 RUN SPD**	0.0 ~ 6553.5	PRM	*	0	
05.23	**TRIP 2 REF SPD**	0 ~ 65535	RPM	*	0	
05.24	**TRIP 2 DC VOLT**	0 ~ 2000	V	*	0	
05.25	**TRIP 2 CURRENT**	0.0 ~ 6553.5	A	*	0.0	
05.26	**TRIP 2 DI**	0000000 ~ 1111111	/	*	0000000	
05.27	**TRIP 2 DO**	000 ~ 111	/	*	000	
05.28	**TRIP 2 TEMP**	0 ~ 200	℃	*	0	
05.29	**TRIP 2 MAIN SW**	0000 ~ FFFF	/	*	0000	
05.30	**TRIP 2 AUX SW**	0000 ~ FFFF	/	*	0000	
05.31	**TRIP 3 CODE**	0 ~ 99	/	*	0	
05.32	**TRIP 3 RUN SPD**	0.0 ~ 6553.5	PRM	*	0	
05.33	**TRIP 3 REF SPD**	0 ~ 65535	RPM	*	0	
05.34	**TRIP 3 DC VOLT**	0 ~ 2000	V	*	0	
05.35	**TRIP 3 CURRENT**	0.0 ~ 6553.5	A	*	0.0	
05.36	**TRIP 3 DI**	0000000 ~ 1111111	/	*	0000000	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
05.37	**TRIP 3 DO**	000 ~ 111	/	*	000	
05.38	**TRIP 3 TEMP**	0 ~ 200	℃	*	0	
05.39	**TRIP 3 MAIN SW**	0000 ~ FFFF	/	*	0000	
05.40	**TRIP 3 AUX SW**	0000 ~ FFFF	/	*	0000	
05.41	**TRIP 4 CODE**	0 ~ 99	/	*	0	
05.42	**TRIP 4 RUN SPD**	0.0 ~ 6553.5	PRM	*	0	
05.43	**TRIP 4 REF SPD**	0 ~ 65535	RPM	*	0	
05.44	**TRIP 4 DC VOLT**	0 ~ 2000	V	*	0	
05.45	**TRIP 4 CURRENT**	0.0 ~ 6553.5	A	*	0.0	
05.46	**TRIP 4 DI**	0000000 ~ 1111111	/	*	0000000	
05.47	**TRIP 4 DO**	000 ~ 111	/	*	000	
05.48	**TRIP 4 TEMP**	0 ~ 200	℃	*	0	
05.49	**TRIP 4 MAIN SW**	0000 ~ FFFF	/	*	0000	
05.50	**TRIP 4 AUX SW**	0000 ~ FFFF	/	*	0000	

09 ACT SIGNALS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
09	ACT SIGNALS	Analog parameters and master slave control monitoring signals.				
09.01	**AI1 SCALED**	0.000 ~ 20.000	mA	*	0.000	
	The value of AI1 after scaling.					1=0.0005V 20000=10V
09.02	**AI2 SCALED**	0.000 ~ 20.000	V	*	0.000	
	The value of AI2 after scaling.					
09.03	**AI3 SCALED**	0.000 ~ 20.000	V	*	0.000	
	The value of AI3 after scaling.					
09.04	**AI5 SCALED**	0.000 ~ 20.000	V	*	0.000	
	The value of AI5 after scaling.					
09.05	**AI6 SCALED**	0.000 ~ 20.000	V	*	0.000	
	The value of AI6 after scaling.					

10 START/STOP/DIR

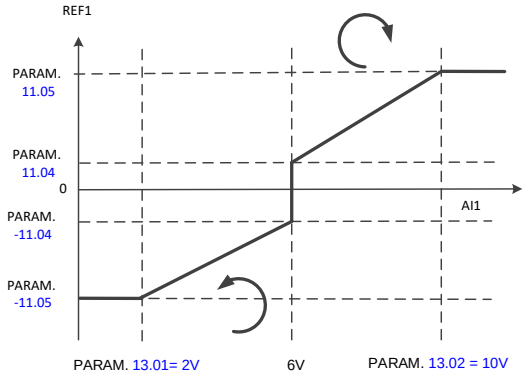
No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
10	START/STOP/DIR	The sources selection for start, stop and direction control.				
10.01	**EXT1 COMMANDS**	1 ~ 17	/	×	X1;2	
	Defines the connections, the source of the start, stop and direction of motor rotation commands for external control location 1 (EXT1).					
	NOT SEL	No start, stop and direction command source for EXT1.				1
	X1	Start and stop through digital input X1, 0 = stop, 1 = start. Direction is determined by parameter 10.03. ⚠ WARNING! After a fault reset, the drive will start if the start signal is ON.				2
	X1;2	Start and stop through digital input X1, 0 = stop, 1 = start. Direction of motor rotation through digital input X2，0 = forward，1 = reserve. **Note**: If using X2 to control direction, must set parameter 10.03 = REQUEST. ⚠ WARNING! After a fault reset, the drive will start if the start signal is ON.				3
	X1P;2P	Pulse start through digital input X1. 0 -> 1: Start. Pulse stop through digital input X2.1 -> 0: Stop. Direction of motor rotation is determined by parameter 10.03.				4
	X1P;2P;3	Pulse start through digital input X1. 0 -> 1: Start. Pulse stop through digital input X2. 1 -> 0: Stop. Direction of motor rotation through digital input X3. 0 = forward, 1 = reverse. **Note**: If using X3 to control direction, must set parameter 10.03 = REQUEST.				5
	X1P;2P;3P	Pulse start forward through digital input X1. 0 -> 1: Start forward. Pulse start reverse through digital input X2. 0 -> 1: Start reverse. Pulse stop through digital input X3. 1 -> "0": stop. **Note**: If using X2 to control direction, must set parameter 10.03 = REQUEST.				6
	X6	See selection X1.				7
	X6;5	See selection X1,2. X6: Start/stop, X5: direction.				8
	KEYPAD	Start and Stop by KEYPAD. Direction is determined by parameter 10.03.				9
	COMM.CW	Start, stop and derection is determined by communication control word.				10
	X7	See selection X1.				11
	X7;8	See selection X1, 2. X7: start/stop, X8: direction.				12
	X7P;8P	See selection: X1P;2P.				13
	X7P;8P;9	See selection：X1P;2P;3.				14
	X7P;8P;9P	See selection：X1P;2P;3P.				15
	PARAM 10.04	Source selected by parameter 10.04.				16
	X1 FWD;X2 REV	Start, stop and direction commands through digital inputs X1 and X2. X2 | X1 | Start/stop/direction 0 | 0 | Stop 0 | 1 | Start forward 1 | 0 | Start reverse 1 | 1 | Stop **Note**: If using X2 to control direction, must set parameter 10.03 = REQUEST.				17

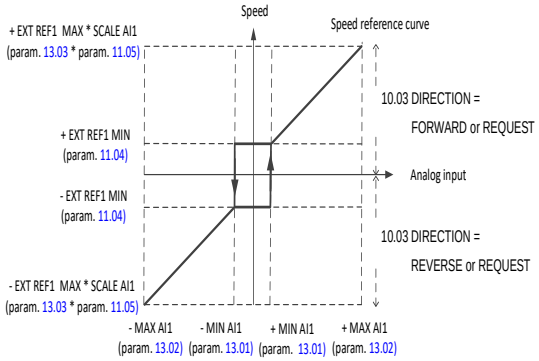
No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
10.02	**EXT2 COMMANDS**	1 ~ 17	/	×	NOT SEL	
	Defines the connections, the source of the start, stop and direction of motor rotation commands for external control location 2 (EXT2).					
	NOT SEL	See parameter 10.01.				1
	X1	See parameter 10.01.				2
	X1;2	See parameter 10.01.				3
	X1P;2P	See parameter 10.01.				4
	X1P;2P;3	See parameter 10.01.				5
	X1P;2P;3P	See parameter 10.01.				6
	X6	See parameter 10.01.				7
	X6;5	See parameter 10.01.				8
	KEYPAD	See parameter 10.01.				9
	COMM.CW	See parameter 10.01.				10
	X7	See parameter 10.01.				11
	X7;8	See parameter 10.01.				12
	X7P;8P	See parameter 10.01.				13
	X7P;8P;9	See parameter 10.01.				14
	X7P;8P;9P	See parameter 10.01.				15
	PARAM 10.05	Source selected by parameter 10.05.				16
	X1 FWD;X2 REV	See parameter 10.01.				17
10.03	**REF DIRECTION**	1 ~ 3	/	○	REQUEST	
	FORWARD	Fixed to forward. If the reference is reverse, the output will be force to 0.				1
	REVERSE	Fixed to reverse. If the reference is forward, the output will be force to 0.				2
	REQUEST	Direction of motor rotation control allowed.				3
10.04	**EXT1 STRT PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
	When parameter 10.01 = PARAM 10.04, EXT1 source selected by parameter 10.04. The value of parameter 10.04 is a parameter pointer or a constant value: ◆ Parameter pointer: composed of sign (positive or negative), parameter group number, parameter index and bit fields. The bit number is effective only for blocks handling boolean inputs. ◆ Constant value: If the leftmost display of the value is C, it means the value is a constant value. Constants value composed of sign (positive or negative) and numbers.					
10.05	**EXT2 STRT PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+000.000.000	
	When parameter 10.02 = PARAM 10.05, EXT2 source selected by parameter 10.05. The value of parameter 10.05 is a parameter pointer or a constant value:					
10.06	**JOG SPEED SEL**	1 ~ 11	/	×	NOT SEL	

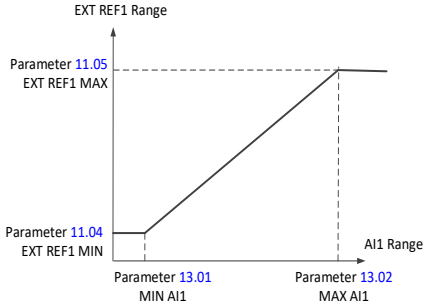
No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	Defines the signal that activates jogging function. **Note:** • If the drive start command is valid, the jogging function is invalid; • If the drive is under local control, the jogging function is invalid (The character "LOC" is displayed on the lower left corner of the keypad main menu). • When the jogging function is effective, the jogging speed 12.15 takes priority over the constant speed.					
	NOT SEL	Not selected.				1
	X3	Digital input X3. 0 = Jogging function is inactive. 1 = Jogging function is active.				2
	X4	See selection X3.				3
	X5	See selection X3.				4
	X6	See selection X3.				5
	X7	See selection X3.				6
	X8	See selection X3.				7
	X9	See selection X3.				8
	X10	See selection X3.				9
	X11	See selection X3.				10
	X12	See selection X3.				11
10.07	**COMM PRIOR**	1 ~ 2	/	×	10.01 PRIOR	
	10.01 PRIOR	When current active control location is EXT1, if there is a communication start and stop command at the same time, the EXT1 command defined by parameter 10.01 has a higher priority.				1
	COMM PRIOR	When current control location is EXT1, if there is a communication start and stop command at the same time, the communication command has a higher priority.				2

11 REF SELECT

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
11	**REF SELECT**	Keypad reference type; external control location selection; external reference sources selection and limits.				
11.01	**KEYPAD REF TYPE**	REF1(rpm)，REF2(%)	/	×	REF1(rpm)	
	REF1(rpm)	Speed reference in RPM. Note: Frequency reference (Hz) if parameter 99.04 = SCALAR.				1
	REF2 (%)	Reference (%). The use of REF2 vary depending on the application macro. For example, if 99.02 = T-CTRL, REF2 is the torque reference.				2
11.02	**EXT1/EXT2 SEL**	1 ~ 16	/	×	X1	
	X1	Digital input X1, 0 = EXT1, 1 = EXT2.				1
	X2	See selection X1.				2
	X3	See selection X1.				3
	X4	See selection X1.				4
	X5	See selection X1.				5
	X6	See selection X1.				6
	EXT1	EXT1 active. The control signal sources are defined by parameters 10.01 and 11.03.				7
	EXT2	EXT2 active. The control signal sources are defined by parameters 10.02 and 11.06.				8
	COMM.CW	Control Word, bit 11.				9
	X7	See selection X1.				10
	X8	See selection X1.				11
	X9	See selection X1.				12
	X10	See selection X1.				13
	X11	See selection X1.				14
	X12	See selection X1.				15
	PARAM 11.09	Source selected by parameter 11.09.				16
11.03	**EXT REF1 SELECT**	1 ~ 38	/	○	KEYPAD	
	Selects the signal source for external reference REF1					
	KEYPAD	KEYPAD.				1
	AI1	Analog input AI1. **Note**: If the signal is bipolar (±10 VDC), use the selection AI1 BIPOLAR. (The selection AI1 ignores the negative signal range.)				2
	AI2	Analog input AI2.				3
	AI3	Analog input AI3.				4
	AI1/JOYST	Unipolar analog input AI1 as joystick. The minimum input signal runs the motor at the maximum reference in the reverse direction, the maximum input at the maximum reference in the forward direction. **Note**: Must set the parameter 10.03 = REQUEST				5

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
		⚠ **WARNING!** Minimum reference for joystick must be higher than 0.5 V. Set parameter 13.01 to 2V or to a value higher than 0.5 V and analog signal loss detection parameter 30.01 to FAULT. The drive will stop in case the control signal is lost  **Note**: If the signal is bipolar (±10 VDC), use the selection AI1 BIPOLAR. (The selection AI1 ignores the negative signal range.)				
	AI2/JOYST	See selection AI1/JOYST。				6
	AI1+AI3	Summation of analog input AI1 and AI3.				7
	AI2+AI3	Summation of analog input AI2 and AI3.				8
	AI1-AI3	Subtraction of analog input AI1 and AI3.				9
	AI2-AI3	Subtraction of analog input AI1 and AI3.				10
	AI1*AI3	Multiplication of analog input AI1 and AI3.				11
	AI2*AI3	Multiplication of analog input AI1 and AI3.				12
	MIN(AI1,AI3)	Multiplication of analog input AI1 and AI3.				13
	MIN(AI2,AI3)	Minimum of analog input AI2 and AI3.				14
	MAX(AI1,AI3)	Maximum of analog input AI1 and AI3.				15
	MAX(AI2,AI3)	Maximum of analog input AI2 and AI3.				16
	X3U,4D(R)	Digital input X3: Reference increase. Digital input X4: Reference decrease. Parameter 22.04 defines the rate of the reference change. Stop command or power switch off resets the reference to zero.				17
	X3U,4D	Digital input X3: Reference increase. Digital input X4: Reference decrease. Parameter 22.04 defines the rate of the reference change. The program stores the active speed reference (not reset by a stop command or power switch-off).				18
	X5U,6D	See selection X3U, 4D.				19
	COMM. REF1	Communication reference COMM.REF1.				20
	COMM.REF1+AI1	Summation of communication reference COMM.REF1 and analog input AI1.				21

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	COMM.REF1*AI1	Multiplication of communication reference COMM.REF1 and analog input AI1.				22
	FAST COMM	As with the selection COMM. REF.				23
	COMM.REF1+AI5	See selection COM.REF1+AI1 (AI5 used instead of AI1).				24
	COMM.REF1*AI5	See selection COM.REF1*AI1 (AI5 used instead of AI1).				25
	AI5	Analog input AI5.				26
	AI6	Analog input AI6.				27
	AI5/JOYST	See selection AI1/JOYST (AI5 used instead of AI1).				28
	AI6/JOYST	See selection AI1/JOYST (AI6 used instead of AI1).				29
	AI5+AI6	Summation of analog input AI5 and AI6.				30
	AI5-AI6	Subtraction of analog input AI5 and AI6.				31
	AI5*AI6	Multiplication of analog input AI5 and AI6.				32
	MIN(AI5,6)	Minimum of analog input AI5 and AI6.				33
	MAX(AI5,6)	Maximum of analog input AI5 and AI6.				34
	X11U,12D(R)	See selection X3U, 4D(R).				35
	X11U,12D	See selection X3U, 4D.				36
	PARAM 11.10	Source selected by parameter 11.10.				37
	AI1 BIPOLAR	Bipolar analog input AI1 (-10 … 10 V). The figure below illustrates the use of AI1 bipolar input as speed reference.  					38
11.04	**EXT REF1 MIN**	0 ~ 1500	/	RPM	0	
	Setting range in rpm. (Hz if parameter 99.04 is SCALAR.) Example: Analog input AI1 is selected as the reference source (value of parameter 11.03 is AI1). The reference minimum and maximum correspond the AI minimum and maximum settings as follows:					1=1RPM

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
						
11.05	**EXT REF1 MAX**	0~18000	RPM	×	1500	
	Defines the maximum value for external reference REF1 (absolute value). Corresponds to the maximum setting of the used source signal. Setting range in rpm. (Hz if parameter 99.04 is SCALAR.) See parameter 11.04.					1=1RPM
11.06	**EXT REF2 SEL**	1 ~ 38	/	×	键盘给定	
	Selects the signal source for external reference REF2. ➢ If 99.02 = FACTORY, HAND/AUTO or SEQ CTRL，REF2 is a speed reference in percent of the Absolute Maximum Speed, 100% = Absolute Maximum Speed. ➢ If 99.02 = T-CTRL, REF2 is a torque reference in percent of the motor nominal torque. 100% = motor nominal torque. ➢ If 99.02 = PID-CTRL, REF2 is a process reference in percent of the maximum process quantity. 100% = maximum process quantity. ➢ If 99.04 = SCALAR, REF2 is a frequency reference in percent of the Absolute Maximum Frequency. 100% = Absolute Maximum Frequency.					
	KEYPAD	See parameter 11.03.				1
	AI1	See parameter 11.03.				2
	AI2	See parameter 11.03.				3
	AI3	See parameter 11.03.				4
	AI1/JOYST	See parameter 11.03.				5
	AI2/JOYST	See parameter 11.03.				6
	AI1+AI3	See parameter 11.03.				7
	AI2+AI3	See parameter 11.03.				8
	AI1-AI3	See parameter 11.03.				9
	AI2-AI3	See parameter 11.03.				10
	AI1*AI3	See parameter 11.03.				11
	AI2*AI3	See parameter 11.03.				12
	MIN(AI1,AI3)	See parameter 11.03.				13
	MIN(AI2,AI3)	See parameter 11.03.				14

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	MAX(AI1,AI3)	See parameter 11.03.				15
	MAX(AI2,AI3)	See parameter 11.03.				16
	3U,4D(R)	See parameter 11.03.				17
	3U,4D	See parameter 11.03.				18
	5U,6D	See parameter 11.03.				19
	COMM. REF2	See parameter 11.03.				20
	COMM.REF2+AI1	See parameter 11.03.				21
	COM.REF2*AI1	See parameter 11.03.				22
	FAST COMM	See parameter 11.03.				23
	COMM.REF2+AI5	See parameter 11.03.				24
	COMM.REF2*AI5	See parameter 11.03.				25
	AI5	See parameter 11.03.				26
	AI6	See parameter 11.03.				27
	AI5/JOYST	See parameter 11.03.				28
	AI6/JOYST	See parameter 11.03.				29
	AI5+AI6	See parameter 11.03.				30
	AI5-AI6	See parameter 11.03.				31
	AI5*AI6	See parameter 11.03.				32
	MIN(AI5,6)	See parameter 11.03.				33
	MAX(AI5,6)	See parameter 11.03.				34
	11U,12D(R)	See parameter 11.03.				35
	11U,12D	See parameter 11.03.				36
	PARAM 11.11	Source selected by parameter 11.11.				37
	AI1 BIPOLAR	See parameter 11.03.				38
11.07	**EXT REF2 MIN**	0 ~ 100	%	×	0	1=1%
11.08	**EXT REF2 MAX**	0 ~ 600	%	×	100	1=1%
11.09	**EXT1/EXT2 SEL PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	001.001.00	
11.10	**EXT REF1 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	001.001.00	
11.11	**EXT REF2 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	001.001.00	

