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hpmont

MONT72 Series
Elevator Controller

MONT72 Series
Elevator Controller
User Manual

V1.0 2018.09

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FOREWORD

Thank you for purchasing MONT72 series elevator controller manufactured by Shenzhen Hpmont Technology Co., Ltd.

This User Manual describes how to use MONT72 series elevator controller and their installation wiring, parameter setting, troubleshooting and daily maintenance etc.

Before using the product, please read through this User Manual carefully. In addition, please do not use this product until you have fully understood safety precautions.

Note:

- Preserve this Manual for future use.
- If you need the User Manual due to damage, loss or other reasons, please contact the regional distributor of our company or directly contact our company Technical Service Center.
- If you still have some problems during use, please contact our company Technical Service Center.
- Due to product upgrade or specification change, and for the purpose of improving convenience and accuracy of this manual, this manual's contents may be modified.
- Email address: **overseas_1@hpmont.com**

Version and Revision Records

Version time: 2018/9

Version: V1.0

Chapter	Content
	• V1.0 issue

CONTENTS

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Chapter 1 Safety Information and Precautions

1.1 Safety Definition

Danger	**Danger:** A Danger contains information which is critical for avoiding safety hazard.
Warning	**Warning:** A Warning contains information which is essential for avoiding a risk of damage to products or other equipments.
Note	**Note:** A Note contains information which helps to ensure correct operation of the product.

1.2 About Motor and Load

Compared to the industrial frequency operation

The MONT72 series controllers are voltage-type controllers and their output is PWM wave with certain harmonic wave. Therefore, the temperature, noise and vibration of the motor will be a little higher than that at industrial frequency running.

Thermal protection of motor

When choose the adaptive motor, MONT72 can effectively implement the motor thermal protection. Otherwise it must adjust the motor protection parameters or other protection measures to ensure that the motor is at a safe and reliable running.

Lubrication of mechanical devices

At long time low-speed running, provide periodical lubrication maintenance for the mechanical devices such as gear box and geared motor etc. to make sure the drive results meet the site need.

Start and stop MONT72

User should use the control terminal to start and stop MONT72. It is strictly forbidden to use contactor or other switches on the input side of MONT72 to start and stop directly, or it will damage the device.

Check the insulation of the motor

For the first time using the motor or after long time storage, it needs check the insulation of the motor. Worse insulation can cause damage to MONT72.

Note:

Use a 500V Mega-Ohm-Meter to test and the insulation resistance must be higher than 5Mohm.

Requirement for leakage current protector RCD

Since the device generates high leakage current which goes through the protective grounding conductor, please install B type leakage current protector RCD on one side of the power supply.

For the selection of RCD, users need to consider the possible problems of ground leakage current in both transient status and steady status at start and during running. It is recommended to choose either special RCD that can suppress the higher harmonics, or general RCD that has more aftercurrent.

Warning for ground mass leakage current

The device generates mass leakage current, so users need to confirm the reliable grounding before connect to the power supply. The grounding should comply with the local relative IEC standard.

1.3 About MONT72 Controller

No capacitor or varistor on the output side

Since MONT72 output is PWM wave, it is strictly forbidden to connect capacitor for improving the power factor or varistor for lightning protection to the output terminals so as to avoid MONT72 fault trip or component damage.

Contactors and circuit breakers connected to the output of MONT72

If circuit breaker or contactor needs to be connected between MONT72 and the motor, be sure to operate these circuit breakers or contactor when MONT72 has no output, so as to avoid any damage to MONT72.

Running voltage

MONT72 is prohibited to be used beyond the specified range of running voltage. If needed, please use the suitable voltage regulation device to change the voltage.

Capacitor energy storage

When the AC power supply is cut off, capacitor of MONT72 sustains deadly power for a while. So to disassemble MONT72 that is powered, please cut off the AC power supply for more than 10 minutes, confirm the internal charge indicator is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.

Generally, the internal circuit enables the capacitor to discharge. However, the discharging may fail in some exceptions. In these cases, users need to consult Hpmont or our regional distributor.

Change three-phase input to single-phase input

For three-phase input controller, users should not change it to be single-phase input.

To use single-phase power supply, disable the input phase-loss protection function. And the bus-voltage and current ripple will increase, which not only influences the life of electrolytic capacitor but also deteriorates the performance of the controller. In that case, the controller must be derating and should be 60% within rated value of controller.

Lightning surge protection

MONT72 internal design has lightning surge over-current protection circuit, and has certain self-protection capacity against the lightning.

Altitude and derating

In area where altitude exceeds 1000 meters, MONT72 should be derating since the heatsink efficiency will be reduced because of the tenuous air.

The rated value of output current derates by 1% for each 100m increase of the altitude. I.e for the altitude of 3000m, derated rate is 20% for rated current of MONT72. Figure 1-1 is the derating curve of rated current and the altitude.

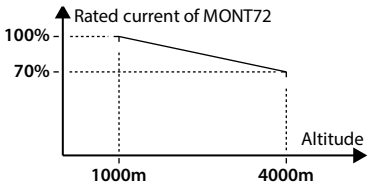

Figure 1-1 Derating curve of rated current and altitude

1.4 Maintenance

Due to environmental temperature, humidity, pH, dust, vibration and other factors, as well as the aging and wear of the device inside the drive controller, etc., it will lead to potential failures. Therefore, the controller must be stored and used. Daily or regular maintenance.

- If the drive controller is transported over long distances, it should be routinely checked before use to confirm that the product components are complete and the nails are fastened.
- During the use of the drive controller, the internal dust of the drive should be cleaned regularly. Check the internal fastening screws to make sure there is no looseness.

Danger

- MONT72 can only be maintained by qualified and trained professionals.
- Maintenance personnel must remove the metal jewelry before maintenance. Maintenance must use clothing and tools that meet the insulation requirements.
- The MONT72 is in a live, running, dangerous high voltage inside.
- Before checking and maintaining the MONT72, disconnect the input power reliably and wait at least 10 minutes. Check that the MONT72 internal charge indicator is off and the voltage between the power terminals (+) and (-) is lower than 36V. In order to open the MONT72 cover for maintenance.

Warning

- For drive controllers that have been stored for more than 2 years, the regulator should be slowly boosted by the regulator during the first power-up.
- Do not leave metal objects such as wires, tools, and dowels inside the drive controller.
- Do not modify the drive controller without authorization.
- There are static-sensitive IC components inside the drive controller. Do not touch the on-board device directly.

Daily maintenance

The MONT72 must be operated in the specified environment, see section 3.2, page 13.

Please follow Table 1-1 to do daily maintenance work, in order to find abnormal phenomena in time and extend the service life of MONT72.

Table 1-1 Daily inspection project

Check object	Check content	Judging criteria
Operating environment	Temperature, humidit	-10 - +40°C, 40 - 50°C derating required; Less than 95% RH, anhydrous beads condensation
	Dust, water and drip	No conductive dust accumulation, no trace of water leakage
	Gas	No smell
Drive controller	Vibration, heat	Stable vibration, reasonable temperature
	Noise	No noise
Motor	Over-heat	No abnormality
	Noise	Normal noise
Status parameters	Output current / current	Current in the rated range

Regular maintenance

Depending on the usage environment, the user can perform regular routine inspections of the drive controller within 3-6 months to eliminate potential hazards and ensure long-term high performance and stable operation of the equipment.

The inspection contents are as follows:

- The control terminal is not loosened. If it is loose, it can be tightened with a suitable torque;
- The power terminals are in firm contact and there are no signs of overheating at the copper bars or cable connections;
- Power cable, control cable for damage, especially for the skin that is in contact with the metal surface;
- The wire nose insulation wrap of the power cable and control signal wire does not fall off or rupture;
- For dust cleaning on the circuit board and on the air duct, it is best to use a vacuum cleaner.

Note:

1. The drive controller has passed the pressure test before leaving the factory. The user does not need to carry out the test. Otherwise, it will be damaged if the test is improper.

2. If the insulation test is performed on motor, the U / V / W terminal of the drive controller must be disconnected and the motor tested separately, otherwise the drive controller will be damaged.

3. The long-term storaged drive controller must conduct a power-on experiment within 2 years. Use the voltage regulator to slowly increase the input voltage of the driver to the rated value, and energize for at least 5 hours.

Drive controller consumable replacement

Drive controller consumables mainly include cooling fans and filter electrolytic capacitors. Their service life is closely related to the environment and maintenance conditions. Users can set the replacement period according to the running time.