12 CONSTANT SPEEDS

<table>
<tr><th>No.</th><th>Name/ Description/Selection</th><th>Range</th><th>Unit</th><th>Attribute</th><th>Default</th><th>FbEq</th></tr>
<tr><td>12</td><td>CONSTANT SPEEDS</td><td colspan="4">Select constant speeds through digital inputs and set constant speed value.
Note:
• The constant speeds takes priority over the speed reference.
• When the jogging function is effective, the jogging speed 12.15 takes priority over the constant speed.</td><td></td></tr>
<tr><td>12.01</td><td>CONST SPEED SEL</td><td>1 ~ 23</td><td>/</td><td>×</td><td>NOT SEL</td><td></td></tr>
<tr><td></td><td>NOT SEL</td><td colspan="4">No constant speeds in use.</td><td>1</td></tr>
<tr><td></td><td>X1(SPEED1)</td><td colspan="4">Speed defined by parameter 12.02 is activated through digital input X1.
1 = active, 0 = inactive.</td><td>2</td></tr>
<tr><td></td><td>X2(SPEED2)</td><td colspan="4">Speed defined by parameter 12.03 is activated through digital input X2.
1 = active, 0 = inactive.</td><td>3</td></tr>
<tr><td></td><td>X3(SPEED3)</td><td colspan="4">Speed defined by parameter 12.04 is activated through digital input X3.
1 = active, 0 = inactive.</td><td>4</td></tr>
<tr><td></td><td>X4(SPEED4)</td><td colspan="4">Speed defined by parameter 12.05 is activated through digital input X4.
1 = active, 0 = inactive.</td><td>5</td></tr>
<tr><td></td><td>X5(SPEED5)</td><td colspan="4">Speed defined by parameter 12.06 is activated through digital input X5.
1 = active, 0 = inactive.</td><td>6</td></tr>
<tr><td></td><td>X6(SPEED6)</td><td colspan="4">Speed defined by parameter 12.07 is activated through digital input X6.
1 = active, 0 = inactive.</td><td>7</td></tr>
<tr><td></td><td>X1;2</td><td colspan="4">Constant speed selection through digital input X1 and X2.<table><tr><th>X2</th><th>X1</th><th>Constant speed in use</th></tr><tr><td>0</td><td>0</td><td>No constant speed in use</td></tr><tr><td>0</td><td>1</td><td>Speed defined by parameter 12.02</td></tr><tr><td>1</td><td>0</td><td>Speed defined by parameter 12.03</td></tr><tr><td>1</td><td>1</td><td>Speed defined by parameter 12.04</td></tr></table></td><td>8</td></tr>
<tr><td></td><td>X3;4</td><td colspan="4">See selection X1;2.</td><td>9</td></tr>
<tr><td></td><td>X5;6</td><td colspan="4">See selection X1;2.</td><td>10</td></tr>
<tr><td></td><td>X1;2;3</td><td colspan="4">Constant speed selection through digital input X1, X2 and X3.<table><tr><th>X3</th><th>X2</th><th>X1</th><th>Constant speed in use</th></tr><tr><td>0</td><td>0</td><td>0</td><td>No constant speed in use</td></tr><tr><td>0</td><td>0</td><td>1</td><td>Speed defined by parameter 12.02</td></tr><tr><td>0</td><td>1</td><td>0</td><td>Speed defined by parameter 12.03</td></tr><tr><td>0</td><td>1</td><td>1</td><td>Speed defined by parameter 12.04</td></tr><tr><td>1</td><td>0</td><td>0</td><td>Speed defined by parameter 12.05</td></tr><tr><td>1</td><td>0</td><td>1</td><td>Speed defined by parameter 12.06</td></tr><tr><td>1</td><td>1</td><td>0</td><td>Speed defined by parameter 12.07</td></tr><tr><td>1</td><td>1</td><td>1</td><td>Speed defined by parameter 12.08</td></tr></table></td><td>11</td></tr>
<tr><td></td><td>X3;4;5</td><td colspan="4">See selection X1; 2; 3.</td><td>12</td></tr>
<tr><td></td><td>X4;5;6</td><td colspan="4">See selection X1; 2; 3.</td><td>13</td></tr>
</table>

<table>
<tr><th>No.</th><th>Name/ Description/Selection</th><th>Range</th><th>Unit</th><th>Attribute</th><th>Default</th><th>FbEq</th></tr>
<tr><td></td><td>X3;4;5;6</td><td>Constant speed selection through digital input X3, X4, X5 and X6.
<table>
<tr><th>X4</th><th>X3</th><th>X2</th><th>X1</th><th>Constant speed in use</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>No constant speed in use</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td>Speed defined by parameter 12.02</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td><td>Speed defined by parameter 12.03</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1</td><td>Speed defined by parameter 12.04</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td>Speed defined by parameter 12.05</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1</td><td>Speed defined by parameter 12.06</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>0</td><td>Speed defined by parameter 12.07</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td><td>Speed defined by parameter 12.08</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>Speed defined by parameter 12.09</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>Speed defined by parameter 12.10</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>0</td><td>Speed defined by parameter 12.11</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td><td>Speed defined by parameter 12.12</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td><td>Speed defined by parameter 12.13</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td><td>Speed defined by parameter 12.14</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>0</td><td>Speed defined by parameter 12.15</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td>Speed defined by parameter 12.16</td></tr>
</table></td><td></td><td></td><td></td><td>14</td></tr>
<tr><td></td><td>X7(SPEED1)</td><td>Speed defined by parameter 12.02 is activated through digital input X7.
1 = active, 0 = inactive.</td><td></td><td></td><td></td><td>15</td></tr>
<tr><td></td><td>X8(SPEED2)</td><td>Speed defined by parameter 12.03 is activated through digital input X8.
1 = active, 0 = inactive.</td><td></td><td></td><td></td><td>16</td></tr>
<tr><td></td><td>X9(SPEED3)</td><td>Speed defined by parameter 12.04 is activated through digital input X9.
1 = active, 0 = inactive.</td><td></td><td></td><td></td><td>17</td></tr>
<tr><td></td><td>X10(SPEED4)</td><td>Speed defined by parameter 12.05 is activated through digital input X10.
1 = active, 0 = inactive.</td><td></td><td></td><td></td><td>18</td></tr>
<tr><td></td><td>X11(SPEED5)</td><td>Speed defined by parameter 12.06 is activated through digital input X11.
1 = active, 0 = inactive.</td><td></td><td></td><td></td><td>19</td></tr>
<tr><td></td><td>X12 (SPEED6)</td><td>Speed defined by parameter 12.07 is activated through digital input X12.
1 = active, 0 = inactive.</td><td></td><td></td><td></td><td>20</td></tr>
<tr><td></td><td>X7;8</td><td>See selection X1;2.</td><td></td><td></td><td></td><td>21</td></tr>
<tr><td></td><td>X9;10</td><td>See selection X1;2.</td><td></td><td></td><td></td><td>22</td></tr>
<tr><td></td><td>X11;12</td><td>See selection X1;2.</td><td></td><td></td><td></td><td>23</td></tr>
<tr><td>12.02</td><td>CONST SPEED 1</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>300</td><td></td></tr>
<tr><td>12.03</td><td>CONST SPEED 2</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>600</td><td></td></tr>
<tr><td>12.04</td><td>CONST SPEED 3</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>600</td><td></td></tr>
<tr><td>12.05</td><td>CONST SPEED 4</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>1200</td><td></td></tr>
<tr><td>12.06</td><td>CONST SPEED 5</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>1500</td><td></td></tr>
<tr><td>12.07</td><td>CONST SPEED 6</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>0</td><td></td></tr>
<tr><td>12.08</td><td>CONST SPEED 7</td><td>-18000 ~ 18000</td><td>PRM</td><td>○</td><td>0</td><td></td></tr>
</table>

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
12.09	**CONST SPEED** 8	-18000 ~ 18000	PRM	○	0	
12.10	**CONST SPEED** 9	-18000 ~ 18000	PRM	○	0	
12.11	**CONST SPEED** 10	-18000 ~ 18000	PRM	○	0	
12.12	**CONST SPEED** 11	-18000 ~ 18000	PRM	○	0	
12.13	**CONST SPEED** 12	-18000 ~ 18000	PRM	○	0	
12.14	**CONST SPEED** 13	-18000 ~ 18000	PRM	○	0	
12.15	**CONST SPEED** 14	-18000 ~ 18000	PRM	○	0	
	Defines speed 14. An absolute value. Does not include the direction information. Note: If the jogging function is in use, the parameter defines the jogging speed. The sign is not taken into account.					
12.16	CONST SPEED 15	-18000 ~ 18000	PRM	○	300	
	Defines speed 15 or fault speed. The program considers the sign when used as a fault speed by parameter 30.01 and 30.02.					

13 ANALOG INPUTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
13	ANALOG INPUTS	The analog input signal processing.				
13.01	**MIN AI1**	0V，2V，TUNED VALUE，TUNE	/	○	0V	
	Defines the minimum value for analog input AI1. When AI1 used as a reference, the value corresponds to the reference minimum setting. Example: If AI1 is selected as the source for external reference REF1, this value corresponds to the value of parameter 11.04.					
	0V	Zero volts. Note: The program cannot detect a loss of analog input signal.				1
	2V	Two volts.				2
	TUNED VALUE	The value measured by the tuning function.				3
	TUNE	The value measurement triggering. Procedure: ① Connect the minimum signal to input. ② Set the parameter to 13.01 = TUNE. ③ Press PRG key on the keypad to start tuning function.				4
13.01	**MAX AI1**	10V，TUNED VALUE，TUNE	/	○	10V	
	Defines the maximum value for analog input AI1. When AI1 used as a reference, the value corresponds to the reference maximum setting. Example: If AI1 is selected as the source for external reference REF1, this value corresponds to the value of parameter 11.05.					
	10V					1
	TUNED VALUE	The value measured by the tuning function.				2
	TUNE	The value measurement triggering. Procedure: ① Connect the maximum signal to input. ② Set the parameter to 13.02 = TUNE. ③ Press PRG key on the keypad to start tuning function.				3
13.03	**SCALE AI1**	0 ~ 1000	%	○	100	
	Scales analogue input AI1. Adjust the value to proportionally enlarge or reduce the analog input. Example: The effect on speed reference REF1 when: REF1 source selection parameter 11.03 = AI1+AI3; REF1 maximum value setting parameter 11.05 = 1500 RPM; Actual AI1 value = 5 V, actual AI3 value = 5 mA, AI1 scaling = 80%, AI3 scaling = 20%. Then : AI1 part: 5V/10V * 1500RPM * 80% = 600 RPM AI3 part: 5mA/20mA * 1500RPM * 20% = 75RPM Then: REF1 = AI1 + AI3 = 600+75 =675 RPM.					
13.04	**FILTER AI1**	0.00 ~ 10.00	s	○	0	
	Defines the filter time constant for analog input AI1.					
13.05	**INVERT AI1**	NO, YES	/	○	NO	
	NO	No inversion.				1
	YES	Inversion active. The maximum value of the analog input signal corresponds to the minimum reference and vice versa.				2
13.06	**MIN AI2**	0mA, 4mA, TUNED VALUE, TUNE	/	○	0mA	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
13.07	**MAX AI2**	20mA, TUNED VALUE, TUNE	/	○	20mA	
13.08	**SCALE AI2**	0 ~ 1000	%	○	100	
13.09	**FILTER AI2**	0.00 ~ 10.00	s	○	0	
13.10	**INVERT AI2**	NO, YES	/	○	NO	
13.11	**MIN AI3**	0mA，4mA，TUNED VALUE, TUNE	/	○	0mA	
13.12	**MAX AI3**	20mA，TUNED VALUE, TUNE	/	○	20mA	
13.13	**SCALE AI3**	0 ~ 1000	%	○	100	
13.14	**FILTER AI3**	0.00 ~ 10.00	s	○	0	
13.15	**INVERT AI3**	NO, YES	/	○	NO	
13.16	**MIN AI5**	0mA，4mA，TUNED VALUE, TUNE	/	○	0mA	
13.17	**MAX AI5**	20mA，TUNED VALUE, TUNE	/	○	20mA	
13.18	**SCALE AI5**	0 ~ 1000	%	○	100	
13.19	**FILTER AI5**	0.00 ~ 10.00	s	○	0	
13.20	**INVERT AI5**	NO, YES	/	○	NO	
13.21	**MIN AI6**	0mA，4mA，TUNED VALUE, TUNE	/	○	0mA	
13.22	**MAX AI6**	20mA，TUNED VALUE, TUNE	/	○	20mA	
13.23	**SCALE AI6**	0 ~ 1000	%	○	100	
13.24	**FILTER AI6**	0.00 ~ 10.00	s	○	0	
13.25	**INVERT AI6**	NO, YES	/	○	NO	

14 RELAY OUTPUTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
14	RELAY OUTPUTS	Relay output functions selection, and the relay operating delays.				
14.01	**RO1 OUTPUT SEL**	1 ~ 37	/	○	READY	
	NOT USED	Not used.				1
	READY	Run Enable signal on, no fault.				2
	RUNNING	Start signal on, Run Enable signal on, no active fault.				3
	FAULT	FAULT				4
	FAULT(-1)	Inverted fault. Relay is de-energised on a fault trip.				5
	FAULT(RST)	Fault. Automatic reset after the autoreset delay.				6
	STALL WARN	Warning by the stall protection function, See parameter 30.10.				7
	STALL FLT	Fault trip by the stall protection function, See parameter 30.10.				8
	MOT TEMP WRN	Warning trip of the motor temperature supervision function. See parameter 30.04.				9
	MOT TEMP FLT	Fault trip of the motor temperature supervision function. See parameter 30.04.				10
	IGBT TEMP WRN	Warning by the drive temperature supervision function.				11
	IGBT TEMP FLT	Fault trip by the drive temperature supervision function.				12
	FAULT/WARN	Fault or warning active.				13
	WARNING	Warning active.				14
	REVERSED	Motor rotates in reverse direction.				15
	EXT CTRL	Drive is under external control.				16
	REF 2 SEL	External reference REF 2 is in use.				17
	CONST SPEED	A constant speed is in use. See parameter group 12 CONSTANT SPEEDS.				18
	DC OVERVOLT	The DC voltage has exceeded the overvoltage limit.				19
	DC UNDERVOLT	The DC voltage has fallen below the undervoltage limit.				20
	SPEED 1 LIM	Motor speed at supervision limit 1. See parameters 32.01 and 32.02.				21
	SPEED 2 LIM	Motor speed at supervision limit 2. See parameters 32.03 and 32.04.				22
	CURRENT LIM	Motor current at the supervision limit. See parameters 32.05 and 32.06。				23
	TORQUE 1 LIM	Motor torque at supervision limit 1. See parameters 32.07 and 32.08。				24
	TORQUE 2 LIM,	Motor torque at supervision limit 2. See parameters 32.09 and 32.10。				25
	REF 1 LIM	External reference REF1 at the supervision limit. See parameters 32.11 and 32.12。				26
	REF 2 LIM	External reference REF2 at the supervision limit. See parameters 32.13 and 32.14。				27
	STARTED	The drive has received the start command.				28
	LOSS OF REF	The drive has received the start command.				29
	AT SPEED	The actual value has reached the reference value. In speed control, the speed error is less or equal to 10% of the nominal motor speed.				30
	PID ACT1 LIM	Process PID controller variable ACT1 at the supervision limit. See parameters 32.15 和 32.16.				31
	PID ACT2 LIM	Process PID controller variable ACT2 at the supervision limit. See				32

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
		parameters 32.17 和 32.18。				
	COMM.REF3(13)	The relay is controlled bit13 of by communication reference REF3.				33
	PARAM. 14.16	The relay is controlled by a source selected by parameter 14.16.				34
	BRAKE CTRL	The relay is controlled by mechanical brake control logic. See parameter group 42.				35
	BC OVERLOAD	Built-in brake chopper fault.				36
	MAGN READY	The motor is magnetised and ready to give nominal torque (nominal magnetising of the motor has been reached).				37
14.02	**RO2 OUTPUT SEL**	1 ~ 37	/	○	RUNNING	
	NOT USED	See parameter 14.01.				1
	READY	See parameter 14.01.				2
	RUNNING	See parameter 14.01.				3
	FAULT	See parameter 14.01.				4
	FAULT(-1)	See parameter 14.01.				5
	FAULT(RST)	See parameter 14.01.				6
	STALL WARN	See parameter 14.01.				7
	STALL FLT	See parameter 14.01.				8
	MOT TEMP WRN	See parameter 14.01.				9
	MOT TEMP FLT	See parameter 14.01.				10
	IGBT TEMP WRN	See parameter 14.01.				11
	IGBT TEMP FLT	See parameter 14.01.				12
	FAULT/WARN	See parameter 14.01.				13
	WARNING	See parameter 14.01.				14
	REVERSED	See parameter 14.01.				15
	EXT CTRL	See parameter 14.01.				16
	REF 2 SEL	See parameter 14.01.				17
	CONST SPEED	See parameter 14.01.				18
	DC OVERVOLT	See parameter 14.01.				19
	DC UNDERVOLT	See parameter 14.01.				20
	SPEED 1 LIM	See parameter 14.01.				21
	SPEED 2 LIM	See parameter 14.01.				22
	CURRENT LIM	See parameter 14.01.				23
	TORQUE 1 LIM	See parameter 14.01.				24
	TORQUE 2 LIM,	See parameter 14.01.				25
	REF 1 LIM	See parameter 14.01.				26
	REF 2 LIM	See parameter 14.01.				27
	STARTED	See parameter 14.01.				28
	LOSS OF REF	See parameter 14.01.				29
	AT SPEED	See parameter 14.01.				30

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	PID ACT1 LIM	See parameter 14.01.				31
	PID ACT2 LIM	See parameter 14.01.				32
	COMM.REF3(14)	The relay is controlled by bit14 of communication reference REF3.				33
	PARAM 14.17	The relay is controlled by a source selected by parameter 14.17.				34
	BRAKE CTRL	See parameter 14.01.				35
	BC OVERLOAD	See parameter 14.01.				36
	MAGN READY	See parameter 14.01.				37
14.03	**RO3 OUTPUT SEL**	1 ~ 37	/	○	FAULT(-1)	
	NOT USED	See parameter 14.01.				1
	READY	See parameter 14.01.				2
	RUNNING	See parameter 14.01.				3
	FAULT	See parameter 14.01.				4
	FAULT(-1)	See parameter 14.01.				5
	FAULT(RST)	See parameter 14.01.				6
	STALL WARN	See parameter 14.01.				7
	STALL FLT	See parameter 14.01.				8
	MOT TEMP WRN	See parameter 14.01.				9
	MOT TEMP FLT	See parameter 14.01.				10
	IGBT TEMP WRN	See parameter 14.01.				11
	IGBT TEMP FLT	See parameter 14.01.				12
	FAULT/WARN	See parameter 14.01.				13
	WARNING	See parameter 14.01.				14
	REVERSED	See parameter 14.01.				15
	EXT CTRL	See parameter 14.01.				16
	REF 2 SEL	See parameter 14.01.				17
	CONST SPEED	See parameter 14.01.				18
	DC OVERVOLT	See parameter 14.01.				19
	DC UNDERVOLT	See parameter 14.01.				20
	SPEED 1 LIM	See parameter 14.01.				21
	SPEED 2 LIM	See parameter 14.01.				22
	CURRENT LIM	See parameter 14.01.				23
	TORQUE 1 LIM	See parameter 14.01.				24
	TORQUE 2 LIM,	See parameter 14.01.				25
	REF 1 LIM	See parameter 14.01.				26
	REF 2 LIM	See parameter 14.01.				27
	STARTED	See parameter 14.01.				28
	LOSS OF REF	See parameter 14.01.				29
	AT SPEED	See parameter 14.01.				30

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	PID ACT1 LIM	See parameter 14.01.				31
	PID ACT2 LIM	See parameter 14.01.				32
	COMM.REF3(15)	The relay is controlled by bit15 of communication reference REF3.				33
	PARAM 14.18	The relay is controlled by a source selected by parameter 14.18.				34
	BRAKE CTRL	See parameter 14.01.				35
	BC OVERLOAD	See parameter 14.01.				36
	MAGN READY	See parameter 14.01.				37
14.04	**RO1 TON DELAY**	0.0 ~ 3600.0	s	○	0.0	
14.05	**RO1 TOFF DELAY**	0.0 ~ 3600.0	s	○	0.0	
14.06	**RO2 TON DELAY**	0.0 ~ 3600.0	s	○	0.0	
14.07	**RO2 TOFF DELAY**	0.0 ~ 3600.0	s	○	0.0	
14.08	**RO3 TON DELAY**	0.0 ~ 3600.0	s	○	0.0	
14.09	**RO3 TOFF DELAY**	0.0 ~ 3600.0	s	○	0.0	
14.10	**RO4 OUTPUT SEL**	1 ~ 7	/	○	就绪	
	READY	See parameter 14.01.				1
	RUNNING	See parameter 14.01.				2
	FAULT	See parameter 14.01.				3
	WARNING	See parameter 14.01.				4
	REF 2 SEL	See parameter 14.01.				5
	AT SPEED	See parameter 14.01.				6
	PARAM 14.19	The relay is controlled by a source selected by parameter 14.19.				7
14.11	**RO5 OUTPUT SEL**	1 ~ 7	/	○	就绪	
	READY	See parameter 14.01.				1
	RUNNING	See parameter 14.01.				2
	FAULT	See parameter 14.01.				3
	WARNING	See parameter 14.01.				4
	REF 2 SEL	See parameter 14.01.				5
	AT SPEED	See parameter 14.01.				6
	PARAM 14.20	The relay is controlled by a source selected by parameter 14.20.				7
14.12	**RO6 OUTPUT SEL**	1 ~ 7	/	○	就绪	
	READY	See parameter 14.01.				1
	RUNNING	See parameter 14.01.				2
	FAULT	See parameter 14.01.				3
	WARNING	See parameter 14.01.				4
	REF 2 SEL	See parameter 14.01.				5
	AT SPEED	See parameter 14.01.				6
	PARAM 14.21	The relay is controlled by a source selected by parameter 14.21.				7
14.16	**RO1 PTR**	-200.00.16 ~ + 200.99.16	/	×	+001.001.00	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
		C.-32767 ~ C.32767			0	
14.17	**RO2 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.00 0	
14.18	**RO3 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.00 0	
14.19	**RO4 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.00 0	
14.20	**RO5 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.00 0	
14.21	**RO6 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.00 0	