Consumables	Cooling fan	Filter electrolytic capacitor
Life time	60,000 hours	50,000 hours
Possible causes of damage	Bearing wear, blade aging	Ambient temperature is high, frequent load jumps cause pulsating current to increase, electrolyte aging
Discrimination standard	When the drive controller is powered off, check whether there are cracks in the fan blades, etc. When the drive controller is energized, check whether the fan is running normally, whether there is abnormal vibration, noise, etc.	Is the drive controller often overcurrent when it is running with load? Overvoltage and other faults; Whether there is liquid leakage, whether the safety valve has protruded, determination of electrostatic capacitance, determination of insulation resistance

Scrap treatment

When scrapping, please note:

- An electrolytic capacitor inside the drive controller may cause an explosion when it is incinerated.
- Toxic gases are produced when plastic parts are incinerated.
- Please treat as industrial waste.

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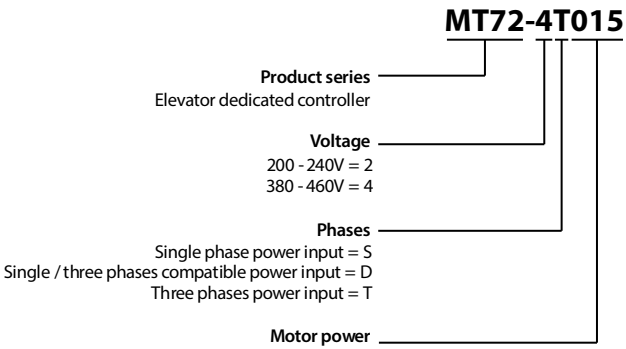
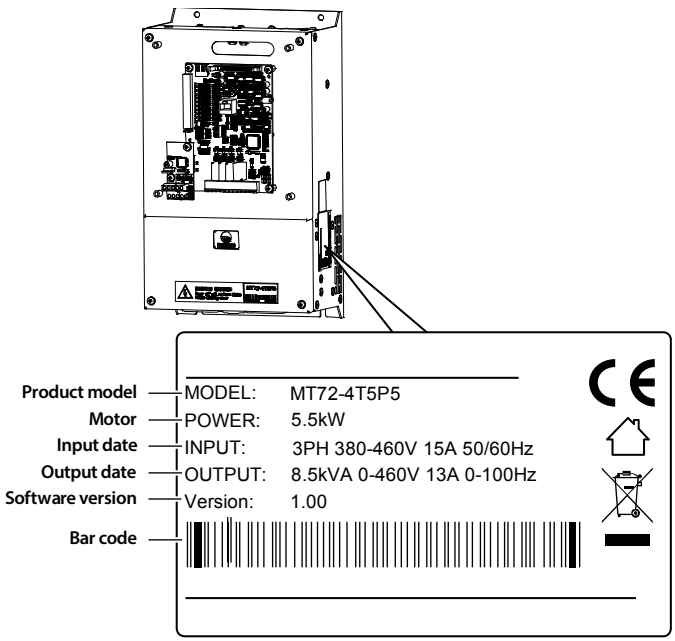
Chapter 2 Product Information

2.1 Model



2.2 Nameplate



2.3 Technical Data

Electrical specifications		
Input voltage	Single / three phase: 200 - 240V Three phase: 380 - 460V Fluctuation does not exceed ± 10%, imbalance rate < 3%	
Input frequency	50/60Hz ± 5%	
The output voltage	0 - Input voltage	
Output frequency	0 - 100.00Hz	
Performance		
Overload capability	150% rated output current for 2 minutes 180% rated output current 10 seconds	
Control method	V/f control; Open loop vector control (SVC); Closed loop vector control (VC)	
Run command setting mode	Keypad setting, external terminal setting	
Speed setting method	Digital setting, analog setting	
Speed setting resolution	Digital setting: 0.01Hz Analog setting: 0.1% × maximum frequency	
Speed control accuracy	SVC: ± 0.5%	VC: ± 0.05%
Speed control range	SVC: 1:100	VC: 1:1000
Torque control response	SVC: < 200ms	VC: < 50ms
Starting torque	SVC: 180% rated torque / 0.5Hz	VC: 180% rated torque / 0Hz
Torque control accuracy	± 5%	
Special feature		
Multiple sets of parameters upload and download function	2 sets of parameters can be uploaded to the keypad backup function	
Programmable input and output interface	Input terminal function can be edited, output terminal function can be edited	
Protective function		
Power-on safety self-test	Power-on peripherals security checks, eliminate safety hazards	
Overspeed protection	Elevator overspeed protection features to ensure safe operation	
Speed deviation protection	Has a speed deviation detection protection, eliminate safety hazards	
Up and down forced speed change function	With up and down forced speed change function, preventing the elevator from slamming the bottom	
Input, output phase loss protection	Input, output phase loss automatic detection and alarm function	
Traction machine temperature detection	Real-time detection of motor temperature to eliminate safety hazards	
Output short circuit protection	Output to ground short-circuit effective protection	
Output phase-to-phase short circuit protection	Output phase-to-phase short circuit effective protection	

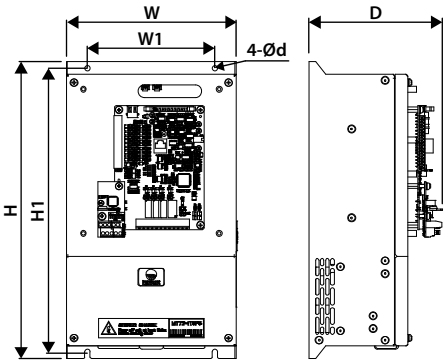
Input output	
External analog power supply	+10V, load capacity 100mA
External power input	External 24VDC power input
Analog input	AI1: Voltage 0 - 10V
Digital input	X1 - X10
Digital output	DO1, DO2
Relay output	Y1 - Y3, contact capacity: 250VAC/3A or 30VDC/3A RA / RB / RC, contact capacity: 250VAC/5A or 30VDC/5A
Keypad display	
LCD display	Function parameter setting, status parameter viewing, fault code viewing, etc.
Parameter copy	Fast parameter copying
Environmental characteristics	
Working temperature	-10 - +40°C, up to 50°C, air temperature change is less than 0.5°C/min Derating at 40 - 50°C: 2% reduction in output current per 1°C
Storage ambient temperature	-40 - +70°C
Place of use	Indoor, free from direct sunlight, no dust, corrosive gases, flammable gases, oil mist, water vapor, dripping or salt, etc.
Altitude	Less than 1000 meters, more than 1000 meters need to be derated
Humidity	Less than 95% RH, anhydrous beads condensation
Vibration resistant	2 - 9Hz when 3.5m/s^2, 9 - 200Hz when 10m/s^2 (IEC60721-3-3)
Protection level	IP00
Pollution level	Level 2 (Dry, non-conductive dust pollution)
Optional accessories	
Encoder card	Frequency division output OC encoder card (HD-PG2-OC-FD) Frequency division output sine and cosine encoder card (HD-PG5-SINCOS-FD) Long-line drive encoder card with crossover output (HD-PG6-UVW-FD) Serial communication encoder card with crossover output (HD5L-PG1-SC) (supports the EnDat protocol)
Keypad	MT70-LED-D
Bluetooth module	MT70-BLE-A
Power unit	Energy feedback unit (HDRU)

2.4 Rated Value

Structure	Model	Motor (kW)	Rated capacity (kVA)	Rated input current (A)	Rated output current (A)
Single-phase: 200 - 240V, 50/60Hz					
FA	MT72-2S2P2	2.2	3.8	24.1	10.3
FA	MT72-2S3P7	3.7	5.9	40	17
Single-phase / Three-phase: 200 - 240V, 50/60Hz					
FB	MT72-2D5P5	5.5	8.5	60 / 29 (1)	27
FB	MT72-2D7P5	7.5	11	75 / 35 (1)	33
FD	MT72-2D011	11	16	100 / 47 (1)	45
FD	MT72-2D015	15	21	130 / 62 (1)	55
FD	MT72-2D018	18.5	24	160 / 77 (1)	70
(1): Value before / is for single-phase model, value after / is for three-phase model.					
Three-phase: 200 - 240V, 50/60Hz					
FA	MT72-2T3P7	3.7	5.9	19	17
FB	MT72-2T5P5	5.5	8.5	29	27
FB	MT72-2T7P5	7.5	11	35	33
FD	MT72-2T011	11	16	47	45
FD	MT72-2T015	15	21	62	55
FD	MT72-2T018	18.5	24	77	70
FE	MT72-2T022	22	30	92	80
FE	MT72-2T030	30	39	113	110
Three-phase: 380 - 460V, 50/60Hz					
FA	MT72-4T2P2	2.2	3.4	7.3	5.1
FA	MT72-4T3P7	3.7	5.9	11.9	9
FA	MT72-4T5P5	5.5	8.5	15	13
FB	MT72-4T7P5	7.5	11	20	18
FB	MT72-4T011	11	16	29	27
FB	MT72-4T015	15	21	35	33
FC	MT72-4T018	18.5	24	41	39
FC	MT72-4T022	22	30	50	48
FD FF	MT72-4T030 MT72-4T030-SM	30	39	62	60
FD FF	MT72-4T037 MT72-4T037-SM	37	49	77	75
FE	MT72-4T045	45	59	93	91
FE	MT72-4T055	55	72	113	112

2.5 Dimension

See Table 2-1 for the appearance and installation dimensions of MONT72. For the specific model corresponding to the external dimensions, see section 2.4 Rated Value, page10.



FA / FB / FC / FD / FE / FF

Table 2-1 MONT72 dimension

Structure	Dimension (mm)		Size (mm)				Gross wet.
	W	H	W1	H1	D	d	(kg)
FA	200	350	150	344.5	159	6.5	8.7
FB	220	350	150	334.5	186	6.5	9.1
FC	220	375	195	360	199	7	13
FD	290	555	235	541.5	218	6.5	17.7
FE	380	598.5	260	576	282	10	46.6
FF	260	440	230	420	403	8	20.8

2.6 Resistor Selection

The braking resistor selection is shown in Table 2-2. For the braking resistor wiring, see section 4.3.2 Power Terminal Wiring.

Table 2-2 Brake resistor selection recommendation table

Model	Motor (kW)	Brake resistor (Ω)			Brake resistor power (kW)	
		Min.	Max.	Recommendation	Syn.	Asyn.
Single phase: 200 - 240V, 50/60Hz						
MT72-2S2P2	2.2	26	130	50	1	1
MT72-2S3P7	3.7	26	90	30	1.6	1.2
Single / Three phases: 200 - 240V, 50/60Hz						
MT72-2D5P5	5.5	17	27	20	2	1.6
MT72-2D7P5	7.5	11	20	15	3.2	2
MT72-2D011	11	11	20	15	4	3.2
MT72-2D015	15	10	16	12	5	4
MT72-2D018	18.5	10	16	12	6.4	5

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روبروی پالایشگاه نفت پارس، پلاک ۱۲

Model	Motor (kW)	Brake resistor (Ω)			Brake resistor power (kW)	
		Min.	Max.	Recommendation	Syn.	Asyn.
Three phases: 200 - 240V, 50/60Hz						
MT72-2T3P7	3.7	26	50	30	1.6	1.2
MT72-2T5P5	5.5	17	27	20	2	1.6
MT72-2T7P5	7.5	11	20	15	3.2	2
MT72-2T011	11	11	20	15	4	3.2
MT72-2T015	15	10	16	12	5	4
MT72-2T018	18.5	10	16	12	6.4	5
MT72-2T022	22	7	10	9	8	6.4
MT72-2T030	30	7	10	9	10	8
Three phases: 380 - 460V, 50/60Hz						
MT72-4T2P2	2.2	56	210	100	1	1
MT72-4T3P7	3.7	56	144	80	1.6	1.2
MT72-4T5P5	5.5	56	100	70	2	1.6
MT72-4T7P5	7.5	56	72	64	3.2	2
MT72-4T011	11	34	48	40	4	3.2
MT72-4T015	15	34	41	36	5	4
MT72-4T018	18.5	17	31	24	6.4	5
MT72-4T022	22	17	27	20	8	6.4
MT72-4T030 MT72-4T030-SM	30	11	20	15	10	8
MT72-4T037 MT72-4T037-SM	37	10	16	12	12	10
MT72-4T045	45	7	10	9	18	15
MT72-4T055	55	5	8	8	22	18

Note:

It is recommended to select the braking resistor according to the resistance range recommended in Table 2-2. Larger resistor values ensure safety in the event of a brake system failure.

However, if the resistance is too high, the braking capacity will decrease, which may cause overvoltage protection of the inverter.

Chapter 3 Mechanical Installation

3.1 Precautions

Danger

- Do not install if MONT72 is incomplete or impaired.
- Please see the controller size to take appropriate tools for handing, avoid harming from sharp edges or injured by a dropped controller.
- Make sure that MONT72 is far from the explosive and flammable things.
- Do not do wiring operation until power supply is cut off for more than 10 minutes, the internal charge indicator of MONT72 is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.

Warning

- When transporting, please hold the bottom of the drive controller, not just the keypad, cover.
- Do not drop wires, screws, or drilling residues into the drive controller during installation.

3.2 Installation Site Requirement

Ensure the installation site meets the following requirements:

- Do not install at the direct sunlight, moisture, water droplet location;
- Do not install at flammable, explosive, corrosive gas and liquid location;
- Do not install at oily dust, fiber and metal powder location;
- Be vertical installed on fire-retardant material with a strong support;
- Make sure adequate cooling space for MONT72 so as to keep ambient temperature between -10 - + 40°C;
- The installation base is sturdy and meets product vibration requirements: 3.5m/s^2 at 2 - 9Hz and 10m/s^2 at 9 - 200Hz (IEC60721-3-3);
- Install at where the humidity is less than 95%RH and non-condensing location;
- Protection level of MONT72 is IP00 and pollution level is 2 (Dry, non-conducting dust pollution).

Note:

1. If the operating environment of the drive controller exceeds 40°C, it needs to be derated. For every 1°C increase, the drive controller needs to be derated by 2%. The maximum working environment temperature is 50°C.

2. Maintain the ambient temperature -10 - +40°C, install in a well-ventilated place or add a cooling device to improve the reliability of the drive controller operation.

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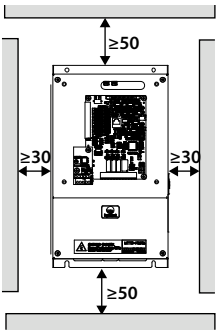
3.3 Installation Direction and Space Requirements

To achieve good cooling efficiency, install MONT72 perpendicularly and always provide the following space to allow normal heat dissipation.

The requirements on mounting space and clearance are shown on the right, the unit is mm.



Chapter 4 Electrical Installation

4.1 Precautions

Danger

- Only qualified electrical engineer can perform wiring job.
- To facilitate the input side over-current protection and outage maintenance, connect MONT72 with power supply via the MCCB or fuse.
- Do not dismantle MONT72 or do wiring operation until the power is cut-off for more than 10 minutes, the internal charge indicator of MONT72 is off and the voltage between (+) and (-) of the main circuit terminals is below 36V.
- Check the wiring carefully before connecting emergency stop or safety circuit.
- There is more than 3mA leakage current in MONT72 grounding, depending on the operating conditions. To ensure safety, MONT72 and the motor must connect to separate and independent grounding wire, so as to ground reliably. It must use Type B mode when utilize ground leakage protection devices (ELCB / RCD).
- Do not touch the wire terminals of MONT72 when it is live. The main circuit terminals are neither allowed connecting to the enclosure nor short-circuiting.

Warning

- Do not do dielectric strength test on MONT72.
- For MONT72 with more than 2 year's storage, please use regulator to power it slowly.
- Do wiring connection of the braking resistor or the braking unit according to the wiring figure.
- Make sure the terminals are fixed tightly.
- Do not connect the AC supply cable to the output terminals U / V / W of MONT72.
- Do not connect the phase-shifting capacitors to the output circuit.
- Be sure MONT72 has ceased output before switching motor or change-over switches.
- The MONT72 DC bus terminals must not be short-circuited.

4.2 Peripheral Accessories Selection

4.2.1 Wiring Specifications of Input and Output

The AC supply to MONT72 must be installed with suitable protection against overload and short-circuits, i.e. MCCB (molded case circuit breaker) or equivalent device.

The recommended specification of MCCB, contactor & cables are shown as Table 4-2.

The size of ground wire should accord with the requirement in 4.3.5.4 of IEC61800-5-1, as shown in Table 4-1.