15 ANALOG OUTPUTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
15	ANALOG OUTPUTS	Analog output functions selection.				
15.01	**AO1 OUTPUT SEL**	1 ~ 19	/	○	SPEED	
	NOT USED	Not in use				1
	P SPEED	Value of a user-defined process quantity derived from the motor speed. See parameters 34.01，34.02，34.03.				2
	SPEED	Motor speed，20 mA = motor nominal speed. The value is filtered with the filter time constant defined by parameter 34.04.				3
	FREQUENCY	Output frequency. 20 mA = motor nominal frequency.				4
	CURRENT	Output current. 20 mA = motor nominal current.				5
	TORQUE	Motor torque. 20 mA = 100% of motor nominal rating.				6
	POWER	Motor power. 20 mA = 100% of motor nominal rating.				7
	DC BUS VOLT	DC bus voltage. 20 mA = 537V for 380...415 VAC supply voltage rating.				8
	OUTPUT VOLT	Motor voltage. 20 mA = motor rated voltage.				9
	APPL OUTPUT	The reference which is given as an output from the application. For example, if the PID Control macro is in use, this is the output of the process PID controller.				10
	REFERENCE	Active reference that the drive is currently following. 20 mA = 100 % of the active reference.				11
	PID CTRL DEV	The difference between the reference and the actual value of the process PID controller. 0/4 mA = -100%, 10/12 mA = 0%, 20 mA = 100%.				12
	PID ACT1	Value of variable ACT1 used in the process PID control. 20 mA = value of parameter 40.10.				13
	PID ACT2	Value of variable ACT2 used in the process PID control. 20 mA = value of parameter 40.12.				14
	COMM.REF4	The value is read from communication reference REF4.				15
	M1 TEMP MEAS	Analog output is a current source in a motor temperature measuring circuit. Depending on the sensor type, the output is 9.1 mA (Pt 100) or 1.6 mA (PTC).				16
	PARAM 15.11	Source selected by parameter 15.11.				17
	SPD RAMP IN	Speed reference ramp in. 20mA = motor nominal speed.				18
	SPD RAMP OUT	Speed reference ramp out. 20mA = motor nominal speed.				19
15.02	**INVERT AO1**	NO, YES	/	○	NO	
15.03	**MINIMUM AO1**	0mA，4mA	/	○	0mA	
15.04	**FILTER AO1**	0.00 ~ 10.00	s	○	0.00	
15.05	**SCALE AO1**	0 ~ 10000	%	○	100	
15.06	**AO2 OUTPUT SEL**	1 ~ 19	/	○	输出电流	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	NOT USED	See parameter 15.01.				1
	P SPEED	See parameter 15.01.				2
	SPEED	See parameter 15.01.				3
	FREQUENCY	See parameter 15.01.				4
	CURRENT	See parameter 15.01.				5
	TORQUE	See parameter 15.01.				6
	POWER	See parameter 15.01.				7
	DC BUS VOLT	See parameter 15.01.				8
	OUTPUT VOLT	See parameter 15.01.				9
	APPL OUTPUT	See parameter 15.01.				10
	REFERENCE	See parameter 15.01.				11
	PID CTRL DEV	See parameter 15.01.				12
	PID ACT1	See parameter 15.01.				13
	PID ACT2	See parameter 15.01.				14
	COMM.REF5	The value is read from communication reference REF5.				15
	M1 TEMP MEAS	See parameter 15.01.				16
	PARAM 15.12	Source selected by parameter 15.12.				17
	SPD RAMP IN	See parameter 15.01.				18
	SPD RAMP OUT	See parameter 15.01.				19
15.07	**INVERT AO1**	NO, YES	/	○	NO	
15.08	**MINIMUM AO1**	0mA，4mA	/	○	0mA	
15.09	**FILTER AO1**	0.00 ~ 10.00	s	○	0.00	
15.10	**SCALE AO1**	0 ~ 10000	%	○	100	
15.11	**AO1 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	○	+001.00 1.000	
15.12	**AO2 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	○	+001.00 1.000	

16 SYS CTRL INPUTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
16	SYS CTRL INPUTS	Run Enable, parameter lock, Reset etc.				
16.01	**RUN ENABLE SEL**	1 ~ 15	/	×	YES	
	YES	Run Enable signal is on.				1
	X1	External signal required through digital input X1. 1 = Run Enable.				2
	X2	See selectionX1.				3
	X3	See selectionX1.				4
	X4	See selectionX1.				5
	X5	See selectionX1.				6
	X6	See selectionX1.				7
	COMM.CW	External signal required through the Communication Control Word (bit 3).				8
	X7	See selectionX1.				9
	X8	See selectionX1.				10
	X9	See selectionX1.				11
	X10	See selectionX1.				12
	X11	See selectionX1.				13
	X12	See selectionX1.				14
	PARAM 16.08	Source selected by parameter 16.08.				15
16.02	**PARAMETER LOCK**	OPEN, LOCKED	/	×	OPEN	
	OPEN	The lock is open. Parameter values can be changed.				1
	LOCKED	Locked. Parameter values cannot be changed from the keypad. The lock can be opened by entering the valid code to parameter 16.03 .				2
16.03	**PASS CODE**	0000 ~ FFFF	/	×	0000	
16.04	**FAULT RESET SEL**	1 ~ 16	/	×	NOT SEL	
	NOT SEL	Fault reset only from the control panel keypad (STOP key).				1
	X1	Reset through digital input X1 or by keypad: If the drive is in external control mode: Reset by a rising edge of X1. If the drive is in local control mode: Reset by the STOP key of the keypad.				2
	X2	See selectionX1。				3
	X3	See selectionX1。				4
	X4	See selectionX1。				5
	X5	See selectionX1。				6
	X6	See selectionX1。				7
	COMM.CW	Reset through the Communication Control Word (bit 7), or by the STOP key of the keypad. Note: Reset through Communication Control Word (bit 7) is enabled automatically and it is independent of parameter 16.04 setting if parameter 10.01 or 10.02 is set to COMM.CW.				8
	ON STOP	Reset along with the stop signal received through a digital input, or by the STOP key of the keypad.				9
	X7	See selection X1.				10

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	X8	See selection X1.				11
	X9	See selection X1.				12
	X10	See selection X1.				13
	X11	See selection X1.				14
	X12	See selection X1.				15
	PARAM 16.11	Source selected by parameter 16.11.				16
16.05	MACRO CHANGE	1 ~ 13	/	×	NOT SEL	
	NOT SEL	User macro change is not possible through a digital input.				1
	X1	Falling edge of digital input X1, 1—>0, User Macro 1 is loaded into use. Rising edge of digital input X1, 0—>1, User Macro 2 is loaded into use.				2
	X2	See selection X1。				3
	X3	See selection X1。				4
	X4	See selection X1。				5
	X5	See selection X1。				6
	X6	See selection X1。				7
	X7	See selection X1。				8
	X8	See selection X1。				9
	X9	See selection X1。				10
	X10	See selection X1。				11
	X11	See selection X1。				12
	X12	See selection X1。				13
16.06	**LOCAL LOCK**	OFF, ON	/	×	OFF	
	OFF	Local control allowed.				1
	ON	Local control disabled.				2
16.07	**PARAMETER SAVE**	DONE, SAVING	/	×	DONE	
	DONE	Saving completed.				1
	SAVING	Saving in progress.				2
16.08	**RUN ENA PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
16.09	**FAULT RESET PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
16.10	**RESET COUNTER**	NO, FAN ON TIME, kWH	/	×	NO	
	NO	No reset.				1
	FAN ON TIME	Resets the running time counter of the drive cooling fan				2
	kWH	kWh counter reset.				3

17 DIGITAL INPUTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
17	DIGITAL INPUTS	Filtering time and forced selection of digital inputs				
17.01	**FILTER DI**	0 ~ 2000	ms	○	0	1=1mS
17.02	**X7-1 FORCE FUNC**	0000000 ~ 1111111	/	×	0000000	1=1
17.03	**X7-1 FORCE DATA**	0000000 ~ 1111111	/	○	0000000	1=1

20 LIMITS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
20	LIMITS	Drive operation limits: speed, current, voltage, frequency, power, torque.				
20.01	**MINIMUM SPEED**	-18000 ~ parameter 20.02	RPM	○	-1500	
20.02	**MAXIMUM SPEED**	parameter 20.01 ~ 18000	RPM	○	3000	
20.03	**MAXIMUM CURRENT**	0.0 ~ Max. allowable current	A	×	Model dependent	
20.04	**TORQ MAX LIM1**	0.0 ~ 600.0	%	×	150.0	
20.05	**OVER VOLT CTRL**	OFF, ON	/	○	ON	
20.06	**UNDER VOLT CTRL**	OFF, ON	/	○	OFF	
20.07	**MINIMUM FREQ**	-300.00 ~ 300.00	Hz	×	-50.00	
20.08	**MAXIMUM FREQ**	-300.00 ~ 300.00	Hz	×	50.00	
20.09	**POWER MOT LIM**	0.00 ~ 600.00	%	×	150.0	
20.10	**POWER GEN LIM**	-300.00 ~ 0.00	%	×	-150.0	
20.11	**MIN TORQ SEL**	1 ~ 20	/	×	MIN LIM1	
	MIN LIM1	Value of parameter 20.13。				1
	X1	Digital input X1. 0: value of parameter 20.13; 1: value of parameter 20.14.				2
	X2	See selection X1.				3
	X3	See selection X1.				4
	X4	See selection X1.				5
	X5	See selection X1.				6
	X6	See selection X1.				7
	X7	See selection X1.				8
	X8	See selection X1.				9
	X9	See selection X1.				10
	X10	See selection X1.				11
	X11	See selection X1.				12
	X12	See selection X1.				13
	AI1	Analog input AI1. See parameter 20.18 and 20.19 on how the signal is converted to a torque limit.				14
	AI2	See selection AI1.				15
	AI3	See selection AI1.				16
	AI5	See selection AI1.				17
	AI6	See selection AI1.				18
	PARAM 20.16	Limit given by 20.16.				19
	NEG MAX TORQ	Inverted maximum torque limit defined by parameter 20.12.				20
20.12	**MAX TORQ SEL**	1 ~ 19	/	×	MAX LIM1	
	MAX LIM1	PARAM 20.04.				1
	X1	Digital input X1. 0: value of parameter 20.04; 1 value of parameter 20.15.				2
	X2	See selection X1.				3

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	X3	See selection X1.				4
	X4	See selection X1.				5
	X5	See selection X1.				6
	X6	See selection X1.				7
	X7	See selection X1.				8
	X8	See selection X1.				9
	X9	See selection X1.				10
	X10	See selection X1.				11
	X11	See selection X1.				12
	X12	See selection X1.				13
	AI1	Analog input AI1. See parameter 20.18 and 20.19 on how the signal is converted to a torque limit.				14
	AI2	Analog input AI2, see selection AI1.				15
	AI3	Analog input AI3, see selection AI1.				16
	AI5	Analog input AI5, see selection AI1.				17
	AI6	Analog input AI6, see selection AI1.				18
	PARAM 20.17	Limit given by parameter 20.17.				19
20.13	**TORQ MIN LIM1**	-600.0 ~ 0.0	%	○	0.0	
20.14	**TORQ MIN LIM2**	-600.0 ~ 0.0	%	○	0.0	
20.15	**TORQ MAX LIM2**	0.0 ~ 600.0	%	○	150.0	
20.16	**TORQ MIN PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
20.17	**TORQ MAX PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
20.18	**MIN AI SCALE**	0.0 ~ 100.0	%	○	0.0	
20.19	**MAX AI SCALE**	0.0 ~ 600.0	%	○	300.0	

21 START/STOP MODE

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
21	START/STOP MODE	Start and stop modes of the motor.				
21.01	**START MODE**	AUTO, DC MAGN, CNST DC MAGN	/	×	AUTO	
	AUTO	Automatic start guarantees optimal motor start in most cases. Note: ➢ When motor control mode is DTC(parameter 99.04 = DTC), this start mode has flying start function (starting to a rotating motor). ➢ When motor control mode is SCALAR(parameter 99.04 = SCALAR), this start mode does not have flying start function (starting to a rotating motor). The flying start function needs to be activated through parameter 21.08.				1
	DC MAGN	DC magnetising should be selected if a high break-away torque is required. The drive pre-magnetises the motor before the start. The pre-magnetising time is determined automatically, being typically 200 ms to 2 s depending on the motor size. DC MAGN guarantees the highest possible break-away torque. **Note**: ➢ Flying start function is not effective when DC magnetising is selected. ➢ DC magnetising is not effective if parameter 99.04 = SCALAR.				2
	CNST DC MAGN	Constant DC magnetising should be selected instead of DC magnetising if constant pre-magnetising time is required. This selection also guarantees the highest possible break-away torque when the pre-magnetising time is set long enough. The pre-magnetising time is defined by parameter 21.02 **Note**: ➢ Flying start function is not effective when DC magnetising is selected. ➢ DC magnetising is not effective if parameter 99.04 = SCALAR. ➢ The drive will start after the set magnetising time has passed although the motor magnetisation is not completed. Ensure always in applications where a full break-away torque is essential, that the constant magnetising time is long enough to allow generation of full magnetisation and torque.				3
21.02	CONST MAGN TIME	300 ~ 10000	ms	○	300	
	When parameter 21.01 = CNST DC MAGN. The drive pre-magnetises the motor before the start. The pre-magnetising time is determined by parameter 21.02. To ensure motor is fully magnetising, set this value to the same value as or higher than the rotor time constant. If not known, use the rule-of-thumb value given in the table below:					
21.03	**STOP MODE**	COAST, RAMP	/	×	COAST	
	COAST	Stop by cutting of the motor power supply. The motor coasts to a stop.				1
	RAMP	Stop along a ramp.				2

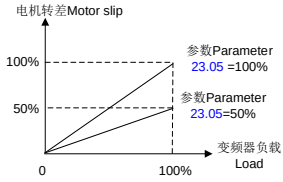
Motor Rated Power	Constant Magnetising Time
< 10 kW	≥ 100~ 200 ms
10 ~ 200 kW	≥ 200 ~ 1000 ms
200 ~ 1000 kW	≥ 1000~ 2000 ms

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
21.04	**DC HOLD**	NO，YES	/	×	NO	
	When parameter 21.04 = YES, When both the reference speed and the actual speed drop below the value of parameter 21.05, the drive will stop generating sinusoidal current and start to inject DC into the motor. The current is set by parameter 21.06. When the reference speed exceeds parameter 21.05, stop to inject DC into the motor, normal drive operation continues. **Note**: ➢ DC Hold has no effect if the start signal is switched off. ➢ Injecting DC current into the motor causes the motor to heat up. In applications where long DC hold times are required, externally ventilated motors should be used. ➢ During the DC holding, the DC hold cannot prevent the motor shaft from rotating if a load is applied to the motor.					
	NO	DC HOLD is inactive.				1
	YES	DC HOLD is active.				2
21.05	**DC HOLD SPEED**	0 ~ 3000	RPM	×	5	
21.06	**DC HOLD CURR**	0 ~ 100	%	×	30	
21.07	**RUN ENABLE OFF**	RAMP STOP, COAST STOP, OFF2 STOP, OFF3 STOP	**/**	×	COAST STOP	
	Note: The setting overrides the normal stop mode setting (parameter 21.03) when the Run Enable signal is switched off.					
	RAMP STOP	Stop along a ramp.				1
	COAST STOP	Stop by cutting of the motor power supply. The motor coasts to a stop.				2
	OFF2 STOP	Stop by cutting of the motor power supply. The motor coasts to a stop.				3
	OFF3 STOP	Stop along a ramp and the deceleration time is defined by parameter 21.07.				4
21.08	**SCALAR FLYSTART**	NO, YES	/	×	NO	
	NO	Flying start feature in the scalar control mode is inactive.				1
	YES	Flying start feature in the scalar control mode is active.				2
21.09	**Reserved**					
21.10	**ZERO SPD DELAY**	0.00 ~ 60.00	s	○	0.50	
	When parameter 21.10 = 0.00, no zero speed delay. The drive receives a stop command and decelerates along a ramp. When the motor actual speed falls below an internal limit (called Zero Speed), the speed controller is switched off. The inverter modulation is stopped and the motor coasts to standstill. When parameter 21.10 != 0, with zero speed delay. The drive receives a stop command and decelerates along a ramp. When the actual motor speed falls below an internal limit (called Zero Speed), the zero speed delay function activates. During the delay the functions keeps the speed controller live: the inverter modulates, motor is magnetised and the drive is ready for a quick restart.					

22 ACCEL/DECEL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
22	ACCEL/DELEC	Acceleration and deceleration times				
22.01	**ACC/DEC SEL**	1 ~ 15	/	×	ACC/DEC 1	
	ACC/DEC 1	Acceleration time 1(parameter 22.02) and deceleration time 1(parameter 22.03) are used.				1
	ACC/DEC 2	Acceleration time 1(parameter 22.04) and deceleration time 1(parameter 22.05) are used.				2
	X1	Acceleration/deceleration time pair selection through digital input X1. 0 = Acceleration time 1 and deceleration time 1 are in use. 1 = Acceleration time 2 and deceleration time 2 are in use.				3
	X2	See selectionX1。				4
	X3	See selectionX1。				5
	X4	See selectionX1。				6
	X5	See selectionX1。				7
	X6	See selectionX1。				8
	X7	See selectionX1。				9
	X8	See selectionX1。				10
	X9	See selectionX1。				11
	X10	See selectionX1。				12
	X11	See selectionX1。				13
	X12	See selectionX1。				14
	PARAM 22.08&09	Acceleration and deceleration times souce selection by parameters 22.08 and 22.09.				15
22.02	**ACCEL TIME 1**	0.00 ~ 180.00	s	○	20.00	
22.03	**DECEL TIME 1**	0.00 ~ 180.00	s	○	20.00	
22.04	**ACCEL TIME 2**	0.00 ~ 180.00	s	○	60.00	
22.05	**DECEL TIME 2**	0.00 ~ 180.00	s	○	60.00	
22.06	**RAMP SHAPE**	0.00 ~ 180.00	s	○	0.00	
22.07	**EM STOP DEC T**	0.00 ~ 180.00	s	○	3.00	
22.08	**22.01 ACC PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
22.09	**22.01 DEC PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	

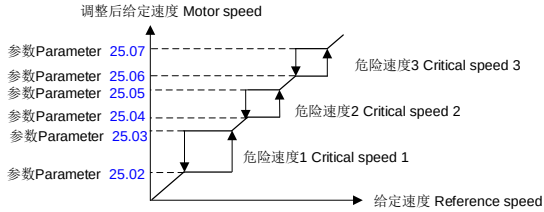
23 SPEED CTRL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
23	SPEED CTRL	Speed controller variables.				
23.01	**GAIN**	0.0 ~ 250.0	/	○	10.0	
	Please adjust according to the mechanical moment of inertia connected to the motor. For large moment of inertia, please increase the gain; For small moment of inertia, please reduce the gain. When the gain value is setting too high, although the control response become more quickly, but may cause the motor speed oscillation. On the contrary, if the gain value is setting too small, may cause the control slow response, the time to adjust the speed to a stable state will be longer.					
23.02	**INTEG TIME**	0.01 ~ 655.35	s	○	0.12	
	The integration time defines the rate at which the controller output changes when the error value is constant. The shorter the integration time, the faster the continuous error value is corrected. Too short an integration time makes the control unstable.					
23.03	**DERIV TIME**	0.0 ~ 6553.5	mS	○	0.0	
	Defines the derivation time for the speed controller. Derivative action boosts the controller output if the error value changes. The longer the derivation time, the more the speed controller output is boosted during the change. If the derivation time is set to zero, the controller works as a PI controller, otherwise as a PID controller. The derivation makes the control more responsive for disturbances.					
23.04	**ACC COMP DERIV**	0.00 ~ 655.35	S	○	0.00	
	Defines the derivation time for acceleration/ (deceleration) compensation. In order to compensate inertia during acceleration a derivative of the reference is added to the output of the speed controller.					
23.05	**SLIP GAIN**	0.0 ~ 400.0	%	○	100.0	
	This function helps the drive keep the motor speed constant under load fluctuation and heavy load. If static speed difference is detected, this value can be set appropriately.  Example: Speed reference is 1500 rpm. Despite of the full slip compensation (SLIP GAIN = 100%), a manual tachometer measurement from the motor axis gives a speed value of 1490 rpm. The static speed error is 1500 rpm - 1490 rpm = 2 rpm. To compensate the error, the slip gain 23.05 should be increased. At the 110% gain value, no static speed error exists.					
23.06	**SPD CTRL TUNE**	NO, YES	/	×		
	NO	No autotuning.				1
	YES	Activates the speed controller autotuning. Automatically reverts to NO.				2
23.07	**SPD FILT TIME**	0.0 ~ 6553.5	mS	○	8.0	

24 TORQUE CTRL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
24	TORQUE CTRL	Defines the torque reference ramp up and ramp down time.				
24.01	**TORQ RAMP UP**	0.00 ~ 120.00	S	○	0.00	
24.02	**TORQ RAMP DOWN**	0.00 ~ 120.00	S	○	0.00	

25 CRITICAL SPEEDS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
25	CRITICAL SPEEDS	CRITICAL SPEEDS				
25.01	**CRIT SPD SEL**	NO, YES	/	×	NO	
	In order to avoid the mechanical resonance speed, the critical speeds can be activated. When the reference speed falls into the critical speed range, it will automatically adjust the running speed outside the critical speed range. (When accelerating, it will be adjusted to the critical low speed, and when decelerating, it will be adjusted to the critical high speed). As shown in the figure below.  **Note**: If parameter 99.02 = PID CTRL，the critical speeds are not in use.					
	NO	Inactive.				1
	YES	Active.				2
25.02	**CRIT SPD 1 LOW**	0 ~ 18000	RPM	○	0	
25.03	**CRIT SPD 1 HIGH**	0 ~ 18000	RPM	○	0	
25.04	**CRIT SPD 2 LOW**	0 ~ 18000	RPM	○	0	
25.05	**CRIT SPD 2 HIGH**	0 ~ 18000	RPM	○	0	
25.06	**CRIT SPD 3 LOW**	0 ~ 18000	RPM	○	0	
25.07	**CRIT SPD 3 HIGH**	0 ~ 18000	RPM	○	0	