Table 4-1 Cross-sectional area of the grounding protective conductor

Sectional area S of phase conductor (power supply cable) while installing (mm^2)	S ≤ 2.5	2.5 < S≤ 16	16 < S ≤ 35	S > 35
Min. sectional area Sp of relative protective conductor (ground cable) (mm^2)	2.5	S	16	S/2

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Table 4-2 Wiring specification

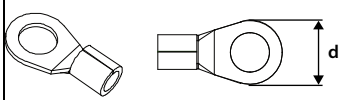
Model	MCCB (A)	Contactor (A)	Supply cable (mm^2)	Motor cable (mm^2)	Ground cable (mm^2)	Size
Single-phase: 200 - 240V, 50/60Hz						
MT72-2S2P2	32	20	6	2.5	2.5	FA
MT72-2S3P7	63	32	16	4	16	FA
Single-phase / Three-phase: 200 - 240V, 50/60Hz						
MT72-2D5P5	125 / 63 (1)	100 / 40 (1)	35 / 10 (1)	6	16 / 10 (1)	FB
MT72-2D7P5	160 / 63 (1)	100 / 40 (1)	35 / 16 (1)	10	16	FB
MT72-2D011	200 / 100 (1)	125 / 63 (1)	50 / 25 (1)	16	25 / 16 (1)	FD
MT72-2D015	200 / 125 (1)	160 / 100 (1)	70 / 35 (1)	25	35 / 16 (1)	FD
MT72-2D018	250 / 160 (1)	160 / 100 (1)	95 / 35 (1)	35	50 / 16 (1)	FD
(1): Value before / is for single-phase model, value after / is for three-phase model.						
Three-phase: 200 - 240V, 50/60Hz						
MT72-2T3P7	40	32	6	4	2.5	FA
MT72-2T5P5	63	40	10	10	2.5	FB
MT72-2T7P5	63	40	16	10	2.5	FB
MT72-2T011	100	63	25	16	16	FD
MT72-2T015	125	100	35	25	16	FD
MT72-2T018	160	100	35	35	16	FD
MT72-2T022	200	125	35	35	16	FE
MT72-2T030	200	125	50	50	25	FE
Three-phase: 380 - 460V, 50/60Hz						
MT72-4T2P2	16	10	1.5	0.75	2.5	FA
MT72-4T3P7	25	16	2.5	2.5	2.5	FA
MT72-4T5P5	32	25	4	4	2.5	FA
MT72-4T7P5	40	32	6	6	2.5	FB
MT72-4T011	63	40	10	10	2.5	FB
MT72-4T015	63	40	16	16	16	FB
MT72-4T018	100	63	16	16	16	FC
MT72-4T022	100	63	25	25	16	FC
MT72-4T030 MT72-4T030-SM	125	100	35	35	16	FD FF
MT72-4T037 MT72-4T037-SM	160	100	35	35	16	FD FF
MT72-4T045	200	125	35	35	16	FE
MT72-4T055	200	125	50	50	25	FE

4.2.2 Power Terminal Lug

Select the lug of power terminal according to the size of terminal, screw size and max. outer diameter of lug. Refer to Table 4-3.

Take the round terminal as an example.

Table 4-3 Selection of power terminal lug



Size	FA	FB	FC / FD / FF	FE
Screw size	M4	M5	M6	M8
Tightening torque (N. M)	1.2 - 1.5	2.5 - 3.0	4.0 - 5.0	9.0 - 10.0
Max. outer diameter of lug d (mm)	9.9	12	15.5	24

4.3 Power Terminals and Wiring

4

Danger

- The bare metal part of the power terminal wiring must be wrapped with insulating tape.

Warning

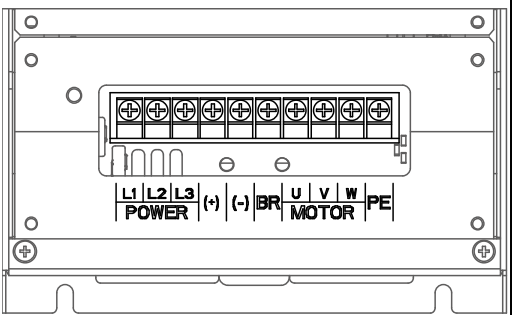
- Check that the AC input supply voltage matches the rated input voltage of the drive controller.

4.3.1 Power Terminal Description

Table 4-4 Power terminal description

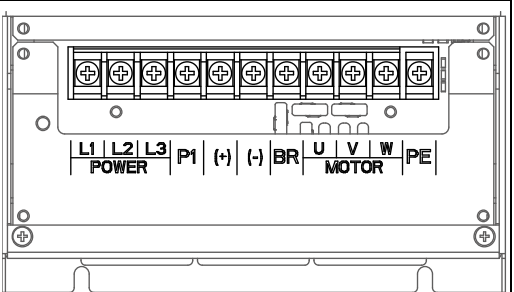
FA

- L1, L2, L3: Three-phase AC power input terminal
- U, V, W: MONT72 output terminal, connected to three-phase AC motor
- (+), (-): DC power input terminal; DC input terminal of the energy feedback unit
- (+), BR: Connect the brake resistor
- PE: Ground terminal, connected to the ground



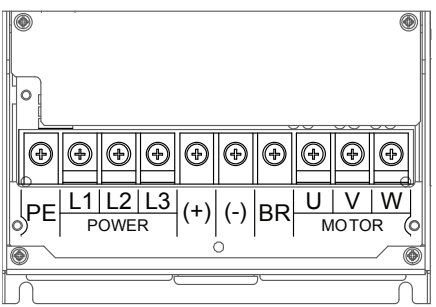
FB / FD / FE

- L1, L2, L3: Three-phase AC power input terminal
- U, V, W: MONT72 output terminal, connected to three-phase AC motor
- P1, (+): External DC reactor, factory shorted
- (+), (-): DC power input terminal; DC input terminal of the energy feedback unit
- (+), BR: Connect the brake resistor
- PE: Ground terminal, connected to the ground



FC / FF

- L1, L2, L3: Three-phase AC power input terminal
- U, V, W: MONT72 output terminal, connected to three-phase AC motor
- (+), (-): DC power input terminal; DC input terminal of the energy feedback unit
- (+), BR: Connect the brake resistor
- PE: Ground terminal, connected to the ground



4.3.2 Power Terminal Wiring

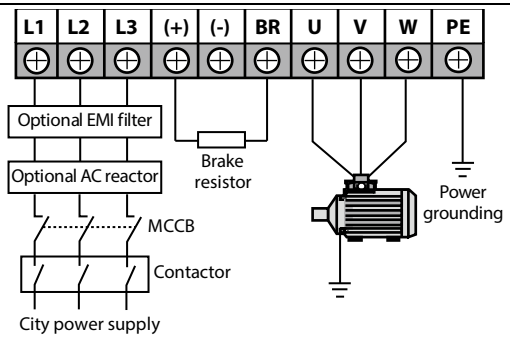
During the test run, please confirm whether the elevator is going up when the command is up. If the elevator is down, reverse the set value of F00.08 (Running direction selection). The power terminal wiring is shown in Table 4-5.

Contactor, MCCB, power cord, motor line, grounding wire selection, see section 4.2.1 Wiring Specifications of Input and Output, page 15.

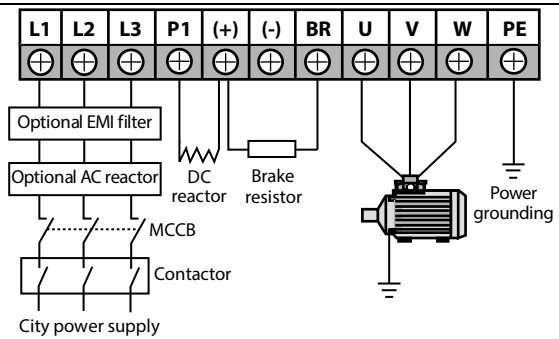
For the selection of braking resistor, see section 2.6 Resistor Selection, page 11.

Table 4-5 Power terminal wiring

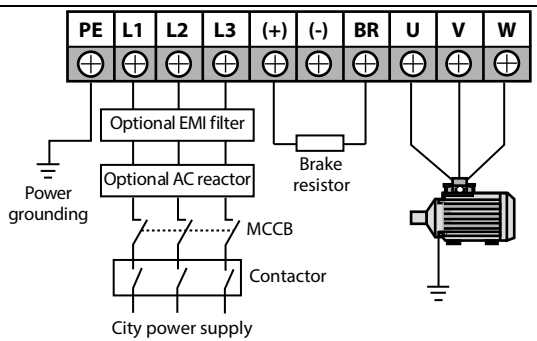
FA



FB / FD / FE



FC / FF



Note: Single-phase input models can connect single-phase input power to any two phases of L1, L2, L3.

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4.4 Control Board

Danger

- The control circuit is designed as an ELV (Extra Low Voltage) circuit, which is basically insulated from the power circuit. The drive controller cannot be touched after power-on.

Warning

- If the control circuit is connected to an external device with a port that is accessible during power-up (SELV circuit), be sure to add a level of additional insulation protection isolation to ensure that the original SELV voltage level of the external device is not changed.
- It is forbidden to connect the control terminal other than the relay terminal to the AC 220V voltage signal.

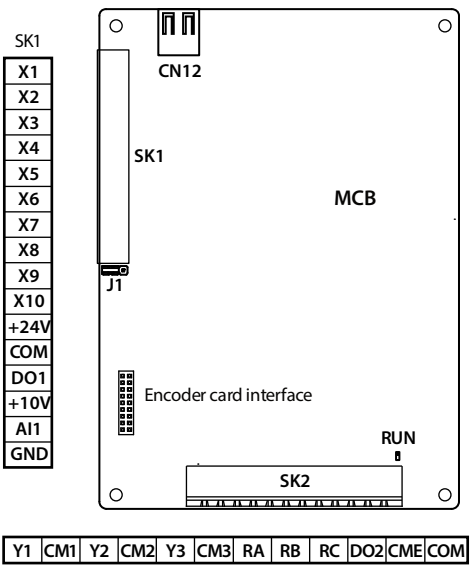

Figure 4-1 MCB terminals

4.4.1 Indicators and Jumper Description

Table 4-6 Indicators and jumper description

Indicators and jumper	Description
RUN indicator (Green)	Normal, always on; Running, flashing period 0.6s.
J1 jumper 	Digital input terminals X1 - X10 are high / low level selection: When 1,2pin is shorted, it is active low (factory setting); When 2,3pin is shorted, it is active high.