26 MOTOR CONTROL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
26	MOTOR CONTROL	Relevant parameters of advanced motor control.				
26.01	**FLUX OPT**	NO, YES	/	×	NO	
	By setting parameter 26.01, the output voltage will automatically decrease as the load decreases under the condition of ensuring normal operation. Minimize reactive power and improve energy-saving effect and efficiency. Note: ① If parameter 99.04 = scalar control, this function is not effective. ② Activating this function will delay the control response.					
	NO	Inactive				1
	YES	Active				2
26.02	**FLUX BRAKING**	NO, YES	/	×	NO	
	When the motor in deceleration process, if the flux braking is selected, the motor will decelerate quickly by increasing the magnetic flux of the motor. In addition, the energy during the motor deceleration process will be converted into heat. Selecting the flux braking action can achieve rapid deceleration, but compared with not activating this function, the output current will be increased. Note: If parameter 99.04 = scalar control, this function is not effective.					
	NO	Inactive				1
	YES	Active				2
26.03	**IR COMP**	0.00 ~ 30.00	%	○	0.00	
26.04	**IR STEP-UP FREQ**	0.00 ~ 50.00	Hz	○	0.00	
26.05	**HEX FIELD WEAK**	OFF, ON	/	×	OFF	
	OFF	The rotating flux vector follows a circular pattern. Optimal selection in most applications: Minimal losses at constant load. Maximal instantaneous torque is not available in the field weakening range of the speed.				1
	ON	Motor flux follows a circular pattern below the field weakening point (typically 50 or 60 Hz) and a hexagonal pattern in the field weakening range. Optimal selection in the applications that require maximal instantaneous torque in the field weakening range of the speed. The losses at constant operation are higher than with the selection NO.				2
26.06	**FLUX REF PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	
26.07	**FLY START CURR**	5.00 ~ 50.00	%	○	25.00	
26.08	**FLY START DELAY**	0 ~ 1000	mS	○	650	

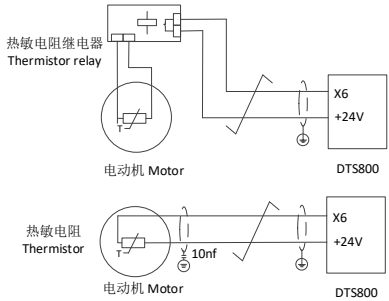
27 BRAKE CHOPPER

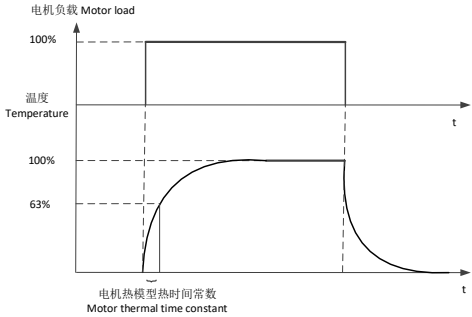
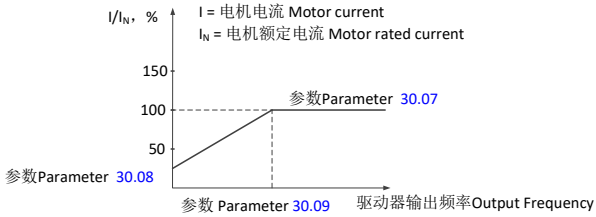
No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
27	BRAKE CHOPPER	Control of the brake chopper.				
27.01	**BRAKE CHOPPER**	NO, YES	/	×	NO	
	NO	Inactive				1
	YES	Active. Note: Ensure the brake chopper and resistor are installed and the overvoltage control is switched off (parameter 20.05).				2
27.02	**BR OVERLOAD SEL**	NO, WARNING, FAULT	/	×	NO	
	NO	Inactive.				1
	WARNING	Active. If the drive detects an overload, it generates a warning.				2
	FAULT	Active. If the drive detects an overload, it trips on a fault.				3
27.03	**BR RESISTANCE**	0.10 ~ 100.00	ohm	○	1.00	
27.04	**BR THERM TCONST**	0.01 ~ 655.35	S	○	2.00	
27.05	**BR Pmax CONT**	0.01 ~ 655.35	kW	○	0.50	
27.06	**BC CTRL MODE**	AS GENERATOR, COMMON DC BUS	/	×	COMMON DC BUS	
	AS GENERATOR	The chopper operation is allowed only when the drive is in operation, the DC bus voltage exceeds the braking action voltage and the motor is in power generating state. Note: This selection prevents the operation in case the intermediate circuit DC voltage rises due to abnormally high supply voltage level. Long time supply voltage rise would damage the chopper.				1
	COMMON DC BUS	Chopper operation is allowed always when the DC voltage exceeds the braking action voltage. Note: The selection is to be used in applications where several inverters are connected to the same intermediate circuit (DC bus). If the DC bus voltage exceeds the braking action voltage value due to abnormal voltage input or problems in the DC voltage detection circuit, the chopper will always work. If the voltage is kept in this abnormal state for a long time, the brake chopper would be damaged and the brake resistor would be overheat.				2

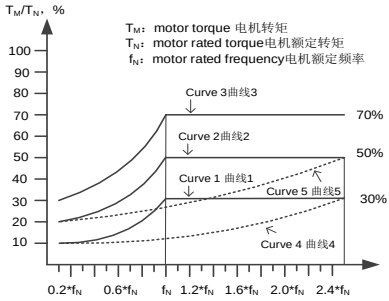
30 PROG FAULTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
30	PROG FAULTS	Programmable protection functions.				
30.01	**AI<MIN FUNC**	FAULT, NO, CONST SPD 15, LAST SPD ALM	/	○	NO	
	When the analog input value is lower than the minimum setting value, the drive performs the protection action according to the action defined by parameter 30.01. AI2, AI3, AI5, AI6 are similar. Note: ① The minimum value of analog input must be set to 0.5 V (1 mA) or greater. ② If the minimum value for analog input is set to 0, the detection of the corresponding analog input is invalid automatically (for example, if the selection of parameter 13.01 AI1 is 0, the detection of the analog input of AI1 is invalid automatically, same as AI2, AI3, AI5, AI6).					
	FAULT	Drive trips on a fault and the motor coasts to a stop.				1
	NO	Inactive.				2
	CONST SPD 15	The drive generates a warning, sets the speed to the value defined by parameter 12.16. Note: Make sure that it is safe to continue operation in case the analog input signal is lost.				3
	LAST SPD ALM	The drive generates a warning, and freezes the speed to the level the drive was operating at. Note: Make sure that it is safe to continue operation in case the analog input signal is lost.				4
30.02	**PANEL LOSS**	FAULT, CONST SPD 15, LAST SPD ALM	/	×	FAULT	
	Selects how the drive reacts to a keypad communication break.					
	FAULT	Drive trips on a fault and the motor coasts to a stop.				1
	CONST SPD 15	The drive generates a warning, sets the speed to the value defined by parameter 12.16. Note: Make sure that it is safe to continue operation in case the analog input signal is lost.				2
	LAST SPD ALM	The drive generates a warning, and freezes the speed to the level the drive was operating at. Note: Make sure that it is safe to continue operation in case of a keypad communication break.				3
30.03	**EXTERNAL FAULT**	NOT SEL，X1，X2，X3，X4，X5，X6，X7，X8，X9，X10，X11，X12	/	×	NOT SEL	
	NOT SEL	Inactive				1
	X1	External fault indication is given through digital input X1 X1=0: Fault trip. Motor coasts to stop； X1=1: No external fault.				2
	X2	See selectionX1.				3
	X3	See selectionX1.				4
	X4	See selectionX1.				5
	X5	See selectionX1.				6

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	X6	See selectionX1。				7
	X7	See selectionX1。				8
	X8	See selectionX1。				9
	X9	See selectionX1。				10
	X10	See selectionX1。				11
	X11	See selectionX1。				12
	X12	See selectionX1.				13
30.04	**MOT THERM PROT**	FAULT, WARNING, NO	/	○	FAULT	
	The parameter 30.04 selects how the drive reacts when the motor overtemperature is detected by the function defined by parameter 30.05.					
	FAULT	The drive trips on a fault when the temperature exceeds the fault level (100% of the allowed maximum value).				1
	WARNING	The drive generates a warning when the temperature exceeds the warning level (95% of the allowed maximum value).				2
	NO	Inactive				3
30.05	**MOT THERM P MOD**	AUTO, USER MODE, THERMISTOR	/	○	AUTO	
	The parameter 30.05 selects the thermal protection mode of the motor. When overtemperature is detected, the drive reacts as defined by parameter 30.04.					
	AUTO	The protection is based on the calculated motor thermal model. The following assumptions are used in the calculation: ① The motor temperature increases if it operates in the region above the load curve. ② The motor temperature decreases if it operates in the region below the curve. ③ The motor thermal time constant is an approximate value for a standard self-cooled squirrel-cage motor. It is possible to finetune the model by parameter 30.06 and 30.07. WARNING! The model does not protect the motor if it does not cool properly due to dust and dirt.				1
	USER MODE	The protection is based on the user-defined motor thermal model and the following basic assumptions: ① The motor temperature increases if it operates in the region above the load curve. ② The motor temperature decreases if it operates in the region below the curve. ③ The user-defined thermal model uses the motor thermal time constant (parameter 30.06) and the motor load curve (parameters 30.07, 30.08, and 30.09). User tuning is typically needed only if the ambient temperature differs from the normal operating temperature specified for the motor Note: The model does not protect the motor if it does not cool properly				2

<table>
<tr><td>No.</td><td>Name/ Description/Selection</td><td>Range</td><td>Unit</td><td>Attribute</td><td>Default</td><td>FbEq</td></tr>
<tr><td></td><td></td><td colspan="5">due to dust and dirt.</td><td></td></tr>
<tr><td></td><td>THERMISTOR</td><td colspan="5">Motor thermal protection is activated through digital input X6. A motor thermistor, or a break contact of a thermistor relay, must be connected to digital input X6. The drive reads the X6 states as follows:
<table><tr><td>X6 Status (Thermistor resistance)</td><td>Temperature</td></tr><tr><td>1 (0 … 1.5 kohm)</td><td>Normal</td></tr><tr><td>0 (4 kohm or higher)</td><td>Overtemperature</td></tr></table>The following figure shows two connection methods of thermistor.
 
Note:
① According to IEC 664, the connection of the motor thermistor to the digital input X6 requires double or reinforced insulation between motor live parts and the thermistor. Reinforced insulation entails a clearance and creeping distance of 8 mm (400 / 500 VAC equipment). If the thermistor assembly does not fulfil the requirement, the other I/O terminals of the drive must be protected against contact digital input X6, or a thermistor relay must be used to isolate the thermistor from the digital input X6.
② At the motor end the cable shield should be earthed through a 10 nF capacitor. If this is not possible, the shield is to be left unconnected.</td><td>3</td></tr>
<tr><td>30.06</td><td>MOT THERM TIME</td><td>60.0 ~ 6553.0</td><td>s</td><td>○</td><td>180.0</td><td></td></tr>
<tr><td></td><td colspan="5">When parameter 30.05 = AUTO or USER MODE, parameter 30.06 defines the thermal time constant.</td><td></td></tr>
</table>

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
						
30.07	**MOT LOAD CURVE**	50.0 ~ 300.0	%	○	100.0	
	When parameter 30.05 = AUTO, the curve is difined by parameter 30.07. When parameter 30.05 = USER MODE, the curve is difined by parameters 30.07, 30.08 and 30.09. 					
30.08	**ZERO SPEED LOAD**	25.0 ~ 150.0	%	○	74.0	
	Allowed continuous motor load at zero speed in percent of the nominal motor current. The load curve is defined by parameters 30.07, 30.08 and 30.09.					
30.09	**BREAK POINT**	1.0 ~ 300.0	Hz	○	45.0	
	Drive output frequency at 100% load. The load curve is defined by parameters 30.07, 30.08 and 30.09.					
30.10	**STALL FUNC**	FAULT, WARNING, NO	/	○	FAULT	
	Selects how the drive reacts to a motor stall condition. The drive performs stall protection action according to the action defined by parameter 30.10. The protection wakes up if : ① The motor output torque is reached the internal torque limit value. ② The output frequency is below the level set by parameter 30.11. ③ The conditions above have been valid longer than the time set by parameter 30.12. Note: Stall limit is restricted by internal current limit.					
	FAULT	The drive trips on a fault and the motor coasts to a stop.				1
	WARNING	The drive generates a warning.				2
	NO	Protection is inactive.				3
30.11	**STALL FREQ LIM**	0.0 ~ 500.0	Hz	○	20.0	
	See parameter 30.10.					
30.12	**STALL TIME**	0.00 ~ 600.00	s	○	20.00	

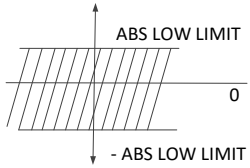
No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	See parameter 30.10.					
30.13	**UNDERLOAD FUNC**	NO, WARNING, FAULT	/	○	无效	
	The drive performs underload protection action according to the action defined by parameter 30.13 The protection wakes up if: ① The motor torque falls below the curve selected by parameter 30.15. ② The output frequency is higher than 10% of the nominal motor frequency. ③ The above conditions have been valid longer than the time set by parameter 30.14.					
	NO	Protection is inactive.				1
	WARNING	The drive generates a warning.				2
	FAULT	The drive trips on a fault and the motor coasts to a stop.				3
30.14	**UNDERLOAD TIME**	0.0 ~ 6000.0	s	○	20.0	
	See parameter 30.13					
30.15	**UNDERLOAD CURVE**	1 ~ 5	/	○	1	
	Selects the load curve for the underload function.  					
30.16	**MOT PHASE LOSS**	NO, FAULT	/	○	NO	
	Activates the motor phase loss supervision function.					
	NO	Inactive.				1
	FAULT	Active. The drive trips on a fault.				2
30.17	**EARTH FAULT**	WARNING, FAULT	/	○	WARNING	
	WARNING	The drive generates a warning.				1
	FAULT	The drive trips on a fault.				2
30.18	**COMM FLT FUNC**	FAULT, NO, CONST SPD 15, LAST SPEED	/	○	FAULT	
	Parameter 30.18 option is only effective under the following conditions ① Parameter 10.01 = COMM.CW. ② Parameter 10.02 = COMM.CW. ③ Parameter 11.03 = COMM.REF, COM.REF1+AI1, COM.REF1* AI1, FAST COMM, COM.REF1+AI5, COM.REF1 * AI5. ④ Parameter 11.06 = COMM.REF, COM.REF1+AI1, COM.REF1* AI1, FAST COMM, COM.REF1+AI5, COM.REF1*AI5.					
	FAULT	Protection is active. The drive trips on a fault and the motor coasts to				1

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
		a stop.				
	NO	Protection is inactive.				2
	CONST SPD 15	Protection is active. The drive generates a warning and sets the speed to the value defined by parameter 12.16. WARNING! Make sure that it is safe to continue operation in case of a communication break.				3
	LAST SPEED	Protection is active. The drive generates a warning and freezes the speed to the level the drive was operating at. WARNING! Make sure that it is safe to continue operation in case of a communication break.				4
30.19	**COMM FLT TIME**	0.00 ~ 600.00	s	○	3.00	
30.20	**COMM FLT RO/AO**	ZERO, LAST VALUE	/	○	ZERO	
	ZERO	After communication break, the relay output controlled by communication is de-energised, and the analog output controlled by communication is set to zero.				1
	LAST VALUE	After communication break, the relay output keeps the last state before the communication loss, and the analog output gives the last value before the communication loss. WARNING! After the communication recovers, the update of the relay and the analog outputs starts immediately without fault message resetting.				2
30.21	**AUX REF T-OUT**	0.00 ~ 600.00	s	○	3.00	
30.22	**LIMIT WARNING**	0000 ~ FFFF	/	○	0000	

31 AUTOMATIC RESET

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
31	AUTOMATIC RESET	Automatic fault reset and select faults that can be reset automatically. Automatic resets are possible only for certain fault types and when the automatic reset function is activated for that fault type. The automatic reset function is not operational if the drive is in local control (Keypad display "LOC")				
31.01	**NO. OF TRIALS**	0 ~ 5	/	○	0	
	The parameter 31.01 defines the number of automatic fault resets the drive performs within the time defined by parameter 31.02.					
31.02	**TRIAL TIME**	0.0 ~ 180.0	s	○	30.0	
	Defines the time for the automatic fault reset function. See parameter 31.01.					
31.03	**DELAY TIME**	0.0 ~ 3.0	s	○	0.0	
	Defines the time that the drive will wait after a fault before attempting an automatic reset. If a fault can be automatic reset, but it will not be automatic reset immediately after the fault occurs. The fault will be automatic reset only after the delay time defined by parameter 31.03. **Note**: If the value of parameter 31.03 is nonzero value, if the value of parameter 31.03 is greater than the value of parameter 31.02, the automatic reset will always be effective.					
31.04	**OVER CURRENT**	NO, YES	/	×	NO	
	NO	Inactive				1
	YES	Active				2
31.05	**OVER VOLTAGE**	NO, YES	/	×	NO	
	NO	Inactive				1
	YES	Active				2
31.06	**UNDER VOLTAGE**	NO， YES	/	×	NO	
	NO	Inactive				1
	YES	Active				2
31.07	**AI SIGNAL<MIN**	NO， YES	/	×	NO	
	NO	Inactive				1
	YES	Active				2
31.08	**LINE CONV**	NO, YES	/	×	NO	
	NO	Inactive				1
	YES	Active				2

32 SUPERVISION

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
32	SUPERVISION	Supervision limits. A relay output can be used to indicate when the value is above/below the limit, including speed, current, torque, EXT 1 reference, EXT2 reference, PID actual feedback.				
32.01	**SPEED1 FUNC**	NO, LOW LIMIT, HIGH LIMIT, ABS LOW LIMIT	/	○	NO	
	NO	Supervision is not used.				1
	LOW LIMIT	Supervision wakes up if the value is below the limit.				2
	HIGH LIMIT	Supervision wakes up if the value is above the limit.				3
	ABS LOW LIMIT	Supervision wakes up if the value is below the set limit. The limit is supervised in both rotating directions. The figure below illustrates the principle. 				4
32.02	**SPEED1 LIMIT**	-18000 ~ 18000	RPM	○	0	
32.03	**SPEED2 FUNC**	NO, LOW LIMIT, HIGH LIMIT, ABS LOW LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
	ABS LOW LIMIT	See parameter 32.01.				4
32.04	**SPEED2 LIMIT**	-18000 ~ 18000	RPM	○	0	
32.05	**CURRENT FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.06	**CURRENT LIMIT**	0 ~ 1000	A	○	0	
32.07	**TORQUE1 FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.08	**TORQUE1 LIMIT**	-600.0 ~ 600.0	%	○	0.0	
32.09	**TORQUE2 FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.10	**TORQUE2 LIMIT**	-600.0 ~ 600.0	%	○	0.0	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
32.11	**EXT REF1 FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.12	**EXT REF1 LIMIT**	0 ~ 18000	RPM	○	0	
32.13	**EXT REF2 FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.14	**EXT REF2 LIMIT**	0.0 ~ 600.0	%	○	0.0	
32.15	**PID ACT1 FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.16	**PID ACT1 LIMIT**	0.0 ~ 200.0	%	○	0.0	
32.17	**PID ACT2 FUNC**	NO, LOW LIMIT, HIGH LIMIT	/	○	NO	
	NO	See parameter 32.01.				1
	LOW LIMIT	See parameter 32.01.				2
	HIGH LIMIT	See parameter 32.01.				3
32.18	**PID ACT2 LIMIT**	0.0 ~ 200.0	%	○	0.0	

33 SOFTWARE VER

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
33	SOFTWARE VER	Software version information.				
33.01	**SOFTWARE VER**	00.00 ~ 655.35	/	*	机型确定	
33.02	**APPL SW VER**	00.00 ~ 655.35	/	*	机型确定	
33.03	**TEST DATE**	00.00 ~ 655.35	//	*	机型确定	
33.04	**BOARD TYPE**	00.00 ~ 655.35		*	机型确定	
33.05	**YEAR**	0 ~ 65535	/	*	机型确定	
33.06	**DATE**	00.00 ~ 655.35	/	*	机型确定	
33.07	**TIME**	00.00 ~ 655.35	/	*	机型确定	
33.08	**BAR CODE MSG 1**	0 ~ 65535	/	*	机型确定	
33.09	**BAR CODE MSG 2**	0 ~ 65535	/	*	机型确定	
33.10	**BAR CODE MSG 3**	0 ~ 65535	/	*	机型确定	
33.11	**BAR CODE MSG 4**	0 ~ 65535	/	*	机型确定	
33.12	**Driver Power**	0.0 ~ 3000.0	kW	*	机型确定	

34 PROCESS VARIABLE

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
34	PROCESS VARIABLE	User variable and unit settings; filtering for the actual signal speed and torque; reset of the run time counter.				
34.01	**P VAR SOURCE**	102 ~ 9999	/	○	102	
	The value of parameter 01.01 is determined by parameters 34.01 and 34.02. The parameter 34.01 is used to select the signal source, and the parameter 34.02 is the proportional coefficient, and the multiplication of the two is saved in parameter 01.01. The unit of parameter 01.01 is determined by parameter 34.03.					
34.02	**P VAR SCALED**	0.00 ~ 655.00	%	○	100.00	
34.03	**P VAR UNIT**	1 ~ 32	/	○	NO	
	NO	No unit is selected (无单位)				1
	rpm	Revolutions per minute (转/ 分钟)				2
	%	Percent (百分比)				3
	m/s	Metres per second (米/ 秒)				4
	A	Ampere (安培)				5
	V	Volt (伏特)				6
	Hz	Hertz (赫兹)				7
	s	Second (秒)				8
	h	Hour (小时)				9
	kh	Kilohour (千小时)				10
	C	Celsius (摄氏度)				11
	lft	pounds per foot (标度 / 英尺)				12
	mA	Milliampere (毫安)				13
	mV	Millivolt (毫伏)				14
	kW	Kilowatt (千瓦)				15
	W	Watt (瓦特)				16
	kWh	Fahrenheit (千瓦小时)				17
	F	Fahrenheit (华氏温度)				18
	hp	Horsepower (马力)				19
	MWh	Megawatt hour (兆瓦特小时)				20
	m3h	Cubic metres per hou (立方米/ 小时)				21
	l/s	Litres per second (升/ 秒)				22
	bar	Bar (巴)				23
	kPa	Kilopascal (千帕)				24
	GPM	Gallons per minute (加仑/ 分钟)				25
	PSI	Pounds per square inch (磅/ 平方英寸)				26
	CFM	Cubic feet per minute (立方英尺/ 分钟)				27
	ft	Foot (英尺)				28
	MGD	Millions of gallons per day (百万加仑/ 天)				29
	iHg	Inches of mercury (英寸汞柱)				30
	FPM	Feet per minute (英尺/ 分钟)				31
	lbs	Pound (磅)				32

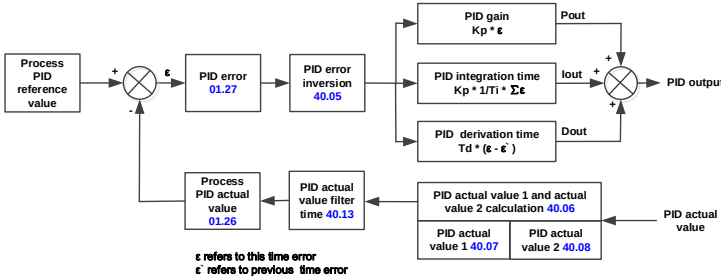
No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
34.04	**MOT SPD FILT T**	0 ~ 60000	mS	○	500	
34.05	**MOT TORQ FILT T**	0 ~ 60000	mS	○	100	
34.06	**RESET RUN TIME**	NO, YES	/	×	NO	
	NO	No reset.				1
	YES	Reset. The counter restarts from zero.				2

35 MOT TEMP MEAS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
35	MOT TEMP MEAS	Motor temperature measurement and alarm value settings.				
35.01	**MOT1 TEMP AI1**	NOT IN USE, 1*PT100, 2*PT100, 3*PT100, 1..3 PTC	/	×	NOT IN USE	
	NOT IN USE	The function is inactive.				1
	1*PT100	The function is active. The temperature is measured with one PT100 sensor. Analog output AO1 feeds constant current through the sensor. The sensor resistance increases as the motor temperature rises, as does the voltage over the sensor. The temperature measurement function reads the voltage through analog input AI1 and converts it to degrees centigrade.				2
	2*PT100	The function is active. Temperature is measured using two PT100 sensors.				3
	3*PT100	The function is active. Temperature is measured using three PT100 sensors.				4
	1..3 PTC	The function is active. The temperature is supervised using one to three PTC sensors or one to three KTY84-1xx silicon temperature sensors. Analog output AO1 feeds constant current through the sensor(s). The resistance of the sensor increases sharply as the motor temperature rises over the sensor reference temperature (Tref), as does the voltage over the resistor. The temperature measurement function reads the voltage throug input AI1 and converts it into ohms.				5
35.02	**MOT1 TEMP ALM L**	-100 ~ 5000	℃	○	110	
	Defines the alarm limit for motor 1 temperature measurement. The alarm indication is given when the limit is exceeded. Limit in °C or ohms. °C: parameter 35.01 is 1xPT100, 2XPT100, 3XPT100. Ohm: parameter 35.01 is 1...3 PTC.					
35.03	**MOT1 TEMP FLT L**	-100 ~ 5000	℃	○	130	
	Defines the alarm limit for motor 1 temperature measurement. The alarm indication is given when the limit is exceeded. Limit in °C or ohms. °C: parameter 35.01 is 1xPT100, 2XPT100, 3XPT100. Ohm: parameter 35.01 is 1...3 PTC.					
35.04	**MOT2 TEMP AI2**	NOT IN USE, 1*PT100, 2*PT100, 3*PT100, 1..3 PTC	℃	○	NOT IN USE	
	NOT IN USE	The function is inactive.				1
	1*PT100	See parameter 35.01.				2
	2*PT100	See parameter 35.01.				3
	3*PT100	See parameter 35.01.				4
	1..3*PTC	See parameter 35.01.				5
35.05	**MOT2 TEMP ALM L**	-100 ~ 5000	℃	○	110	
	Defines the alarm limit for the motor 2 temperature measurement function. The alarm indication is given when the limit is exceeded.					
35.06	**MOT2 TEMP FLT L**	-100 ~ 5000	℃	○	130	
	Defines the fault trip limit for the motor 2 temperature measurement function. The fault indication is given					

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	when the limit is exceeded.					
35.07	**MOT MOD COMP**	NO, YES, PARAM 35.08	/	×	NO	
	NO	The function is inactive.				1
	YES	The measured motor 1 temperature is used in the motor model compensation.				2
	PARAM 35.08	Motor model compensation source is defined by parameter 35.08.				3
35.08	**MOT MOD COMP PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+001.001.000	

40 PID CONTROL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
40	PID CONTROL	Process PID; speed and torque reference trimming; sleep and wake-up.				
40.01	**PID GAIN**	0.1 ~ 100.0	/	○	1.0	
	 As shown in the PID schematic block diagram, the gain part output of PID Pout = Kp * ε. Assuming that the error is 30% and the maximum speed is 1500rpm, the following table lists the relationship between Kp output and error. PID Gain / Gain part output Pout / Calculation process 1.0(Default) / 450 rpm / 1.0 * 1500 * 30% 0.5 / 225 rpm / 0.5 * 1500 * 30% 2.0 / 900 rpm / 2.0 * 1500 * 30% 20.0 / 1500（Max speed） / 20.0 * 1500 * 30% The Gain part is to react and adjust the error immediately in proportion. The larger the gain Kp, the stronger the adjustment effect. However, excessive adjustment is easy to cause output oscillation, and Kp cannot eliminate the error.					
40.02	**PID INTEG TIME**	0.00 ~ 600.00	s	○	0.50	
	The integration part output of PID Iout = Kp * 1/Ti * ∑ε. The integration time defines the rate at which the controller output changes when the error value is constant and the proportional gain of the speed controller is 1. Integration can be used to eliminate the residual deviation. The shorter the integration time, the faster the continuous error value is corrected. ☞Note: if parameter 40.02 = 0, integration part output of PID Iout = 0.					
40.03	**PID DERIV TIME**	0.00 ~ 100.00	s	○	0.00	
	The derivation part output of PID Dout = Td * (ε – ε`). Derivative action boosts the controller output if the error value changes. The longer the derivation time, the more the speed controller output is boosted during the change. If the derivation time is set to zero, the controller works as a PI controller, otherwise as a PID controller. The derivation makes the control more responsive for disturbances. For simple applications, derivative time is not normally required and should be left at zero. ☞Note: if parameter 40.03 = 0, derivative part output of PID Dout = 0.					
40.04	**PID DERIV FILT**	0.01 ~ 100.00	s	○	1.00	
	Defines the derivation filter time constant.					

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
40.05	**PID DEV INV**	NO, YES	/	○	NO	
	NO	PID error = process PID reference –process PID actual value				
	YES	PID error = -(process PID reference –process PID actual value)				
40.06	**PID ACT CALC**	ACT1，ACT1-ACT2，ACT1+ACT2，ACT1*ACT2，ACT1/ACT2，MIN(A1;A2)，MAX(A1;A2)，sqrt(A1-A2)，sqA1+sqA2	/	○	ACT1	
	ACT1	Process PID actual value = ACT1.				1
	ACT1 - ACT2	Process PID actual value = ACT1 - ACT2.				2
	ACT1 + ACT2	Process PID actual value = ACT1 + ACT2.				3
	ACT1 * ACT2	Process PID actual value = ACT1 * ACT2.				4
	ACT1/ACT2	Process PID actual value = ACT1/ACT2.				5
	MIN(A1,A2)	Process PID actual value = MIN(ACT1,ACT2)				6
	MAX(A1,A2)	Process PID actual value = MAX(ACT1,ACT2)				7
	sqrt(A1 - A2)	Process PID actual value = Square root of (ACT1 - ACT 2).				8
	sqA1 + sqA2	Process PID actual value = Square root of ACT1 + Square root of ACT2.				9
40.07	**PID ACT1 SEL**	AI1, AI2, AI3, AI5, AI6, PARAM 40.27	/	○	AI2	
	AI1	Analog input AI1.				1
	AI2	Analog input AI2.				2
	AI3	Analog input AI3.				3
	AI5	Analog input AI5.				4
	AI6	Analog input AI6.				5
	PARAM 40.25	Source selected by parameter 40.25.				6
40.08	**PID ACT2 SEL**	AI1, AI2, AI3, AI5, AI6	/	○	AI2	
	AI1	Analog input AI1.				1
	AI2	Analog input AI2.				2
	AI3	Analog input AI3.				3
	AI5	Analog input AI5.				4
	AI6	Analog input AI6.				5
40.09	**PID ACT1 MIN**	-300.00 ~ 300.00	%	○	0.00	
40.10	**PID ACT1 MAX**	-300.00 ~ 300.00	%	○	100.00	
40.11	**PID ACT2 MIN**	-300.00 ~ 300.00	%	○	0.00	
40.12	**PID ACT2 MAX**	-300.00 ~ 300.00	%	○	100.00	
40.13	**PID ACT FILT T**	0.01 ~ 10.00	s	○	0.01	
	Defines the time constant for the filter through which the actual signals are connected to the process PID controller.					
40.14	**PID INTEGRATION**	**OFF, ON, Always ON**	/			
40.15	**PID MINIMUM**	-100.00 ~ 100.00	%	○	-100.00	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	Defines the minimum limit for the PID controller output. Using the minimum and maximum limits, it is possible to restrict the operation to a certain speed range. Example: The process PID control is restricted to the forward rotation direction of the motor by setting the PID minimum limit to 0% and the maximum to 100%.					
40.16	**PID MAXIMUM**	-100.00 ~ 100.00	%	○	-100.00	1=0.01
	Defines the maximum limit for the PID controller output. Using the minimum and maximum limits, it is possible to restrict the operation to a certain speed range. See parameter 40.15.					
40.17	**TRIM MODE**	OFF, PROPORTIONAL, DIRECT	/	×	OFF	
	OFF	The trim function is deactivated.				1
	PROPORTIONAL	The trim function is active. The trimming factor is relative to the external %-reference (REF2). See parameter 11.06.				2
	DIRECT	The trim function is active. The trimming factor is relative to a fixed maximum limit used in the reference control loop (maximum speed, frequency or torque).				3
40.18	**TRIM REF SEL**	AI1， AI2，AI3，AI5，AI6，PARAM 40.19，PARAM 40.28	/	○	PARAM 40.19	
	AI1	AI1 is used as the trim reference.				1
	AI2	AI2 is used as the trim reference.				2
	AI3	AI3 is used as the trim reference.				3
	AI5	AI5 is used as the trim reference.				4
	AI6	AI6 is used as the trim reference.				5
	PARAM 40.19	Value of parameter 40.19 is used as the trim reference.				6
	PARAM 40.28	Value of parameter 40.28 is used as the trim reference.				7
40.19	**TRIM REF**	-100.00 ~ 100.00	%	○	0.00	
	When parameter 40.18 = PARAM 40.19, Value of parameter 40.19 is used as the trim reference..					
40.20	**TRIM RANGE**	-200.00 ~ 200.00	%	○	100.00	
	Parameter 40.20 is a trimming factor to correct the output of PID. The output of PID is multiplied by the trimming factor defined by parameter 40.20, and the result of the multiplication is used to multiply the result selected by parameter 40.21.					
40.21	**TRIM SELECTION**	SPEED TRIM, TORQUE TRIM	/	×	SPEED TRIM	
	SPEED TRIM	Speed reference trimming.				1
	TORQUE TRIM	Speed reference trimming				2
40.22	**SLEEP FUNC SEL**	OFF, INTERNAL, X1 ~ X12	/	○	OFF	
	Activates the sleep function and selects the source for the activation input. Valid only when when PID CTRL macro is active (parameter 99.02 = PID CTRL).					
	OFF	Sleep function is inactive.				1
	INTERNAL	Entering or exiting sleep function is defined by parameters(40.23 … 40.26)				2

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
		If the PID controller output remains below the sleep level (parameter 40.23) longer than the sleep delay (parameter 40.24), the drive decelerates to 0 and enters sleep mode. When the process actual value falls below the wake-up level (parameter 40.25), and remains there for the duration of the wake-up delay (parameter 40.46), the drive wakes up, enters PID regulation again, and the motor starts to run from the stop state.				
	X1	Digital input X1 = 1: Sleep function is active. Digital input X1 = 0: Sleep function is not active.				3
	X2	See selection X1.				4
	X3	See selection X1.				5
	X4	See selection X1.				6
	X5	See selection X1.				7
	X6	See selection X1.				8
	X7	See selection X1.				9
	X8	See selection X1.				10
	X9	See selection X1.				11
	X10	See selection X1.				12
	X11	See selection X1.				13
	X12	See selection X1.				14
40.23	**SLEEP LEVEL**	0.0~6000.0	rpm	○	900.0	
	See parameter 40.22 = INTERNAL.					
40.24	**SLEEP DELAY**	0.0~3600.0	s	○	60.0	
	See parameter 40.22 = INTERNAL.					
40.25	**WAKE UP LEVEL**	0.0~100.0	%	○	50.0	
	See parameter 40.22 = INTERNAL.					
40.26	**WAKE UP DELAY**	0.0~3600.0	s	○	30.0	
	See parameter 40.22 = INTERNAL.					
40.27	**40.07 ACT1 PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+000.000.000	
40.28	**40.18 TRIM REF PTR**	-200.00.16 ~ + 200.99.16 C.-32767 ~ C.32767	/	×	+000.000.000	

42 BRAKE CONTROL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
42	BRAKE CONTROL	Mechanical brake, used in the Crane industry.				
42.01	BRAKE CTRL	OFF, ON	/	×	OFF	
	OFF	Deactivates the mechanical brake control logic.				1
	ON	Activates the mechanical brake control logic.				2
42.02	BRK OPEN TRQ SEL	NO, AI1, AI2, AI3, AI5, AI6, PARAM 42.03, MOMORY	/	×	PARAM 42.03	
	Selects the source for the motor starting torque applied at the brake release. The value is read in percent of the motor nominal torque.					
	NO	No source selected. This is the default value.				1
	AI1	Analog input AI1.				2
	AI2	Analog input AI2.				3
	AI3	Analog input AI3.				4
	AI5	Analog input AI5.				5
	AI6	Analog input AI6.				6
	PARAM 42.03	Defined by parameter 42.03 .				7
	MOMORY	The motor torque stored at the previous brake close command.				8
42.03	BRK OPEN TRQ	-300.00 ~ 300.00	%	○	10.00	
	Defines the motor starting torque at brake release if parameter 42.02 = PARAM 42.03.					
42.04	BRK OPEN DELAY	0.00 ~ 60.00	s	○	0.00	
	Defines the brake open delay, ie. the delay between the internal open brake command and the release of motor speed control. The delay timer starts when the drive has magnetized the motor and increased the motor torque to the level required for brake release (parameters 42.02). Simultaneously with the timer start, the brake control logic energizes the brake control output and the brake starts to open. Set this parameter to the value of mechanical opening delay specified by the brake manufacturer.					
42.05	BRK CLS SPD ABS	0.0~1500.0	RPM	○		
	Defines the brake close speed as an absolute value. If the motor actual speed has fallen below the set level (parameter 42.05) after the drive has received the stop command, a brake close command is given and keep the drive running remains the duration of the brake close delay time (parameter 42.06). This function is used to avoid the situation that the brake cannot close in time due to the delay of mechanical brake closing.					
42.06	BRK CLS DELAY T	0.00 ~ 60.00	s	○	0.50	
	See parameter 42.05.					
42.07	EXTEND RUN TIME	0 ~ 60.00	s	○	0.50	
	Defines an extended run time for the brake control function at stop. After the brake is closed, the drive remains in RUN for the duration set in parameter 42.07. During the delay, the motor is kept magnetised and ready for an immediate restart.					
42.08	LOW REF BRK HOLD	0.0 ~ 60.00	s	○	0.0	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	0.00s = inactive. 0.01 … 60.00 s = active. When the absolute value of the motor speed reference falls below the brake close speed: The brake hold delay counter starts. The brake is closed according to normal stop mode of the brake control function. During the delay, the function keeps the brake closed despite of the speed reference value and the value of start command. When the set delay has passed, the normal operation resumes.					
42.09	**TRQ PROVE TIME**	0.00 ~ 60.00	s	○	2.00	
	After the drive receives the start command, if the output torque of the motor reaches the brake open torque (parameter 42.02), then the conditions for opening the brake are met, and then the brake is opened. The timer counts the drive receives the start command. If the torque does not reach the brake open torque and the duration reaches the time defined in parameter 42.09, the torque prove fault will be reported.					
42.10	**MEMORY TRQ**	0.00~655.35	%	*	0.00	
	Displays the torque (in percent) at the instant of the previous brake close command. If parameter 44.02 = MOMORY, this value can be used as a reference for the brake open torque. However, if the memory value is less than parameter 42.03, the current torque memory value will be ignored, and the value of parameter value 42.03 will be used as a reference for the brake open torque.					
42.11	**BRK ACKN SEL**	OFF, X5, X6, X11, X12	/	○	关闭	
	Parameter 42.11 is used to activate external brake open/close status supervision and select the source for the signal. The use of the external on/off supervision signal is optional. If an external brake is active, the setting steps are as follows: ◆ Set parameter 42.11 to activate the supervision and select the signal source; ◆ When the command to control the brake is open (ON), the input signal of brake feedback should also be open (ON); When the command to control the brake is closed (OFF), the input signal of brake feedback should also be closed (OFF); ◆ If the command to control the brake is inconsistent with the brake feedback, after exceeding the brake feedback delay time defined in parameter 42.13 BRK ACKN DELAY, the drive reacts as defined by parameter 42.12 BRK ACKN FLT.					
	OFF	Deactivates external brake open/close status supervision.				1
	X5	Activates external brake open/close status supervision. Digital input X5 is the signal source. X5 = 1: The brake is open. X5 = 0: the brake is closed.				2
	X6	See selection X5				3
	X11	See selection X				4
	X12	See selection X5				5
42.12	**BRK ACKN FLT**	FAULT, WARNING	/	○	故障	
	FAULT	The drive trips on a fault: fault indication, drive stops the motor and a close command is given immediately.				1
	WARNING	The drive generates a warning, but not stop.				2

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
42.13	**BRK ACKN DELAY**	0.00 ~ 60.00	s	○	0.50	
	See parameter 42.11.					1=10ms

50 ENCODER MODULE

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
50	ENCODER MODULE	Encoder parameters setting				
50.01	**PULSE NR**	1 ~ 65535	ppr	×	1024	
	The parameter shall be set correctly according to the nameplate of the encoder if motor control with encoder is active. ☞ Note: speed calculation mode parameter 50.06 = ENCODER to activate motor control with encoder.					
50.02	**SPEED MEAS DIR**	NOT INVERT，INVERT	/	×	NOT INVERT	
	The factory setting is NOT INVERT. Sometimes, the direction of the motor is opposite to the direction of the encoder pulse input, resulting in the wrong direction of the measured speed. Set parameter 50.02 = INVERT to switch the direction of the encoder pulse input so that it matches the motor direction. ☞ Note: If any two phase motor cable is replaced after commissioning, this parameter must be changed.					
	NOT INVERT	NOT INVERT				1
	INVERT	INVERT				2
50.03	**ENCODER FAULT**	WARNING, FAULT	/	×	WARNING	
	The parameter 50.03 defines the operation of the drive if the drive detects the encoder signal is abnormal. If the encoder signal abnormal time exceeds the time set by parameter 50.04, will give an alarm or report a fault according to the operation set by parameter 50.03. Encoder supervision function activates if either of the following conditions is valid: ◆ The difference between estimated and measured speed is greater than 20% of the motor nominal speed. ◆ No pulses are received from the encoder within the defined time (see parameter 50.04) and the drive is simultaneously at current or torque limit.					
	WARNING	The drive generates a warning indication.				1
	FAULT	The drive trips on a fault, gives a fault indication and stops the motor.				2
50.04	**ENCODER DELAY**	0 ~ 6000	s	○	0	
	See parameter 50.03					
50.05	**ENCODER CHANNEL**	CH1， CH2	/	×	CH1	
50.06	**SPEED FB SEL**	INTERNAL, ENCODER	/	×	INTERNAL	
	INTERNAL	Calculated speed estimate				1
	ENCODER	Actual speed measured with an encode				2
50.07	**ENC CABLE CHECK**	NO，WARNING，FAULT	/	×	NO	
	NO	No action				1
	WARNING	Drive generates warning Encoderfail.				2
	FAULT	Drive trips on fault Encoderfail.				3

52 MODBUS-RTU/NET

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
52	MODBUS-RTU/NET	MODBUS-RTU configuration; ENET configuration				
52.01	**STATION NUMBER**	0 ~ 240	/	×	1	
	Defines the MODBUS-RTU address of the drive. The broadcast address is "0", address range is "1 ~ 240". Two units with the same address are not allowed on-line.					1=1
52.02	**BAUDRATE**	2400， 4800， 9600，19200 38400，57600，115200	bps	×	19200	
	2400	2400 bit/s				1
	4800	4800 bit/s				2
	9600	9600 bit/s				3
	19200	19200 bit/s				4
	38400	38400 bit/s				5
	57600	57600 bit/s				6
	115200	115200 bit/s				7
52.03	**PARITY**	NONE1STOPBIT, NONE2STOPBIT, ODD, EVEN	/	×	NONE1STOPBIT	
	NONE1STOPBIT	No parity, 8 data bits, 1 stop bit				1
	NONE2STOPBIT	No parity, 8 data bits, 2 stop bits				2
	ODD	Odd parity indication bit, 8 data bits, 1 stop bit				3
	EVEN	Even parity indication bit, 8 data bits, 1 stop bit				4
52.04	IP xxx .* . * . *	0 ~ 255	/	×	192	
52.05	IP * . xxx .* . *	0 ~ 255	/	×	168	
52.06	IP * . *. xxx . *	0 ~ 255	/	×	0	
52.07	IP * . * . * . xxx	0 ~ 255	/	×	252	