4.4.2 Controlling Terminals Description

Table 4-7 Controlling terminals description

Terminals		Description
+10, GND	Analogue power	Analog input with +10V reference supply, maximum allowable output current 100mA • GND is isolated from COM
AI1, GND	Analogue input	Input voltage range 0 - 10V, input impedance 32kΩ
X1 - X10, COM	Digital input	Programmable bipolar optional input signal Input voltage range 0 - 30VDC, input impedance 4.7kΩ
+24V, COM	Digital output	External DC24V power input, power supply for input and output circuits • COM is isolated from CME
DO1, COM	Digital output	Programmable optocoupler isolation, open collector output Voltage range 0 - 30VDC, maximum current 50mA • CME is isolated from COM. Please short CME and COM when using
DO2, CME	Digital output	
Y1-CM1, Y2-CM2, Y3-CM3	Relay 1-3 output Y1 - Y3	Normally open relay output Contact capacity: 250VAC/3A or 30VDC/3A
RA / RB / RC	Relay 4 output Y4	RB, RC normally closed, RA, RC normally open Programmable output, contact capacity: 250VAC/5A or 30VDC/5A
CN12	Bluetooth connection	External Bluetooth module, debugging through mobile APP

4.4.3 Terminals Wiring

In order to reduce the interference and attenuation of the control signal, the length of the control cable should be limited to 50m and the distance from the cable of the motor should be greater than 0.3m. The control cable must be shielded cable, and the analog signal cable should be twisted pair shielded cable.

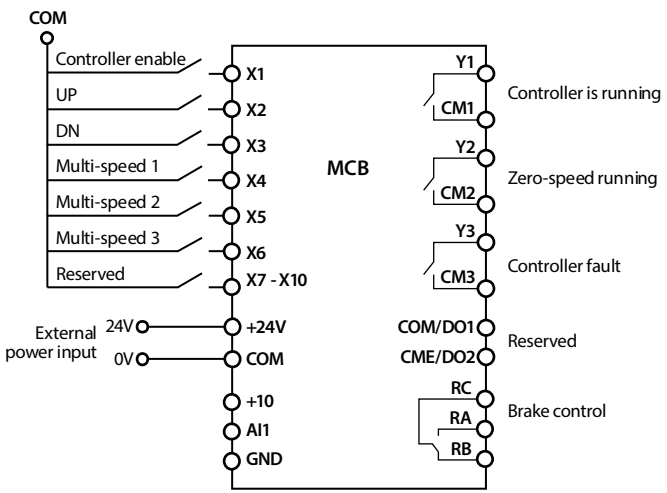

Figure 4-2 MONT72 terminals wiring

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Digital input terminal (X) wiring

Dry contact mode: The factory default is active low, and the wiring is as shown in Figure 4-3.

NPN mode: The external controller is the connection mode of the common emitter output of the NPN type, as shown in Figure 4-3.

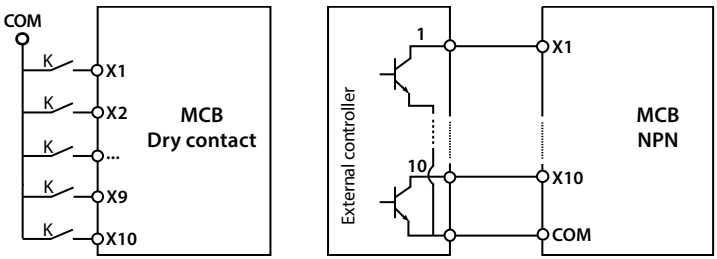

Figure 4-3 X terminals wiring

Analog input terminal (AI) wiring

When AI1 is a voltage input, the input voltage range is 0 - 10V, as shown in Figure 4-4.

When AI1 is used as the input terminal of the motor overheat detection signal, the wiring is as shown in Figure 4-4. The thermistor embedded in the stator coil of the motor is connected to AI1.

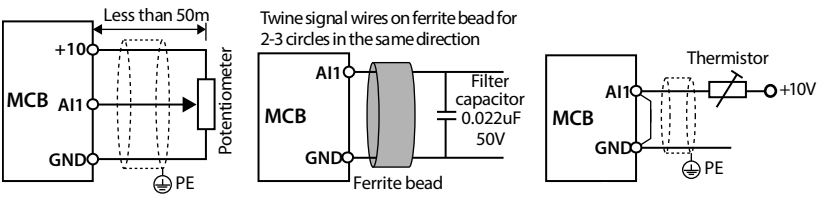

Figure 4-4 AI1 terminals wiring

Note:

In order to reduce the interference and attenuation of the control signal, the length of the control cable should be limited to 50m, and the shielding layer is reliably grounded.

In the case of serious interference, the analog input signal needs to add filter capacitor or ferrite magnetic ring, as shown in Figure 4-4.

Digital output terminal (DO) wiring

DO is the open collector output, as shown in Figure 4-5.

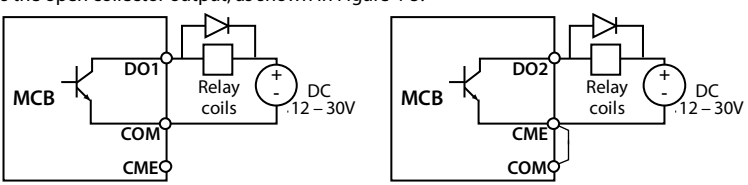

Figure 4-5 DO terminals wiring

4.5 Encoder Card

4.5.1 Introduction

The MONT72 offers four encoder expansion cards (optional), models and functions as shown in Table 4-8.

Table 4-8 Encoder card

Encoder interface boards	Functions
HD-PG2-OC-FD OC encoder interface board with frequency demultiplication (FD) output	• Support the differential ABZ signals and the pulse FD output; • Apply to asyn. motor closed-loop vector control (VC)
HD-PG5-SINCOS-FD SINCOS encoder interface board with FD output	• Support the SINCOS signal and the pulse FD output; • Apply to syn. motor closed-loop vector control (VC)
HD-PG6-UVW-FD Line drive encoder interface board with FD output	• Support the differential ABZ and UVW signal and the pulse FD output; • Apply to syn. motor closed-loop vector control (VC)
HD5L-PG1-SC Serial communication encoder card with FD output	• Support serial communication encoder; Support EnDat protocol; • Suitable for synchronous motor closed loop vector control (VC)

4.5.2 Wiring Requirement

1. Encoder card wire should be laid separately and keep distance from power cables and forbidden to parallel with them.

2. Encoder card wire should be installed inside separated metal conduits and connected to ground firmly.

4.5.3 FD Description

FD setting

To change the FD coefficient, shift 6-digit FD switches. When the switch shifts to ON, it means "1", otherwise means "0". Convert the 6-digit binary number into decimal number. Multiple the decimal number by 2, the result is FD coefficient, as shown in Figure 4-6.

Maximum value is "111111" which is 63*2 FD.