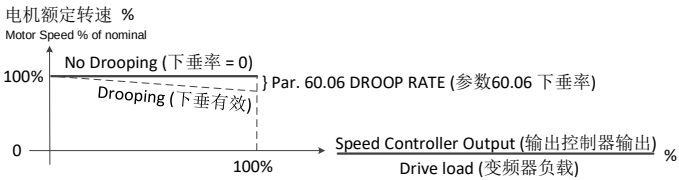
53 KEYPAD SETTING

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
53	KEYPAD SETTING	Keypad backlight and contrast setting.				
53.02	**BACKLIGHT**	AUTO ADJUST, ALWAYS ON, ALWAYS OFF	/	○	AUTO ADJUST	
53.03	**CONTRAST**	18 ~ 34	/	○	24	

60 MASTER/FOLLOWER

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
60	MASTER/FOLLOWER	Master/Follower application				
60.01	**MASTER/FOLLOWER**	NOT IN USE，MASTER，FOLLOWER，STANDBY	/	×	NOT IN USE	
	NOT IN USE	The Master/Follower link is not active.				1
	MASTER	The drive runs in the master mode, sending control signals, speed, and torque to the follower.				2
	FOLLOWER	The drive runs in the follower mode, receiving control signals, speed, and torque from the master.				3
	STANDBY(reserved)	The drive runs in the follower mode, receiving signal through a field bus communication.				4
60.02	**TORQUE SEL**	1 ~ 8	/	×	TORQUE	
	Selects the torque reference source used in motor torque control (99.02 = T-CTRL). ☞ **Note：** External control location 2 (EXT2) must be active to enable torque selector.					
	ZERO	This selection forces the output of the torque selector to zero.				1
	SPEED	The follower speed controller output is used as a reference for motor torque control. The drive is speed-controlled. SPEED can be used both in the Follower and in the Master if ◆ the motor shafts of the Master and Follower are connected flexibly. (A slight speed difference between the Master and the Follower is possible/allowed.) ◆ drooping is used (see parameter 60.06).				2
	TORQUE	The drive is torque-controlled. The selection is used in the Follower(s) when the motor shafts of the Master and Follower are coupled solidly to each other by gearing, a chain or other means of mechanical power transmission and no speed difference between the drives is allowed or possible. Note: If TORQUE is selected, the drive does not restrict the speed variation as long as the speed is within the limits defined by parameters 20.01 and 20.02.				3
	MINIMUM	The torque selector compares the direct torque reference and the speed controller output, and the smaller of them is used as the reference for the motor torque control. MINIMUM is selected in special cases only.				4
	MAXIMUM	The torque selector compares the direct torque reference and the speed controller output and the greater of them is used as the reference for the motor torque control. MAXIMUM is selected in special cases only.				5
	ADD	The torque selector adds the speed controller output to the direct torque reference. The drive is torque-controlled in the normal operating range. The selection ADD, together with the window control, forms a speed supervision function for a torque-controlled Follower drive. See parameter 60.03.				6
	SPEEDLIM1	The drive is torque-controlled, the speed rererence direction is determined by the torque direction.				7
	SPEEDLIM2	The drive is torque-controlled, the speed rererence direction is determined by the torque direction.				8

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
60.03	**WINDOW SEL ON**	NO, YES	/	×	NO	
	Activates the Window control function. The Window control, together with selection ADD at parameter 60.02, forms a speed supervision function for a torque-controlled drive. The parameter is visible only when parameter 99.02 is T-CTRL. External control location 2 (EXT2) must be active to enable window control.					
	NO	Inactive				1
	YES	Window control is active. Selection YES is used only when parameter 60.02 has value ADD. Window control supervises the speed error value (Speed Reference - Actual Speed). In the normal operating range, window control keeps the speed controller input at zero. The speed controller is evoked only if: ◆ the speed error exceeds the value of parameter 60.04 or ◆ the absolute value of the negative speed error exceeds the value of parameter 60.05. When the speed error moves outside the window, the exceeding part of the error value is connected to the speed controller. The speed controller produces a reference term relative to the input and gain of the speed controller (parameter 23.01) which the torque selector adds to the torque reference. The result is used as the internal torque reference for the drive. Example: In a load loss condition, the internal torque reference of the drive is decreased to prevent an excessive rise of the motor speed. If window control were inactivated, the motor speed would rise until a speed limit of the drive were reached.				2
60.04	**WIN WIDTH POS**	0.0 ~ 1500.0	RPM	×	0.0	
	Defines the supervision window width above the speed reference. See parameter 60.03.					
60.05	**WIN WIDTH NEG**	0.0 ~ 1500.0	RPM	×	0.0	
	Defines the supervision window width below the speed reference. See parameter 60.03.					
60.06	**DROOP RATE**	0 ~ 1000	%	×	0	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	When multiple drives jointly drive a same load, droop rate function can automatically distribute the load among the drives and work together. For example, several drives drive a pipeline. This function can be used to balance the load, so that the drives of different power levels can share the load in proportion to ensure the normal operation of the production line. Each drive automatically adjusts its output according to its own load condition and the droop rate setting. The drooping prevents a conflict between the Master and the Follower by allowing a slight speed difference between them. The drooping slightly decreases the drive speed as the drive load increases. The actual speed decrease at a certain operating point depends on the droop rate setting and the drive load (= torque reference / speed controller output). At 100% speed controller output, drooping is at its nominal level, i.e. equal to the value of the DROOP RATE. The drooping effect decreases linearly to zero along with the decreasing load. Speed Decrease = Speed Controller Output * Drooping * Nominal Speed Example: Speed Controller output is 50%, DROOP RATE is 1%, nominal speed of the drive is 1500 rpm. Speed decrease = 0.50 * 0.01 * 1500 rpm = 7.5 rpm  ☞ **Note**：The droop rate needs to be set both for the Master and the Follower, is enabled only if both the Master and the Follower are speed-controlled.					
60.07	**MASTER SPD PTR**	+ 000.000.00 ~ + 200.99.16 C. - 32767 ~ C. 32767	/	×	+002.002.00	
60.08	**MASTER TORQ PTR**	+ 000.000.00 ~ + 200.99.16 C. - 32767 ~ C. 32767	/	×	+002.005.00	

72 USER LOAD CURVE

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
72	USER LOAD CURVE	The user load curve parameters setting				
72.01	OVERLOAD FUNC	NO, WARNING, FAULT, LIMIT, CURR LIM AND WARN	/	×	NO	
	Activates the user load curve and selects how the drive reacts when the user load curve has been exceeded.					
	NO	User load curve is inactive.				1
	WARNING	The drive generates a warning USERLOADCUR and the output current is not limited.				2
	FAULT	The drive trips on a fault USERLOADCUR.				3
	LIMIT	Drive output current is limited to $I_{user\ curve}$				4
	CURR LIM AND WARN	The drive generates a warning USERLOADCUR and the output current is limited to $I_{user\ curve}$				5
72.02	**LOAD CURR 1**	0 ~ 800	%	×	500	
	Defines the first current point of the load curve at the frequency defined by par. 72.10 LOAD FREQ 1. Value in percent of the nominal motor current.					
72.03	**LOAD CURR 2**	0 ~ 800	%	×	500	
	Defines the second current point of the load curve at the frequency defined by par. 72.11 LOAD FREQ 2. Value in percent of the nominal motor current.					
72.04	**LOAD CURR 3**	0 ~ 800	%	×	500	
	Defines the third current point of the load curve at the frequency defined by par. 72.12 LOAD FREQ 3. Value in percent of the nominal motor current.					
72.05	**LOAD CURR 4**	0 ~ 800	%	×	500	
	Defines the fourth current point of the load curve at the frequency defined by par. 72.13 LOAD FREQ 4. Value in percent of the nominal motor current.					
72.06	**LOAD CURR 5**	0 ~ 800	%	×	500	
	Defines the fifth current point of the load curve at the frequency defined by par. 72.14 LOAD FREQ 5. Value in percent of the nominal motor current.					
72.07	**LOAD CURR 6**	0 ~ 800	%	×	500	
	Defines the sixth current point of the load curve at the frequency defined by par. 72.15 LOAD FREQ 6. Value in percent of the nominal motor current.					
72.08	**LOAD CURR 7**	0 ~ 800	%	×	500	
	Defines the seventh current point of the load curve at the frequency defined by par. 72.16 LOAD FREQ 7. Value in percent of the nominal motor current.					
72.09	**LOAD CURR 8**	0 ~ 800	%	×	500	
	Defines the eighth current point of the load curve at the frequency defined by par. 72.17 LOAD FREQ 8. Value in percent of the nominal motor current.					
72.10	**LOAD FREQ 1**	0 ~ par.72.11	%	○	0	
	Defines the first frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.11	**LOAD FREQ 2**	par. 72.10 ~ par. 72.12	%	○	20	
	Defines the second frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.12	**LOAD FREQ 3**	par. 72.11 ~ par. 72.13	%	○	40	
	Defines the third frequency point of the load curve. Value in percent of the nominal motor frequency.					

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
72.13	**LOAD FREQ 4**	par. 72.12 ~ par. 72.14	%	○	60	
	Defines the fourth frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.14	**LOAD FREQ 5**	par. 72.13 ~ par. 72.15	%	○	80	
	Defines the fifth frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.15	**LOAD FREQ 6**	par. 72.14 ~ par. 72.16	%	○	100	
	Defines the sixth frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.16	**LOAD FREQ 7**	par. 72.15 ~ par. 72.17	%	○	130	
	Defines the seventh frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.17	**LOAD FREQ 8**	par. 72.16 ~ 800	%	○	150	
	Defines the eight frequency point of the load curve. Value in percent of the nominal motor frequency.					
72.18	**LOAD CURR LIM**	10.0 ~ 800.0	%	○	500.0	
	Value in percent of the nominal motor current (99.09 MOT NOM CURR) Defines the motor overload current. Value is used by the overload integrator. If the continuous motor load capacity (i.e. the defined user load curve) is not 100% at the nominal frequency, calculate the overload current using the following equation: $72.18\ \text{LOAD CURR LIM} = \sqrt{I^2_{\text{OVERLOAD}} - I^2_{\text{USER CURVE}} + 100^2}$ Where $I_{overload}$ is the motor overload and $I_{user\ curve}$ is the current defined by the user load curve at the nominal frequency. User load curve is defined by parameters 72.02…72.17. **Example**: Motor overload capacity is 150% of the nominal current for 10 s / 10 min and the continuous load capacity is 80% at the nominal frequency: $72.18\ \text{LOAD CURR LIM} = \sqrt{150^2 - 80^2 + 100^2} = 162\%$ 72.19 LOAD THERMAL TIME = 10 s 72.20 LOAD COOLING TIME = 590 s					
72.19	**LOAD THERM TIME**	0.0 ~ 999.9	S	○	1.0	
	Defines the overload time. Value is used by the overload integrator. See the example given for par. 72.18 LOAD CUR LIM. If the value is set to zero, the drive output current is limited to the user load curve defined by parameters 72.02…72.17.					
72.20	**LOAD COOL TIME**	0 ~ 9999	S	○	1	
	Defines the cooling time. The output of the overload integrator is set to zero if the current stays continuously below the user load curve for the defined cooling time 72.20.					

83 ADAPT PROG CTRL

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
83	**ADAPT PROG CTRL**	Control of the Adaptive Program execution				
83.01	**ADAPT PROG CMD**	STOP, RUN, EDIT	/	×	STOP	
	STOP	Stop. The program cannot be edited.				1
	RUN	Run. The program cannot be edited.				2
	EDIT	Stop to edit mode. Program can be edited.				3
83.02	**EDIT COMMAND**	NO，PUSH，DELETE，PROTECT，UNPROTECT	/	×	NO	
	Selects the command for the block placed in the location defined by parameter 83.03. The program must be in editing mode (see parameter 83.01).					
	NO	Home value. The value automatically restores to NO after an editing command has been executed.				1
	PUSH	Shifts the block in location defined by parameter 83.03 and the following blocks one location up. Then the block location defined by parameter 83.03 is emptied, and a new block can be added in this emptied location. For example, a new block needs to be placed in the current block number five (parameters 84.23…84.27). In order to do this: ◆ Set parameter 83.01 = EDIT. ◆ Set parameter 83.03 = 5. ◆ Set parameter 83.02 = PUSH. The blocks from location number 5 to location number 14 are moved to from location number 6 to location number 15. Then the block in location number 5 will be emptied. ◆ Program the emptied location number 5 by parameters 84.23 to 84.27.				2
	DELETE	Deletes the block in location defined by parameter 83.03 and shifts the following blocks one step down. For example, delete the block in location 5 (parameters 84.23… 84.27). In order to do this: ◆ Set parameter 83.01 = EDIT. ◆ Set parameter 83.03 = 5. ◆ Set parameter 83.02 = DELETE. The blocks from location number 6 to location number 15 are moved to from location number 5 to location number 14. Then the block in location number 15 will be emptied.				3
	PROTECT	Activation of the Adaptive Program protection. Activate as follows: ◆ Set parameter 83.01 = EDIT. ◆ Set parameter 83.05 = ***** (Set the password) ◆ Set 83.02 = PROTECT，all parameters in group 84 are hidden. ☞ **Note:** Please remember the set password.				4
	UNPROTECT	Inactivation of the Adaptive Program protection. Inactivate as follows: ◆ Set parameter 83.01 = EDIT. ◆ Set parameter 83.05 = ***** (enter the previously encrypted password) ◆ Set parameter 83.02 = UNPROTECT, all parameters in group 84 are displayed.				5
83.03	**EDIT BLOCK**	1 ~ 15	/	○	1	
83.04	**TIMELEVEL SEL**	12ms，100ms，1000ms	/	×	12ms	
83.05	**PASSCODE**	0 ~ 65535	/	○	0	

84 ADAPTIVE PROG

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
84	ADAPTIVE PROG	Selections of the function blocks and their input connections.				
84.01	**STATUS**	0 ~ 65535	/	*	0	
	Shows the value of the Adaptive Program status word. The table below shows the alternative bit states and the corresponding values on the keypad display.					

Bit	Display	Meaning
0	1	Stopped
1	2	Running
2	4	Faulted
3	8	Editing
4	10	Checking
5	20	Pushing
6	40	Popping
8	100	Initialising

84.02	**FAULTED PAR**	0 ~ 65535	/	*	0	
84.03	**BLOCK1**	1 ~ 26	/	×	NO	
	Selects the function block for Block Parameter Set 1					
	NO	No function				1
	AND					2
	OR					3
	XOR					4
	SR					5
	TRIGG					6
	SWITCH-B					7
	TON					8
	TOFF					9
	ADD					10
	ABS					11
	MULDIV					12
	FILTER					13
	PI					14
	PI-BAL					15
	COMPARE					16
	MAX					17
	MIN					18
	SWITCH-I					19
	EVENT					20
	COUNT					21
	RAMP					22
	DPOT					23
	MASK-SET					24
	PI BIPOLAR					25
	BITWISE					26

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
84.04	**BLOCK1 INPUT1**	-255.255.31 ~ +255.255.31 C.-32768 … C.32767	/	×	+000.00 0.00	
	Selects the source for input I1 of Block Parameter Set 1. Parameter index or a constant value: ◆ Parameter pointer: Inversion, group, index and bit fields. The bit number is effective only for blocks handling boolean inputs. ◆ Constant value: Inversion and constant fields. Inversion field must have value C to enable the constant setting.					
84.05	**BLOCK1 INPUT2**	-255.255.31 ~ +255.255.31 C.-32768 … C.32767	/	×	+000.00 0.00	
84.06	**BLOCK1 INPUT3**	-255.255.31 ~ +255.255.31 C.-32768 … C.32767	/	×	+000.00 0.00	
84.07	**BLOCK1 OUTPUT**	-32768 ~ 32767	/	*	0	
84.08	**BLOCK2 INPUT1**	-255.255.31 ~ +255.255.31 C.-32768 … C.32767	/	×	+000.00 0.00	
…	**…**					
84.77	**BLOCK15 OUTPUT**	-32768 ~ 32767	/	*	0	

85 USER CONSTANTS

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
85	USER CONSTANTS	Storage of the Adaptive Program constants and messages.				
85.01	**CONSTANT1**	-32768 ~ 32767	/	○	0	
85.02	**CONSTANT2**	-32768 ~ 32767	/	○	0	
85.03	**CONSTANT3**	-32768 ~ 32767	/	○	0	
85.04	**CONSTANT4**	-32768 ~ 32767	/	○	0	
85.05	**CONSTANT5**	-32768 ~ 32767	/	○	0	
85.06	**CONSTANT6**	-32768 ~ 32767	/	○	0	
85.07	**CONSTANT7**	-32768 ~ 32767	/	○	0	
85.08	**CONSTANT8**	-32768 ~ 32767	/	○	0	
85.09	**CONSTANT9**	-32768 ~ 32767	/	○	0	
85.10	**CONSTANT10**	-32768 ~ 32767	/	○	0	
85.11	**MESSAGE1**	1 ~ 1	/	○	1	
85.12	**MESSAGE2**	2 ~ 2	/	○	1	
85.13	**MESSAGE3**	3 ~ 3	/	○	1	
85.14	**MESSAGE4**	4 ~ 4	/	○	1	
85.15	**MESSAGE5**	5 ~ 5	/	○	1	

95 HARDWARE SPECIF

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
95	HARDWARE SPECIF	Control of cooling fan; active IGBT supply unit parameters.				
95.01	**FAN CTRL MODE**	ON DURING RUN, ALWAYS ON, AUTO CTRL	/	×	ON DURING RUN	
	ON DURING RUN	Parameter 95.01 = ON DURING RUN, The cooling fan start/stop is controlled by drive run command and heat sink temperature. The cooling fan runs when the drive is running; and the fan runs when the heatsink temperature is higher than 40℃, even the drive is in stopped state.				1
	ALWAYS ON	Parameter 95.01 = ALWAYS ON, the cooling fan runs when the drive is powered.				2
	AUTO CTRL	Parameter 95.01 = AUTO CTRL, the cooling fan is controlled by the heat sink temperature. The cooling fan runs when the heatsink temperature is higher than 40℃ and stops when the heatsink temperature is lower than 40℃.				3
95.02	**AFE CTRL MODE**	Udc CTRL，Pdc CTRL，Idc CTRL	/	×	Udc CTRL	
	Udc CTRL	Control the voltage of the DC bus, Udc.				1
	Pdc CTRL	Control the power of the DC bus, Pdc.				2
	Idc CTRL	Control the current of the DC bus, Idc.				3
95.03	**AFE Udc REF**	250 ~ 1000	V	○	650	
	DC voltage reference when parameter 95.02 = Udc CTRL.					
95.04	**AFE Pdc REF**	-1000.0 ~ 1000.0	kW	○	0.0	
	DC power reference when parameter 95.02 = Pdc CTRL.					
95.05	**AFE Idc REF**	-1000.0 ~ 1000.0	A	○	0.0	
	DC current reference when parameter 95.02 = Idc CTRL.					
95.06	**AFE reactive current**	-200.0 ~ 200.0	A	○	0.0	
95.07	**AFE voltage loop proportion**	0.00 ~ 200.00	/	○	1.50	
	The proportion determines the adjustment intensity. The larger the proportion setting is, the stronger the adjustment intensity is. However, too large proportion will easily to cause output oscillation.					
95.08	**AFE voltage loop integration**	0.1 ~ 2000.0	mS	○	1.6	
	The integration determines the speed of adjustment. The smaller the integration setting is, the stronger the adjustment intensity is. However, too small the integration will easily to cause output oscillation.					
95.09	**AFE DC bus voltage upper limit**	560 ~ 1200	V	○	720	
	The maximum allowable DC bus voltage during control.					
95.10	**AFE DC bus voltage lower limit**	460 ~ 1200	V	○	600	
	The minimum allowable DC bus voltage during control.					
95.11	**AFE power loop**	0.00 ~ 200.00	/	○	1.50	

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	proportion					
	The proportion determines the adjustment intensity. The larger the proportion setting is, the stronger the adjustment intensity is. However, too large proportion will easily to cause output oscillation.					
95.12	**AFE power loop integration**	0.1 ~ 2000.0	mS	○	1.6	
	The integration determines the speed of adjustment. The smaller the integration setting is, the stronger the adjustment intensity is. However, too small the integration will easily to cause output oscillation.					
95.13	**AFE DC bus voltage filter time**	0.0 ~ 60.0	mS	○	0.0	
	Filter time of bus voltage.					
95.14	**AFE L1 inductance**	0.000 ~ 65.535	mH	○	0.000	
	This parameter is used to set the inductance of the L1 of the current LCL filter of AFE. Please set according to the actual LCL filter parameters.					
95.15	**AFE angle compensation**	-30 ~ 30	°	○	0	