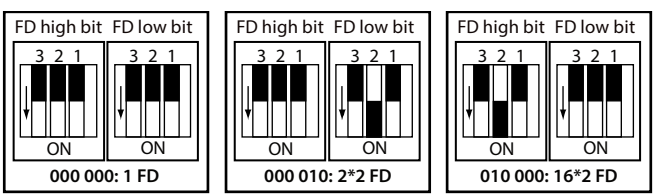

Figure 4-6 FD description

FD wiring

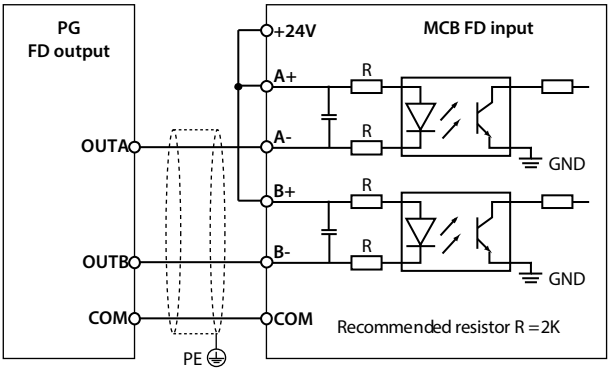

Figure 4-7 FD optocoupler input

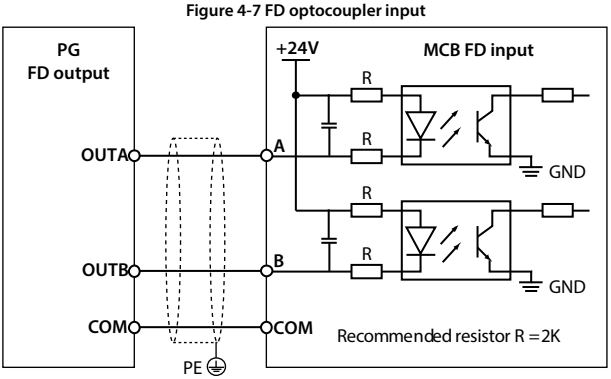

Figure 4-8 Single-ended optocoupler input

4.5.4 HD-PG2-OC-FD

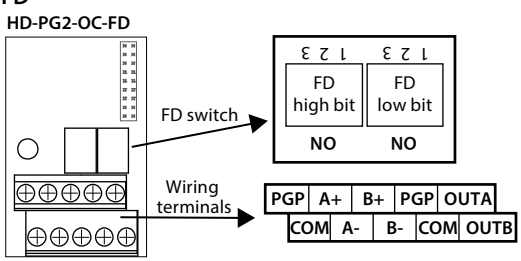

Figure 4-9 HD-PG2-OC-FD

Frequency divider switch

The crossover switch is described in section 4.5.3 FD Description.

Terminals description

Table 4-9 Terminals description

Terminals	Description	Terminals	Description
PGP	+12V power output	OUTA	Divided output A signal, NPN type OC output
COM	Power ground	OUTB	Divided output B signal, NPN type OC output
A+ / A-	Encoder A+ / A- signal	COM	Frequency division output signal ground
B+ / B-	Encoder B+ / B- signal		

Wiring

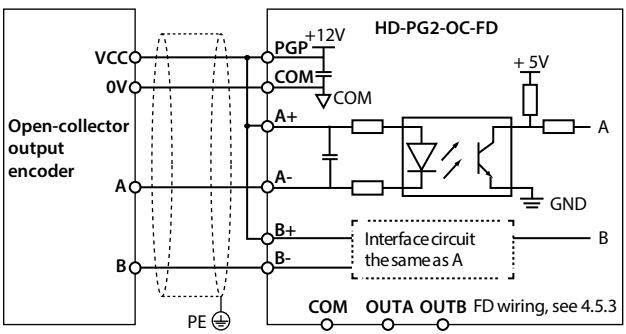

Figure 4-10 Open collector output encoder wiring

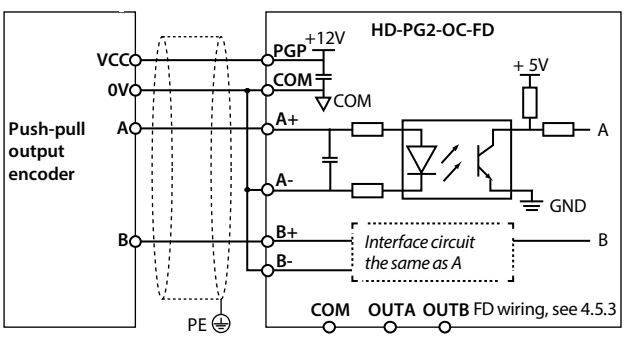

Figure 4-11 Push-pull output encoder wiring

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4.5.5 HD-PG5-SINCOS-FD

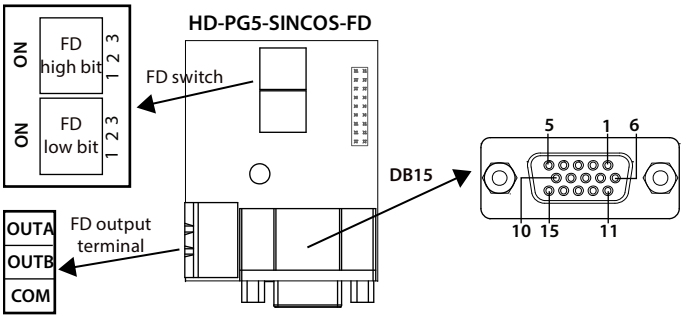

Figure 4-12 HD-PG5-SINCOS-FD

FD switch

FD switch is shown as section 4.5.3 FD Description.

Terminals description

Connect the DB15 terminal to the DB15 socket of motor encoder signal cable.

Table 4-10 DB15 and terminals description

Terminals		Description	Terminals		Description
1 / 8	B- / B+	Differential signal B- / B+	12 / 13	D+ / D-	Differential signal D+ / D-
3 / 4	R+ / R-	Differential signal R+ / R-	2 / 14 / 15		Reserved
5 / 6	A+ / A-	Differential signal A+ / A-			
7	GND	Power supply ground	OUTA		Output A signal, NPN type OC output
9	PGVCC	+5V power supply	OUTB		Output B signal, NPN type OC output
10 / 11	C+ / C-	Differential signal C+ / C-	COM		Output ground, isolated from GND

Connection

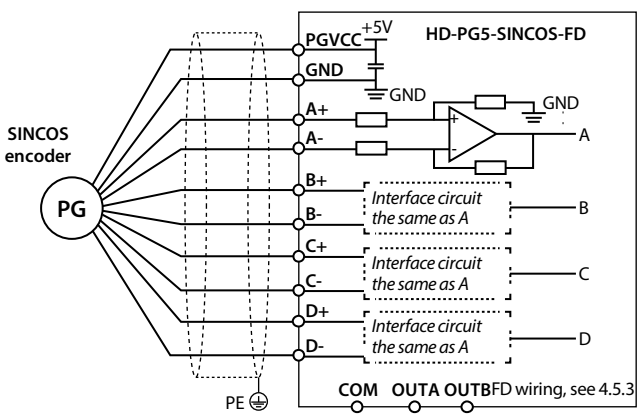

Figure 4-13 Connection of SINCOS encoder

4.5.6 HD-PG6-UVW-FD

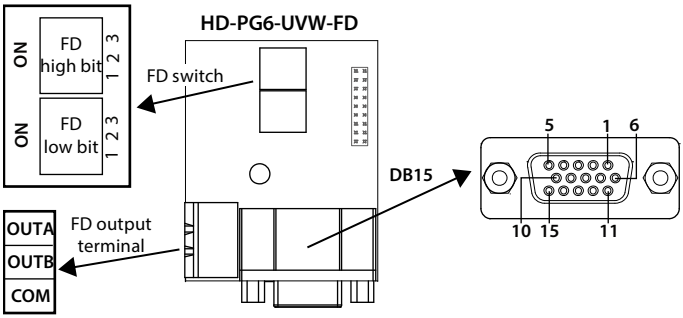

Figure 4-14 HD-PG6-UVW-FD

FD switch

FD switch is shown as section 4.5.3 FD Description.

Terminals description

Connect the DB15 terminal to the DB15 socket of motor encoder signal cable.

Table 4-11 DB15 and terminals description

Terminals		Description	Terminals		Description
1 / 2	A+ / A-	Differential signal A+ / A-	13	PGVCC	+5V power supply
3 / 4	B+ / B-	Differential signal B- / B+	14	PGGND	Power supply ground
5 / 6	Z+ / Z-	Differential signal Z+ / Z-	15		Reserved
7 / 8	U+ /U-	Differential signal U+ / U-	OUTA		Output A signal, NPN type OC output
9 / 10	V+ / V-	Differential signal V+ / V-	OUTB		Output B signal, NPN type OC output
11 / 12	W+ / W-	Differential signal W+ / W-	COM		Output ground, isolated from GND