99 START-UP DATA

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
99	**START-UP DATA**	Language selection; application macro selection; restore parameters to factory settings; motor control mode; motor parameters setting and identification.				
99.01	**Language 语言**	中文，ENGLISH	/	×	中文	
	中文	操作键盘的显示语言为中文。				1
	ENGLISH	The display language of the keypad is English.				2
99.02	**APPL MACRO**	1 ~ 9	/	×	FACTORY	
	FACTORY	FACTORY macro is applicable to simple speed regulation applications. The START/STOP command reference is defined by external control location (EXT1), and the speed reference is defined by EXT1 and constant speed.				1
	HAND/AUTO	HAND/AUTO macro is applicable to applications where two external control devices are used, the selection between the control locations(EXT1 or EXT2) is done through digital input				2
	PID-CTRL	Process PID control macro is applicable for process control applications.				3
	T-CTRL	T-CTRL macro is applicable to applications in which torque control of the motor is required.				4
	SEQ CTRL	SEQ CTRL macro is applicable to applications where multiple constant speeds need to be switched through digital input.				5
99.03	**APPL RESTORE**	NO, YES	/	×	NO	
	NO	No action				1
	YES	Restores the original settings of the active application macro (99.02), Exceptions: parameters settings in parameter group 99 remain unchanged. After the restore operation is completed, parameter 99.03 = NO automatically.				2
99.04	**MOT CTRL MODE**	DTC，SCALAR	/	×	DTC	
	DTC	The direct torque control (DTC) mode is applicable for most applications. It has excellent speed and torque control performance, not only has high speed stabilization accuracy, but also has high torque control accuracy. When an encoder is used for motor speed feedback, DTC mode must be selected.				1

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	SCALAR	Scalar control is applicable to special applications that the DTC cannot be applied. Scalar control must be used in the following special applications: ◆ One drive drives multiple motors; ◆ The rated current of the drive is greater than the rated current of the motor (more than 6 times); ◆ The drive is used as power supply, or where the drive output frequency and output voltage need to be changed; ◆ The drive is used for test purposes with no motor connected. The outstanding motor control accuracy of the DTC cannot be achieved in scalar control. There are some standard features that are disabled in the scalar control mode: ◆ Speed limits(parameter 20.01, 20.02); ◆ Torque Limits (parameter 20.04，20.13，20.14，20.15，20.16，20.17，20.18，20.19，20.20，20.21); ◆ DC Magnetizing (parameter 21.01), DC Hold (parameter 21.04); ◆ Speed Controller(parameter group 23); ◆ Torque Control(parameter group 24); ◆ Flux Optimization (parameter 26.01), Flux Braking (parameter 26.02); ◆ Motor Stall Protection (parameter 30.10, 30.11, 30.12), Underload Function (parameter 30.13, 30.14, 30.15), Motor Phase Loss Protection (parameter 30.16); ◆ Motor Identification Run (parameter 99.10).				2
99.05	MOT NOM VOLT	10 ~ 1500	V	×	380V	
	Please set parameter 99.05 according to the motor nameplate.					
99.06	MOT NOM POWER	0.1 ~ 6553.5	kW	×	Model dependent	
	Please set parameter 99.06 according to the motor nameplate. If several motors are connected to the drive, please set the total rated power of the motors.					
99.07	MOT NOM FREQ	0.1 ~ 6553.5	Hz	×	50.00	
	Please set parameter 99.07 according to the motor nameplate.					
99.08	MOT NOM SPEED	0 ~ 65535	RPM	×	1500	
	Please set parameter 99.08 according to the motor nameplate.					
99.09	MOT NOM CURR	0.1 ~ 6553.5	A	×	Model dependent	
	Please set parameter 99.09 according to the motor nameplate. If several motors are connected to the drive, please set the total rated current of the motors.					
99.10	ID RUN MODE	NO, Static, Dynamic	/	×	NO	
	By performing motor identification, determine the key motor parameters that affect the operation and control of the drive. These motor parameters will be automatically saved in the drive memory after the identification is completed, until the next parameters is changed or motor identification again. Motor parameters dentification steps: ◆ Set motor parameters 99.05 … 99.09 correctly according to motor nameplate; ◆ Set appropriate acceleration and deceleration time; ◆ Select motor identification mode by parameter 99.10:					

No.	Name/ Description/Selection	Range	Unit	Attribute	Default	FbEq
	Static: Press the RUN key to automatically measure the motor parameters 99.11…99.14. Dynamic: Press the RUN key to automatically measure the motor parameters 99.11…99.15. ◆ Press the RUN key to start motor parameters identification. ◆ After the identification process is completed, the parameter 99.10 = NO automatically. **Note**: ● The static identification can be used when the motor is loaded and it is not possible to remove the load from the motor shaft. ● The motor must be free from load for dynamic identification. The dynamic identification first performs a static identification, before rotating the motor at 70% of rated speed in the forward direction for several seconds, please be careful.					
	NO	No action				1
	Static	◆ If the motor cannot be disconnected from the load, please select static identification. ◆ If the drive power does not match the motor power (the rated current of the drive is more than 6 times of the rated current of the motor), motor data static identification should be selected. Before identification, manually change the no-load current parameter 99.15 to about 40% of the motor rated current 99.09.				2
	Dynamic	◆ If the motor can be disconnected from the load, please select dynamic identification. ◆ Make sure that the motor is in the standstill status when starting dynamic identification. If there is over current or over voltage fault during the data identification process, please prolong the acceleration and deceleration time properly. ⚠ Note: The motor will rotate during dynamic identification, please pay attention to safety during identification!				3
99.11	**MOTOR Rs**	0.001 ~ 65.535	ohm	×	Model dependent	
99.12	**MOTOR Rr**	0.001 ~ 65.535	ohm	×	Model dependent	
99.13	**MOTOR Ls**	0.001 ~ 65.535	mH	×	Model dependent	
99.14	**MOTOR Lm**	0.01 ~ 655.35	mH	×	Model dependent	
99.15	**MOTOR I0**	0.1 ~ 6553.5	A	×	Model dependent	
99.16	**MOTOR J**	0.001 ~ 65.535	kg*m^2*10	×	Model dependent	

Chapter 6 Diagnostics

6.1 Fault Indications

This chapter lists all the faults messages including the possible causes and corrective actions. If the drive faults, the drive output is disabled so that the drive stops controlling the motor, and the following fault code will be displayed on the keypad, the fault relay contact output operates too.

For details, refer to the following table to identify and correct the cause of the fault.

For damages on units or questions that cannot be resolved, please contact with local distributors/agents, service centers or manufacturer for solutions.

Fault No.	Fault display on keypad	Fault description	Causes	What to do
1	Shortcircuit	Short-circuit in motor cable(s) or motor	Short-circuit in motor cable(s) or motor.	Use a multimeter to measure the drive output for short-circuit or earth fault
				Check motor and motor cable for short-circuit or earth fault.
				Check whether motor insulation resistance in the normal range Check the drive output for short-circuit or earth fault
2	Overcurrent	Excessive output current.	Power supply voltage too low.	Check the power supply voltage.
			Direct start during motor flying.	Make sure the motor is stopped before starting.
			Load inertia is too high.	Extended acceleration time.
			Motor parameters are not correctly.	Set motor parameters correctly.
			Voltage boost setting too high.	Set voltage boost parameter correctly.
			Acceleration time too short.	Extended acceleration time
			Incorrect VF curve setting.	Adjust V/F curve and voltage boost.
			Drive and motor does't match.	Check whether motor and drive are correctly matched.
			Incorrect model selection.	Check the driven load for an overload condition.
3	DCOvervaltage	Excessive DC bus voltage.	The motor has earth fault.	Check motor and motor cable for earth fault.
			Abnormal input power supply.	Check the power supply voltage.
			Load inertia is too high.	Extend the deceleration time. Use appropriate dynamic braking unit.
			Deceleration time too short.	Extended deceleration time。
			Incorrect selection of braking or regenerative components.	Correct selection of braking chopper (braking unit) and braking resistor or regerative braking unit.
4	IGBT hot	Drive IGBT temperature is excessive.	Ambient over−temperature	Reduce ambient temperature and strengthen ventilation and heat dissipation.
			Blockage of air duct	Check heatsink fins for dust pick-up. Clean the dust, cotton wool and other sundries in the air duct.

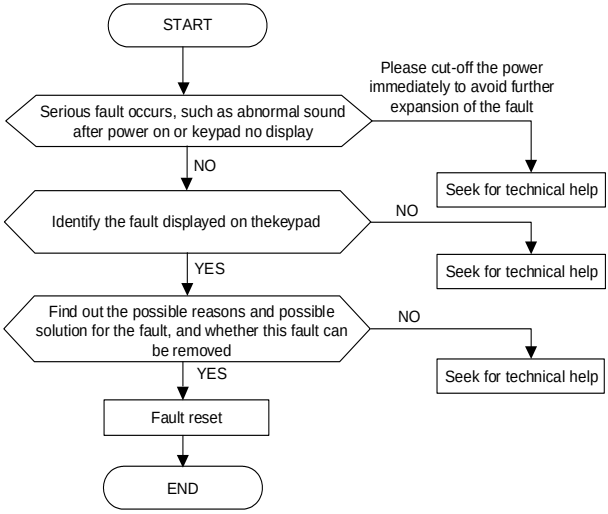
Fault No.	Fault display on keypad	Fault description	Causes	What to do
			Fan failure	Check air flow and fan operation Check whether the cable is connected properly Replace the fan of the same model
			Abnormal Inverter module	Check power semiconductors (IGBTs). Seek for technical support.
			Abnormal Rectifier module	Check Rectifier Bridge. Seek for technical support.
			Temperature detect circuit failure	Replace drive board. Seek for technical support
5	Earthfault	Drive has detected load unbalance typically due to earth fault in motor or motor cable.	Serious external interference signal	Ask professional technicians to find the interference source and deal with it
			Wrong wiring.	Check the motor wiring and cable.
			Abnormal motor	Replace a motor Measure insulation resistances of motor and motor cable.
			Abnormal Inverter module	Check power semiconductors (IGBTs). Seek for technical support.
			The ground leakage current at the output side is too large	Seek for technical support.
6	ThermistorER	Motor temperature is excessive. Motor thermal protection mode selection is AUTO	Motor thermal model parameter are not correctly.	Check whether the motor parameters are set correctly. Check whether motor thermal model parameters are set correctly.
			Motor load is too high	Check for problem in driven equipment.
7	MotorTemperature	The temperature sensor has detected the motor temperature is excessive. Motor thermal protection mode selection is THERMISTOR	The motor temperature reaches the alarm setting value	Ensure that the ventilation and heat dissipation of the motor are normal.
			The thermistor resistance value is abnormal	Check whether the thermistor resistance and wiring are normal.
			Motor temperature sensor protection threshold is set improperly	Adjust the motor temperature sensor protection threshold
8	Systemfault	System fault	Excessive output current.	Check the motor and output wiring for short circuit, enrth fault or heavy load.
			Excessive DC bus voltage.	Check the power supply of the power grid Check whether exits large inertia load Wether quickly deceleration without braking compoment.
			Motor earth fault	Check motor and motor cable for earth fault.
			Short-circuit in motor cable(s) or motor	Check motor and motor cable for short-circuit.
			Abnormal Inverter module	Check power semiconductors (IGBTs). Seek for technical support.
			The internal connector of the drive is loose.	Check internal connectors. Seek for technical support.

Fault No.	Fault display on keypad	Fault description	Causes	What to do
9	Underload	Motor load is too low.	Motor load is too low.	Check for problem in driven equipment.
			Incorrect setting of underload curve.	Check Fault Function parameters.
10	Overfrequency	Output frequency is excessive	Motor is turning faster than highest allowed speed due to incorrectly set minimum/ maximum speed	Check minimum/maximum speed settings. Check adequacy of motor braking torque. Check applicability of torque control. Check need for brake chopper and resistor(s).
11	EEPROMfualt	EEPROM abnormal	EEPROM read/write abnormal	Seek for technical support
12	IGBTOvLoad	IGBToverload, output current has exceeded internal fault limit.	Power supply voltage too low	Check the power supply voltage
			Start when the motor is spinning	Restart after the motor at standstill
			Overloading for a long time	Reduce overload time and reduce load
			Acceleration time too short.	Extended acceleration time
			Incorrect VF curve setting.	Adjust V/F curve and voltage boost.
			Drive and motor does't match.	Check whether motor and drive are correctly matched.
			Incorrect model selection.	Check the driven load for an overload condition.
13	BROVERLOAD	Brake resistor overload	Braking time is too long	Check whether the input voltage is too high Check whether the braking time is reasonable
			The selection of brake resistor is unreasonable	Select appropriate brake resistors according to actual requirements.
			Brake resistor parameter setting is incorrect	Check whether the brake resistor parameter setting is reasonable
14	reserved			
15	reserved			
16	reserved			
17	Supplyphase	DC bus voltage is oscillating due to missing supply voltage phase, blown fuse or rectifier bridge internal fault.	Abnormal connection, missing connection or disconnection at the power supply	Check the power connections as per the operational regulations and eliminate the errors of missing connection and disconnection. Check main power supply fuses.
			Serious imbalance of three phases power supply	Check for main power supply imbalance.
			Insufficient power supply	Check main input power supply.
			Abnormal capacitor	Replace capacitor.
			Abnormal pre-charge circuit	Replace pre-contactor, pre-charge resistor or power supply board. Seek for technical support.
18	NoMotordata	No motor data	The motor is not connected	Connect the motor If you need to operate without connect the motor, please use scalar control.
			Motor and driver cables disconnected	Check the cables between the driver and the motor.
19	DCundervoltage	DC bus voltage is too low	The power supply voltage is lower than the under voltage value of the drive.	Check input power supply. Check pre-charge circuit.
			Abnormal internal switch power supply	Replace power board. Seek for technical support.

Fault No.	Fault display on keypad	Fault description	Causes	What to do
20	USERLOADCUR	Integrated motor current has exceeded load curve defined by USER LOAD CURVE.	Motor load is too high.	Check for problem in driven equipment.
			Incorrect setting of underload curve.	Check Fault Function parameters.
21	Runenable	Run enabled signal disconnection	Run enabled signal OFF.	Check run enabled signal
			Incorrect Run enabled signal source selection.	Check Run enabled signal source selection.
22	Encoderfail	Encoder abnormality detected	Encoder connection incorrect	Check the encoder wiring.
			Incorrect encoder card selection	Select the encoder card can match the encoder.
			Encoder has no signal output	Check encoder and encoder power supply.
			Encoder card loose.	Confirm that the encoder card is inserted reliably.
			Encoder parameter setting incorrect	Confirm that the relevant parameters of the drive encoder are set correctly
23	IOComm	MODBUS communication fault	Communication disconnection	Check the wiring connection
			Baud rate is set improperly	Set the matching baud rate.
			Incorrect data format	Check whether the sending and receiving data comply with the protocol, whether the checksum is correct, and whether the sending and receiving time interval meets the requirements.
			Communication timeout	Check whether the communication timeout setting is appropriate and confirm the application communication cycle.
			Improper setting of fault parameters	Check parameters setting.
24	ControlboardT	Control board exception detected	The cable of the control board and the drive board are loose.	Check wiring.
			The expansion card is inserted incorrectly	Check whether the expansion card is properly inserted.
			Abnormal control board	Seek for technical support and replace the control board.
25	Externfail	Fault from external digital input	Fault in external device.	Check external devices for faults. Check parameter 30.03 EXTERNAL FAULT.
26	OverSwtitchFrequncy	Brake chopper over load	Incorrect selection of braking resistor	Select appropriate brake resistor.
			Overload.	Check equipment load.
			The deceleration time is too short.	Properly extend the deceleration time.
27	AIMinfucn	Analog input is below minimum allowed value.	Analog input is below minimum allowed value due to incorrect signal level or failure in control wiring.	Check for proper analogue control signal levels. Check control wiring. Check Fault Function parameters.

Fault No.	Fault display on keypad	Fault description	Causes	What to do
28	PPClinkLoss	Parallel communication fault	Communication parameters of master and follower setting is incorrect.	Check the communication parameters of master and follower.
			Poor contact of communication cable.	Check the communication cable.
			Control board failure	Replace a control board.
29	CommModule	Master and follower communication fault	Communication parameters of master and follower setting is incorrect.	Check the communication parameters of master and follower.
			Poor contact of communication cable.	Check the communication cable.
			Control board failure	Replace a control board.
30	PanelLoss	Abnormal communication between keypad and main control board	Keyboard removed	Insert keyboard
			Poor contact between keyboard and main control board	Check the connecting lines.
			Abnormal communication between keypad and main control board	Check the communication. If the hardware is damaged, please contact the factory to check the communication. If the hardware is damaged, please contact the factory.
31	MotorStall	Motor is operating in stall region	Incorrect motor parameter setting.	Check motor parameter.
			Encoder signal abnormality.	Check encoder signal, wiring and installation.
			Motor overload.	Check motor load and drive ratings.
			Motor shaft is stuck and cannot rotate.	Check the motor shaft, mechanical shaft and Reducer.
32	MotorPhase	Motor circuit fault due to missing motor connection	The wiring at the output side of the drive is abnormal or missing wiring.	Check motor and motor cable.
			Output three-phase unbalance	Check whether the motor is in good condition Check whether the insulation of the motor is normal Check whether the motor cable wiring is connected properly.

6.2 Troubleshooting Procedures



6.3 FAQ

◆ **Why occur over current trip or over load trip?**

- Please check the correctness of motor parameter settings;
- Please check the correctness of encoder PPR setting and encoder direction setting.
- Please check whether the PG card matches the encoder, whether the connection cable between the PG card and the encoder is correct, and whether there is virtual connection or disconnection;
- Check if the PG card and the encoder are properly connected;
- Check if the control cable of the Hall sensor is loose or dislocated.

◆ **Why does the drive operate abnormally during torque control?**

- Please confirm whether the power of the motor is too different from that of the drive.
- Check if complete motor data identification has been performed.
- Please check whether the torque reference source and speed limit source settings are correct;
- Check whether the control wire of the current sensor is loose or misplaced.

◆ **Why is the output frequency always at 0Hz (or speed is 0RPM) when the driver reverse running?**

- Please check whether the frequency reference (or speed reference) is 0;
- Please check whether the drive RUN command is keep forward running.

◆ **Why does the correspondence between analog input and relevant input deviate greatly?**

- Please check whether the analog input type and the jumper of the control board are correct. For analog voltage input, please move the jumper to V side, and for analog current input, please move

the jumper to I side;
- Please check whether the analog input function setting is correct;
- Use analog input curve for correction.

◆ **Why does the correspondence between analog output and relevant output deviate greatly?**
- Please check whether the analog output type and the jumper of the control board are correct. For analog voltage output, please move the jumper to V side, and for analog current output, please move the jumper to I side;
- Please check whether the analog output function selection is correct;
- Use analog output curve for correction.

◆ **Why is the communication between PLC and driver 485 abnormal?**
- Please check whether the data format, address and baud rate of the driver and PLC are consistent;
- Please confirm whether the PLC address needs to add 1;
- Please confirm whether PLC is RTU format in Modbus;
- Please confirm whether the register address of PLC is converted to correct decimal system (hexadecimal or decimal);
- Please confirm whether the 485 cable is correct.

◆ **Why does the keyboard sometimes appear white screen or no display?**
- Check whether the keypad and control board of the drive are well connected;
- When connecting the keypad and the control board of the drive with the self-made keypad extension cable, please confirm whether the signal of the connection cable is correct;

◆ **Why can't the parameters be modified by using the keypad?**
- Please confirm whether the keypad is encrypted;
- If the parameter cannot be viewed, please confirm whether the parameter is hidden.
- Please confirm the attribute of the parameter, it is a read-only parameter or a parameter cannot be changed while the drive is running.

◆ **The driver is connected a brake resistor for energy consumption braking, why does it still have no braking effect?**
- **Please check whether the brake resistor wiring is correct;**
- **Please check whether the brake chopper function is ON;**
- **Check it is built-in brake chopper or external brake chopper.**

◆ **Causes of brake chopper damage**
- Check whether the brake resistor is short circuited;
- Check whether there is short circuit or short circuit to ground in the connecting wire of brake resistor and brake chopper;
- Check whether the selection of brake resistor matches the selection of brake chopper;
- Check whether the on-site braking condition matches the selection of brake chopper and brake resistor;

- Measure whether the brake chopper is normal: ① Cut off the power supply; ② Remove the wiring of brake resistor on terminals B1 and B2; ③ Turn the multimeter to 1-ohm resistance or diode. ④ Connect the red probe to "PB" and the black probe to "+"; ⑤ It is normal when the measured value is about 0.4V.

◆ **Why some model drives, the cooling fans will run after power on and some not after power on?**

- Parameter 95.01 = ON DURING RUN, The cooling fan start/stop is controlled by drive run command and heat sink temperature. The cooling fan runs when the drive is running; and the fan runs when the heatsink temperature is higher than 40℃, even the drive is in stopped state;
- Parameter 95.01 = ALWAYS ON, the cooling fan runs when the drive is powered;
- Parameter 95.01 = AUTO CTRL, the cooling fan is controlled by the heat sink temperature. The cooling fan runs when the heatsink temperature is higher than 40℃ and stops when the heatsink temperature is lower than 40℃.

◆ **-LU- occurs at start**

- Check whether the three-phase input power is normal, whether the three-phase input voltage and voltage are normal, whether the three-phase input power is balanced; whether there is a loose wiring, etc.;
- Check whether the circuit breaker is in good contact;
- Check whether the pre-charge circuit of the inverter is normal.

◆ **The phenomenon of tripping occurs as soon as the power is turned on**

- Check whether there is a short circuit in the three-phase input power supply;
- Check whether the rectifier bridge is normal. The measurement method is as follows, first cut off the power supply, remove the R, S, T wiring, and turn the multimeter to 1-ohm resistance or diode.
  The black probe of the multimeter is connected to the "+1" terminal of the DC bus, and the red probe is connected to R, S, and T respectively to observe the three values;
  The red probe of the multimeter is connected to the "-" terminal of the DC bus, the black probe is connected to R, S, and T respectively observe these three values;
  The deviation of these six values should not be too large, and the general value is normal between 0.3 and 0.5V.