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Connection

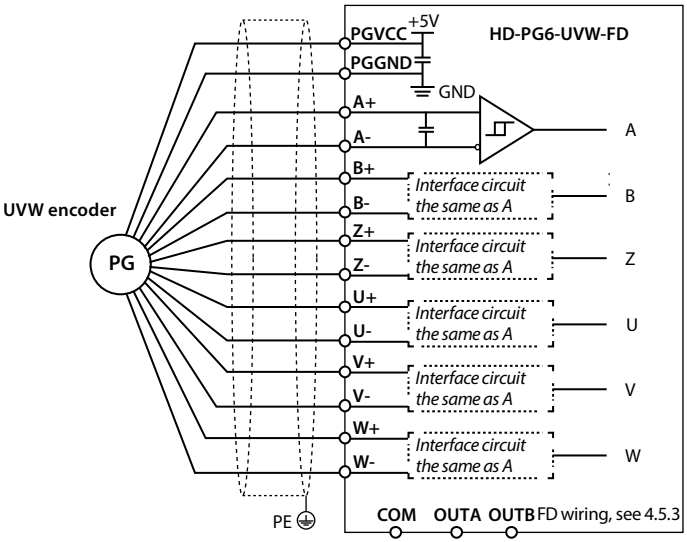

Figure 4-15 UVW encoder wiring

4.5.7 HD5L-PG1-SC

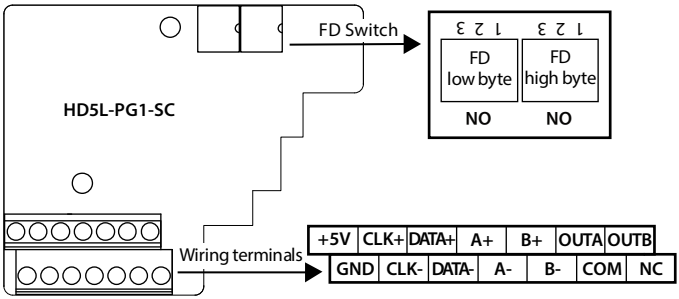

Figure 4-16 HD5L-PG1-SC

Terminals description

Table 4-12 Terminals description

Terminals	Description	Terminals	Description
+5V	+5V power supply	A+ / A-	Encoder differential sine and cosine analog signal A
GND	+5V power ground	B+ / B-	Encoder differential sine and cosine analog signal B
CLK+ / CLK-	Encoder differential clock signal CLK	OUTA	Output A signal, OC output
DATA+ / DATA-	Encoder differential data signal DATA	OUTB	Output B signal, OC output
		COM	Output signal ground, isolated from GND

Connection

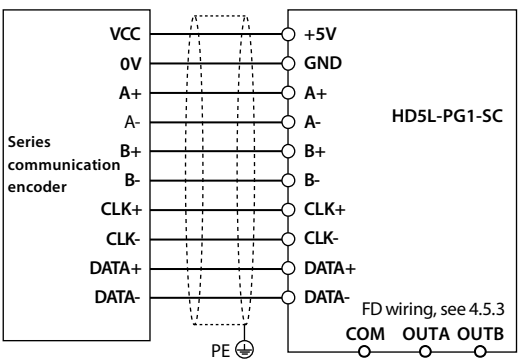

Figure 4-17 Serial communication encoder wiring

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4.6 Meet EMC Requirement of Installation

4.6.1 Correct EMC Installation

According to national standards GB/T12668.3, the controller should meet the two requirements of electromagnetic interference (EMI) and anti-electromagnetic interference. The international standards IEC/61800-3 (VVVF drive system part 3: EMC specifications and test methods) are identical to the national standards GB/T12668.3.

MONT72 are designed and produced according to the requirements of IEC/61800-3. Please install the controller as per the description below so as to achieve good electromagnetic compatibility (EMC).

- In a drive system, the controller, control equipment and sensors are installed in the same cabinet; The electromagnetic noise should be suppressed at the main connecting points, and the EMI filter and AC reactor installed in cabinet to satisfy the EMC requirements.
- The most effective but expensive measure to reduce the interference is to isolate the noise source and the noise receiver, which should be considered in mechanical system design phase. In driving system, the noise source can be controller, braking unit and contactor. Noise receiver can be automation equipment, encoder and sensor etc.

The mechanical / system is divided into different EMC areas according to electrical characteristics. The recommended installation positions are shown in Figure 4-18.

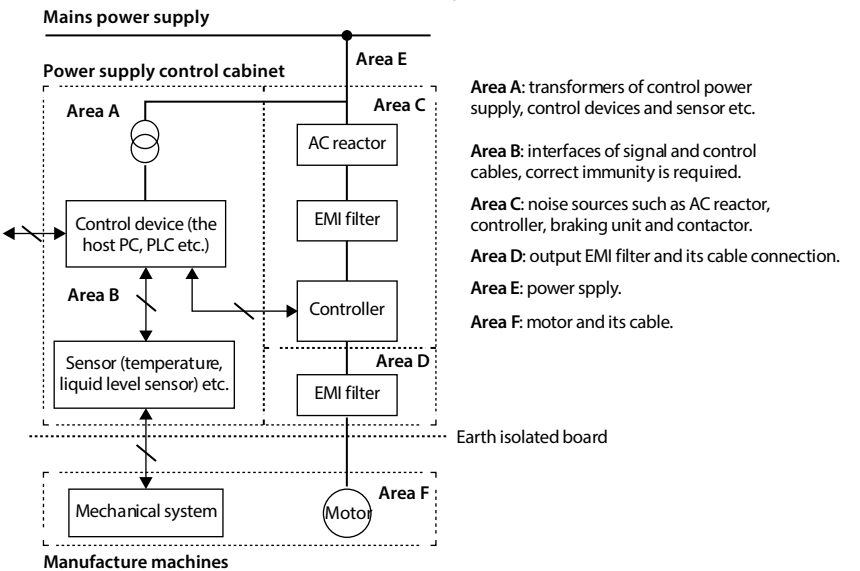

Figure 4-18 System wiring

- All areas should be isolated in space to achieve electromagnetic decoupling effect.
- The min. distance between areas should be 20cm, and use grounding bars for decoupling among areas, the cables from different area should be placed in different tubes.
- EMI filters should be installed at the interfaces between different areas if necessary.
- Bus cable (such as RS485) and signal cable must be shielded.

4.6.2 Wiring Requirement

In order to avoid interference intercoupling, it is recommended to separate the power supply cables, motor cables and the control cables, and keep enough distance among them, especially when the cables are laid in parallel and are long enough.

The signal cables should cross the power supply cables or motor cables, keep it perpendicular (90°) as shown in Figure 4-19.

Distribute the power supply cables, motor cables and control cables in different pipelines.

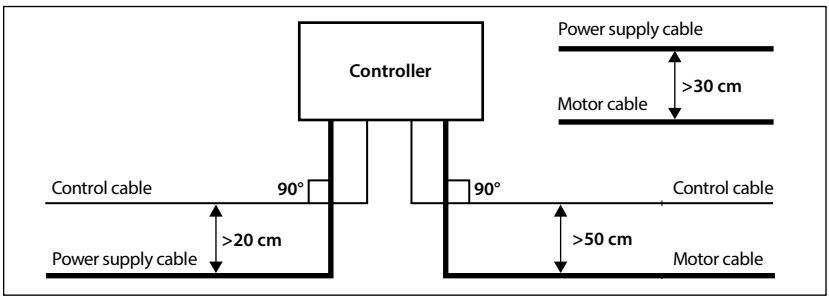

Figure 4-19 System wiring

Shielded / armoured cable: High frequency low impedance shielded cable should be used.
For example: Copper net, aluminum net or iron net.

Normally, the control cables must use the shielded cables and the shielding metal net must be connected to the metal enclosure of the controller by cable clamps as shown in Figure 4-20.

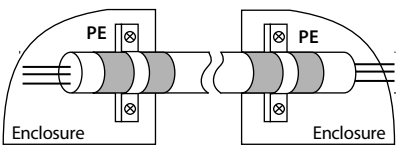

Figure 4-20 Shielded cable connection

4.6.3 Motor Connection

The longer cable between the controller and the motor is, the higher frequency leakage current will be, causing the controller output current to increase as well. This may affect peripheral devices.

When the cable length is longer than 100 meters, it is recommended to install AC output reactor and adjust the carrier frequency according to Table 4-13.

Table 4-13 Carrier frequency and the cable length between controller and motor

Cable length	< 30m	30 - 50m	50 - 100m	≥ 100m
Carrier frequency	15kHz below	10kHz below	5kHz below	2kHz below

The cross sectional area (CSA) of controller cables should refer to 4.2 Peripheral Accessories Selection, on page 15.

The controller should be derated if motor cables are too long or their CSA is too large. The current should be decreased by 5% when per level of CSA is increased. If the CSA increase, so do the current to ground and capacitance.

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4.6.4 Ground Connection

The grounding terminals PE must be connected to ground properly. The grounding cable should be as short as possible (the grounding point should be as close to the controller as possible) and the grounding area should be as large as possible. The grounding resistance should be less than 10Ω.

Do not share the grounding wire with other devices (A). MONT72 can share grounding pole with other devices (C). It achieves the best effect if MONT72 and other devices use dedicated grounding poles (B), as shown in Figure 4-21.

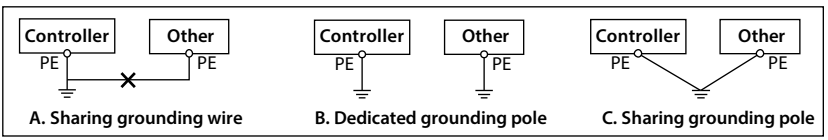

Figure 4-21 Grounding method

When using more than one controller, be careful not to loop the ground wire as shown in Figure 4-22.