◆ **IGBT protection appears as soon as it is started**

- Check whether there is a phase-to-phase short circuit in the motor cable;
- Check whether there is a short circuit to ground in the three phases of the motor;
- Check whether the insulation level of the motor is normal;
- Check whether the module. The measurement method is as follows, first cut off the power supply, remove the U, V, W wiring, and turn the multimeter to 1-ohm resistance or diode.
  The black probe is connected to "+", and the red probe is connected to U, V, and W respectively to observe these 3 values;
  The red probe is connected to "-", and the black probe is connected to U, V, and W respectively to observe these 3 values;
  The six value should about 0.28~0.5V is normal.

Chapter 7 Maintenance and Inspection

The application environment (such as temperature, humidity, dust and powder, wool, smoke and oscillation), burning and wearing of internal devices and other factors may reduces the service life. To reduce the fault and prolong the service life, it is necessary to perform daily inspections and periodic maintenance.

Note:

1. Only the professionals can dismantle and replace the inverter components.
2. Before inspection and maintenance, please make sure that the power supply to the has been shut down for at least ten minutes or the CHARGER indicator is OFF, otherwise, electric shock may be happened.
3. Do not leave metal components and parts in the inner of the product, otherwise, otherwise, equipment damage or electric shock may be caused.

7.1 Daily Inspections

The drive should be used under the allowable conditions as recommended in this manual and its daily inspections should be performed as the table.

Item	Inspection Contents	Inspection Means	Criteria
Environment	Temperature	Thermometer	−10 ~ +40ºC Derated at 40 to 50º C and the rated output current should be decreased by 1% for every temperature rise of 1ºC.
	Humidity	hygrometer	5 ~ 95%, no condensing
	Dust, oil, water and water-drop	Visual check	There are no dust, oil, water and water-drop
	Vibration	Special test instrument	3.5m/s^2, 2 ~ 9Hz 10m/s^2,9 ~ 200Hz 15m/s^2,200 ~ 500Hz
	Gas	Special test instrument, smell check and visual check	There are no abnormal smell and smoke
Drive	Heat dissipation effect	Special test instrument	Exhaust normal
	Noise	Listen	There is no abnormal noise
	Gas	Smell and visual check	There are no abnormal smell and smoke
	Physical appearance	Visual check	The physical appearance is kept intact
	Heat-sink fan ventilation	Visual check	There are no fouling and wool that block the air duct
	Input current	Ampere-meter	In the allowable operating range, refer to the nameplate
	Input voltage	Voltmeter	In the allowable operating range, refer to the nameplate
	Output current	Ampere-meter	In the rated value range. It can be overloaded for a short while
	Output voltage	Voltmeter	In the rated value range
Motor	Heat dissipation effect	Special test instrument and smell	There are no over temperature and burning smell
	Noise	Listen	There is no abnormal noise
	Vibration	Special test instrument	There is no abnormal oscillation

7.2 Periodic Maintenance

It needs to perform periodic maintenance every three to six months according to the application environment and working conditions.

Item	Inspection Contents	Inspection Means	Criteria
Drive	Main circuit terminal	Screwdriver/sleeve	The screws are tightened and the cables are kept well
	PE terminal	Screwdriver/sleeve	The screws are tightened and the cables are kept well
	Control circuit terminal	Screwdriver	The screws are tightened and the cables are kept well
	Reliability of internal connections and connectors	Screwdriver and hands	Connection is firm and reliable
	Expansion card connector	Screwdriver and hands	Connection is firm and reliable
	Mounting screws	Screwdriver/sleeve	The screws are tightened
	Cleaning the dusts and powders	Cleaner	There are no dusts and wool
	Internal foreign matter	Visual check	There are no foreign matter
Motor	Insulation test	500VDC megger	Normal

7.3 Component Replacement

Different types of components have different service lives. The service lives of the components are subject to the environment and application conditions. Better working environment may prolong the service lives of the components. The cooling fan and electrolytic capacitor are vulnerable components and should be periodic maintenance. If any fault occurs, the component should be replaced.

Vulnerable Components	Damage Causes	Solutions	Items for Routine Inspection
Fan	Bearing worn, blade aging	Replace	The fan blade has no cracks and rotates normally. The screws are tightened
Electrolytic capacitor	High ambient temperature and electrolyte volatilizes.	Replace	There are no electrolyte leakage, color change, crack and shell inflation. The safety valve is normal Static capacity is equal to or higher than the initial value *0.85

Note:

When the drive is stored for a long time, power connection test should be conducted once within two years and last at least five hours. It can use voltage regulator to gradually increase the value to the rated value after power connection is performed.

7.4 Insulation Test

Insulation test had been perform before leaving−factory, the user should not perform such test as much as possible under general condition. If the test is unavoidable, please perform the test strictly according to the following procedures, or inverter may be damaged.

High voltage testing is strictly prohibited, or inverter may be damaged. If the test is unavoidable, please contact the manufacture.

Appendix A Modbus Communication

1 Support Protocol

Support Modbus RTU protocol, broadcast address is 0, the slave address range is1 to 247, 248 to 255 is reserved.

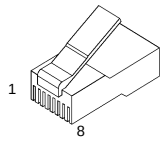
2 Interface

RS485：Asynchronous, half-duplex, LSB sending priority. Low byte is follow the high byte

Communication port A (Operation Panel RJ45 interface) default data format: 8−N−1, 38400 bps

Communication port B (terminal RS485+/−) default data format: 8−N−1, 19200 bps, see parameters 52.01, 52.02, 52.03.

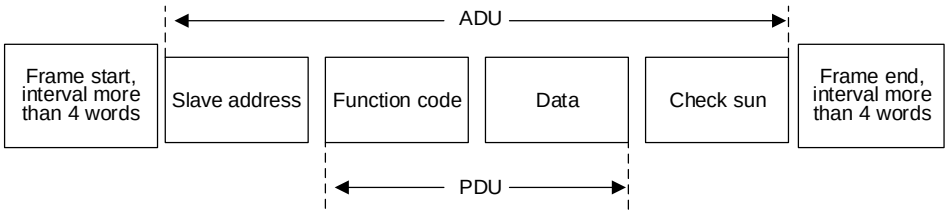
This is recommended to use EIA/TIA T568B network cable straight-through connection, the interface of port A is defined as:



Appendix Figure 1 RJ45 interface

Pin of port A	1	2	3	4	5	6	7	8
Signal of port A	+5V	GND	485+	485-	485+	485-	GND	+5V
EIA/TIA T568A	White green	Green	White orange	Blue	White blue	Orange	White brown	Brown
EIA/TIA T568B	White orange	Orange	White green	Blue	White blue	Green	White brown	Brown

3 Protocol Format



A ppendix Figure 2 Protocol Format

ADU (Application Data Unit) check sum is the CRC16 check sum of the front three parts of ADU (slave address, function code and data), through exchange of high byte and low byte.

4 Function Interpretation

◆ Function **0x03 reads parameters**.

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x03
Register start address	2	0x0000～0xFFFF
Registers No.	2	0x0001～0x0010
Response:		
Function code	1	0x03
Read bytes	1	2* Registers No.
Read contents	2* Registers No.	

◆ Function **0x06 writes single parameter** or control word (not save to EEPROM after power-off)

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x06（0x41）
Register address	2	0x0000～0xFFFF
Register data	2	0x0000～0xFFFF
Response:		
Function code	1	0x06（0x41）
Register address	2	0x0000～0xFFFF
Register data	2	0x0000～0xFFFF

◆ Function **0x10 writes multiple parameters** or control word (not save to EEPROM after power-off)

PDU Part Contents	Data Length (Byte)	Range
Request:		
Function code	1	0x10（0x42）
Register start address	2	0x0000～0xFFFF
Registers No.	2	0x0001～0x0010
Bytes of register contents	1	2* Registers No.
Register contents	2* Registers No.	
Response:		
Function code	1	0x10（0x42）
Register start address	2	0x0000～0xFFFF
Registers No.	2	0x0001～0x0010

Note: Function 0x10 can write up to 16 consecutive address parameters at a time

Note: After communication, the data are not be saved to EEPROM after power-off.

5 Register Address

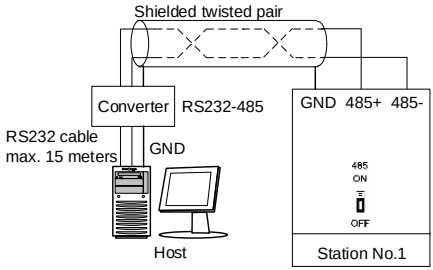
<table>
<tr><th>Address Space</th><th>Meaning</th></tr>
<tr><td>Parameters address</td><td>The calculation method of the register address corresponding to the parameter:
Register address = 400000 + 100 × parameter group + parameter index
For example: the modbus address of parameter 01.03 would be mapped to register:
40000 + 01*100 + 03 = 40103 (decimal data format)</td></tr>
<tr><td>Modbus addressing</td><td>
<table>
<tr><td colspan="3">Control word registers (Data from Modbus to drive)</td></tr>
<tr><th>Modbus Address</th><th>Contents</th><th>Description</th></tr>
<tr><td>40001</td><td>Control Word</td><td>See parameter 03.01</td></tr>
<tr><td>40002</td><td>Reference 1</td><td>COMM.REF1, used as EXT REF1, See parameter 11.03</td></tr>
<tr><td>40003</td><td>Reference 2</td><td>COMM.REF2，used as EXT REF2，See parameter 11.06</td></tr>
<tr><td>40007</td><td>Reference 3</td><td>COMM.REF3，used to control RO1，RO2，RO3
See parameters 14.01, 14.02, 14.03</td></tr>
<tr><td>40008</td><td>Reference 4</td><td>COMM.REF4, used to control AO1 output, see parameter 15.01</td></tr>
<tr><td>40009</td><td>Reference 5</td><td>COMM.REF5, used to control AO2output，see parameter 15.06</td></tr>
</table>
Status word register: The host computer can directly read the monitoring parameters.
</td></tr>
</table>

6 Modbus Communication Example

Run command (Please set EXT1 COMMANDS parameter 10.01 = COMM.CW)					
	Address	Function code	Register address	Register contents	Checksum
Request	0x01	0x06	0x9C41	0x0008	0XF648
Response	0x01	0x06	0x9C41	0x0008	0XF648
Stop command (Please set EXT1 COMMANDS parameter 10.01 = COMM.CW)					
	Address	Function code	Register address	Register contents	Checksum
Request	0x01	0x06	0x9C41	0x0000	0XF78E
Response	0x01	0x06	0x9C41	0x0000	0XF78E
Set COMM.REF1 to 1500RPM command					
	Address	Function code	Register address	Register contents	Checksum
Request	0x01	0x06	0x9C42	0x05DC	0X0547
Response	0x01	0x06	0x9C42	0x05DC	0X0547

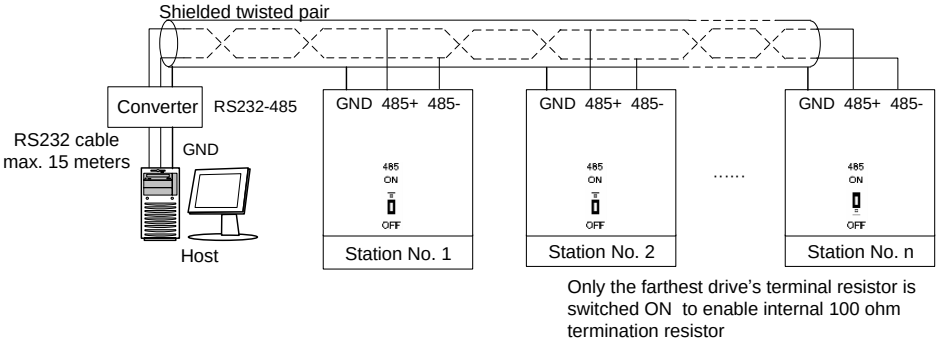
7 Communication Network Construction

◆ The connection of one drive and one host computer



Appendix Figure 3 The connection of one drive and one computer

◆ The connection of multiple drives and one host computer



Appendix Figure 4 The connection of multiple drives and one computer

Appendix B PG Card

1. PG Card Introduction

Model	Frequency dividing	Technical specification	Power voltage of encoder
EX-PG01	No	Maximum current 200mA, up to 80K pulse input	+12V～+24V
EX-PG02	No	Maximum current 150mA, up to 300K pulse input	+5V
EX-PG03	Yes	Maximum current 200mA, up to 80K pulse input	+12V～+24V
EX-PG04	Yes	Maximum current 150mA, up to 300K pulse input	+5V

2. PG Card DIP Settings

No.1 jumper corresponds to bit 0 of binary system

No.2 jumper corresponds to bit 1 of binary system

No.3 jumper corresponds to bit 2 of binary system

……

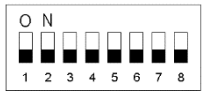
No.8 jumper corresponds to bit 7 of binary system

When the jumper is in ON status, the value of the corresponding bit is 1; otherwise, it is 0. The frequency division from 1, 2 to 510 can be realized through to remove the jumper.

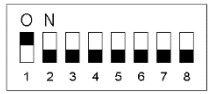
The calculation formula of the number of the PG card frequency divisions is:

Number of frequency divisions=binary number indicated by jumper×2

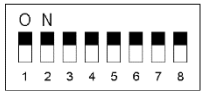
For example, when the jumper is in the status shown in the figure, the corresponding number of frequency division is 1.



When the jumper is in the status shown in the figure, the corresponding number of frequency divisions is 2.



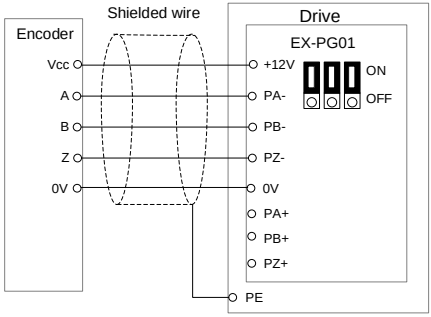
When the jumper is in the status shown in the figure, the corresponding number of frequency divisions is 510.



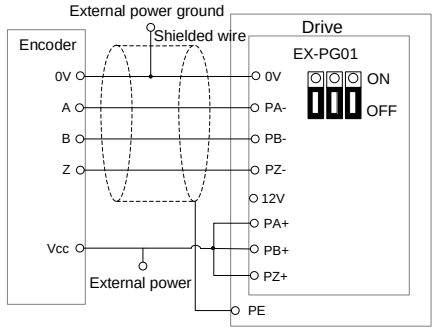
3. PG Card Wiring

◆ **EX−PG01 Card and EX−PG03 Card**

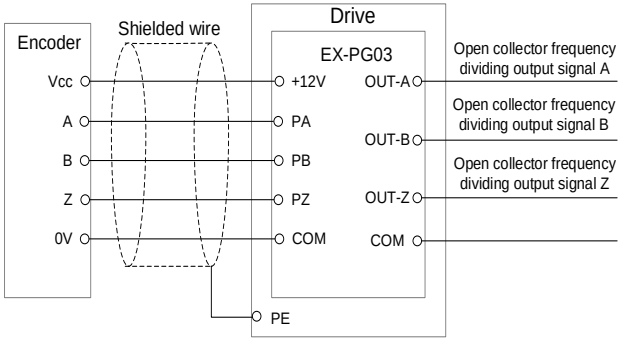
For the open collector, voltage, push pull (complementary) type encoder for motor speed feedback and power supply is +12V to +24V, EX−PG01 should be selected. If the motor speed needs to send to other equipment for calculation or speed measurement, EX−PG03 with frequency division output should be selected.



EX−PG01 card apply internal power supply
(Jumper removed to ON side)



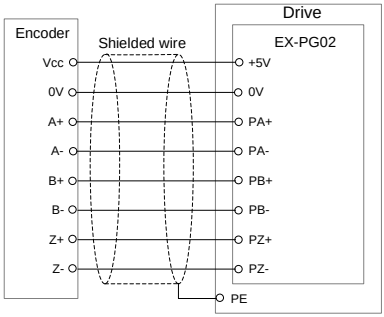
EX−PG01 card apply external power supply
(Jumper removed to OFF side)



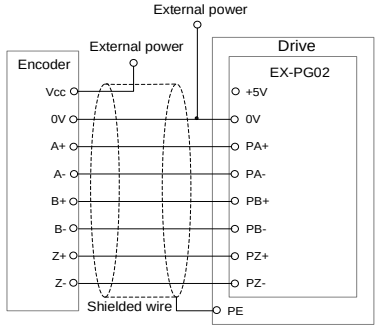
EX−PG03 card apply internal power supply
(Not support external power supply)

◆ **EX-PG02 Card and EX-PG04 Card**

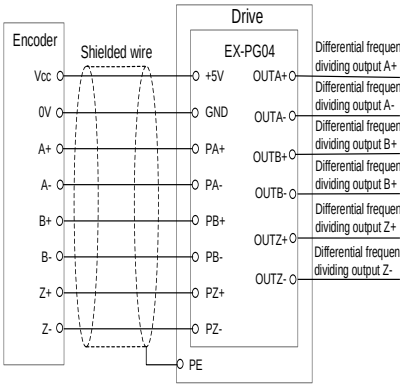
For the differential type encoder for motor speed feedback and power supply is +5V, EX−PG02 should be selected. If the motor speed needs to send to other equipment for calculation or speed measurement, EX−PG04 with frequency division output should be selected.



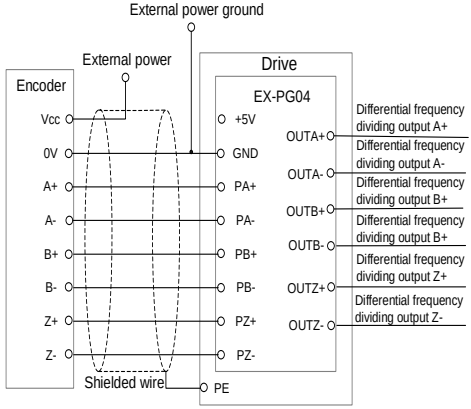
EX−PG02 card apply internal power supply



EX−PG02 card apply external power supply



EX−PG04 card apply internal power supply



EX−PG04 card apply external power supply

Appendix C Communication Adapter

1 Communication Adapter Card Introduction

Model	Install mode	Protocol	Power supply
EX-CA04	Internal / external	CANopen DS301、DS303、DS305	+24VDC 100mA
EX-CA06	Internal / external	PROFIBUS DP DPV0	+24VDC 100mA
EX-CA13	Internal	PROFINET, it also has 5V incremental encoder interface, and encoder feedback output interface	+5VDC 150mA

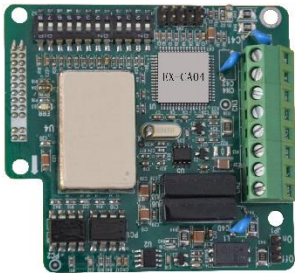
2 Communication Adapter Card Wiring

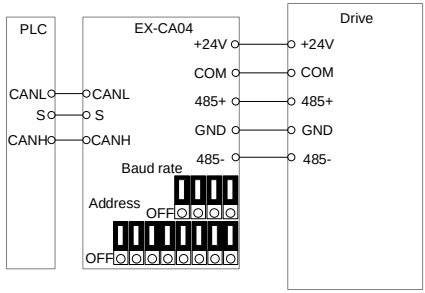
◆ EX-CA04

• EX-CA04, it is a communication module of CANopen slave station, which can be used to connect CANopen configuration network, programmable controller and human-machine interface.

• EX-CA04, provides customer-define function, which is used to connect CANopen configuration network and Modbus protocol compliant custom devices;

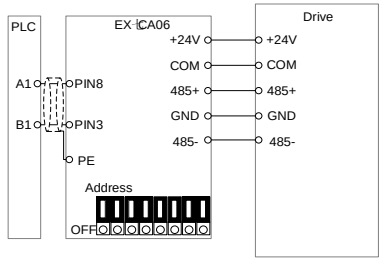
• Support CAN2.0A protocol, support CANopen DS301 V4.02、DS303、DS305 protocol.





◆ EX-CA06

Ex-CA06 is a PROFIBUS DP bus adapter card. This adapter card provides PROFIBUS DP interface for users, which is suitable for various industrial automation occasions. The electrical interface and protocol fully comply with Siemens PROFIBUS DP bus standard, which is more convenient for users to configure.



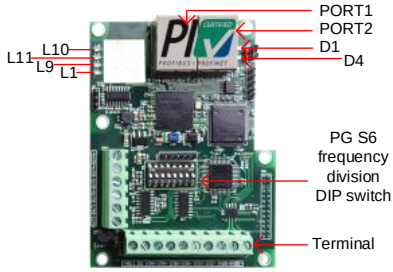
◆ EX−CA13

• It is a PROFINET Industrial Ethernet communication adapter card with full duplex and adaptive 10 / 100M baud rate;

• Integrated dual port Fast Ethernet interface with switch function;

•The product status and fault are indicated by LED light, which is convenient for commissioning and maintenance;

• It can be connected with 5V incremental encoder and feedback output. For the wiring and description of encoder part, please refer to EX-PG04 function description.



Fault indicator

Fault	Fault reason
L1	BF indicator，Bus Failure. The indicator is ON when PN network error occurs；The indicator flashes during start-up；The indicator is OFF when PN network working normal.
L9	System Fail，The lamp is always on when the system is wrong, and it is off when it is normal.
L10	Device Ready, after the internal protocol stack is started correctly, this light is always on.
L11	Maintenance，Reserved
D1	Power indicator, 3.3V normal, normally ON.
D4	The system running light will flash once when MODBUS message is sent.