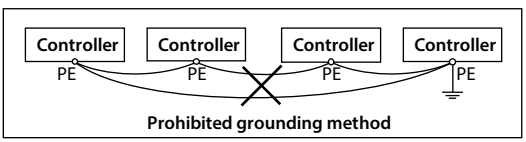

Figure 4-22 Prohibited grounding method

4.6.5 EMI Filter

The EMI filter should be used in the equipment that may generate strong EMI or the equipment that is sensitive to the external EMI. The EMI filter is a dual-way low pass filter through which lower frequency current can flow while higher frequency current can hardly flow.

Function of EMI filter

1. The EMI filter ensures the equipment not only satisfy the conducting emission and conducting sensitivity in EMC standard but also can suppress the radiation of the equipment.

2. It can prevent the EMI generated by equipment from entering the power cable and the EMI generated by power cable from entering equipment.

Common mistakes in using EMI filter

Common mistakes in using EMI filter	
1	**Too long the power cable is between the EMI filter and the controller** The filter inside the cabinet should be located near to the input power source. The length of the power cables should be as short as possible.
2	**Too close the input and output cables of the EMI filter** The distance between input and output cables of the filter should be as far apart as possible. Otherwise the high-frequency noise may be coupled between the cables and bypass the filter. Thus, the filter will become ineffective.
3	**Bad grounding of the EMI filter** The enclosure of EMI filter must be grounded properly to the metal case of the controller. In order to achieve better grounding effect, make use of a special grounding terminal on the enclosure. If using one cable to connect the filter to the case, the grounding is useless for high frequency interference. When the frequency is high, so is the impedance of cable, hence there is little bypass effect.

4.6.6 Conduction, Radiation, Radio Frequency Interference Countermeasures

EMI of the controller

The operating theory of controller means that some EMI is unavoidable. The controller is usually installed in a metal cabinet which normally little affects the instruments outside the metal cabinet. The cables are the main EMI source. If connect the cables according to this manual, the EMI can be suppressed effectively.

If the controller and other control equipment are installed in one cabinet, the area rule must be observed. Pay attention to the isolation between different areas, cable layout and shielding.

Reducing conducted interference

Add a noise filter to suppress conducted interference on the output side. Additionally, conducted interference can be efficiently reduced by threading all the output cables through a grounded metal tube. And conducted interference can be dramatically decreased when the distance between the output cables and the signal cables is above 0.3m.

Reducing RF interference

The I/O cables and the controller produce radio frequency interference. A noise filter can be installed both on the input side and output side, and shield them with iron utensil to reduce RF interference.

The wiring distance between the controller and the motor should be as short as possible shown in Figure 4-23.

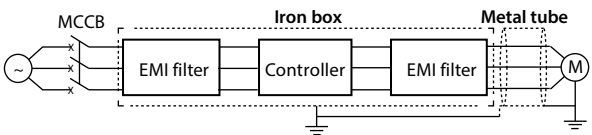

Figure 4-23 Reducing RF interference

4.6.7 Reactor

AC input reactor

The purpose of installing an AC input reactor: To increase the input power factor; To dramatically reduce the harmonics on the input side at the high voltage point of common coupling and prevent input current unbalance which can be caused by the phase-to-phase unbalance of the power supply.

DC reactor

The installation of a DC reactor can increase the input power factor, improve the overall efficiency and thermal stability of controller, substantially eliminate the upper harmonics influence on performance of controller, and decrease the conducted and radiated electromagnetic emissions from the controller.

AC output reactor

When the length of cable between controller and motor is more than 100m, it will cause leakage current and controller tripping. It is suggested that user should consider installing an AC output reactor.

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Chapter 5 Operation Instructions

Danger

- Only when the terminal cover of MONT72 has been fitted can you switch on AC power source. Do not remove the cover after power is switched on.
- Ensure the motor and the mechnical device are in the use application before MONT72 starts.
- Keep away from MONT72 if the auto-restart function is enabled at power outage.
- To change the main control PCBA, correctly set the parameters before operating.

Warning

- Do not check or detect the signal during MONT72 running.
- Do not randomly change MONT72 parameter setting.
- Please thoroughly complete all control debugging and testing, make all adjustments and conduct a full safety assessment before switching the run command source of MONT72.
- Do not touch the energy-depletion braking resistor due to the high temperature.

5.1 Function Description

Note:

In the following sections, you may encounter control, running and status of MONT72 description many times. Please read this section. It will help you to correctly understand and use the functions to be discussed.

5.1.1 MONT72 Operation Mode

The operation mode defines how MONT72 receives run commands (start or stop command) and speed command. There are selectable through parameter F00.05.

Operation mode	Description
Keypad control	The run command is controlled by **RUN**, **STOP** and **JOG** keys of the keypad; And the run speed is set by F00.07.
Terminal analogue control	The run command is controlled by UP and DN of the terminal; And the run speed is set by AI1 terminals.
Terminal speed control	The run command is controlled by UP and DN of the terminal; And the run speed is set by MS1 - MS3 multi-step speed terminal combination.

5.1.2 Controller Status

Controller status	Description
Stop status	After MONT72 is switched on and initialized, if no run command inputs or the stop command is given, there will be no output from U / V / W of MONT72.
Run status	The controller will start output from U / V / W terminals after it receives the run command. And the LCD keypad will display ⬇ / ⬆ (motor reversed rotation/ positive rotation).
Motor parameters auto-tuning	Set F07.06 / F10.10 = 1 or 2, MONT72 will receive the run command then enter motor parameters auto-tuning status. If the auto-tuning process is completed, the controller will enter into stop status.
Fault alarm status	MONT72 has fault.
Under-voltage status	MONT72 is under-voltage.

5.1.3 Control Mode

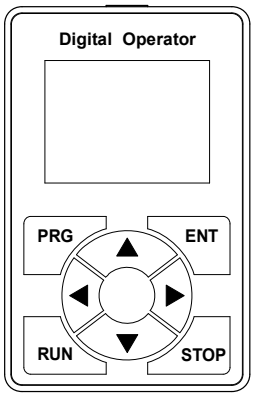
MONT72 series have three control modes which are V/f control, SVC control and VC control. (Refer to F00.01 for more detail)

5.1.4 Controller Running Mode

Running mode	Description
Auto-tuning running	Set F07.06 / F10.10 = 1 or 2 and press RUN key to enter the auto-tuning running.
MS speed running	The run speed is set by MS1 - MS3 in combination or communication. • This mode is accessible when F00.05 = 2.
Inspection running	When inspection signal is valid, the speed will be set by F05.08 (Inspection run speed). This mode is accessible when F00.05 = 1, 2.
Battery-driven running	When emergency signal is valid, the speed will be set by F05.09 (Battery driven run speed). This mode is accessible when F00.05 = 1, 2.
Normal running	Controlled by keypad (F00.05 = 0) or terminal analogue (F00.05 = 1).

5.2 LCD Keypad

MONT72 LCD keypad.



Buttons	Functions
PRG	Entry or exit programming key
ENT	a. Enter lower menu b. Confirm saving the data
RUN	In the keypad control, press this key to run MONT72
STOP	a. In the keypad control, press this key to stop MONT72 b. In the detection fault, press this key to reset at fault
▲	Increase value or parameter
▼	Decrease value or parameter
◀	a. Select the modification bit of the setting data b. Cycle switch stop / run display status parameter
▶	Select the modification bit of the setting data

5

5.2.1 Display Description

Power on display interface

When the keypad is powered on, the display interface is as shown in Figure 5-1.

After the "Power-on Display Interface" is displayed on keypad, if the MONT72 does not set the user password, the "Status Display Interface" is displayed; If the user password is set, the "Enter Password Display Interface" is displayed.

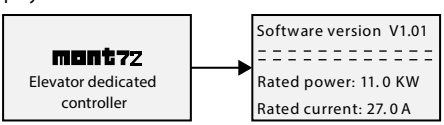


Figure 5-1 Power-on display

Password entering interface

When the MONT72 is configured with parameter password protection, you must enter the correct password to perform the operation of the keypad.

When the MONT72 is powered on or the keypad has no button operation within 5 minutes, the keypad displays "Enter Password Display Interface", as shown in Figure 5-2.

User password clearing, modification, setting, see section 5.2.3.

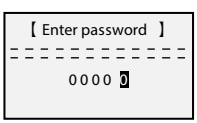


Figure 5-2 Enter the password display interface

Note:

If the MONT72 is not set with password protection, the "Enter Password Display Interface" does not appear when the power is turned on.

Fault alarm display status

When the MONT72 fails, the keypad displays the "Fault Display Interface", as shown in Figure 5-3.

- To view the fault log information, go to the F17 group to view the fault log information.
- The fault can be reset by the **STOP** key of the keypad and the external fault reset terminal.

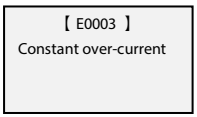
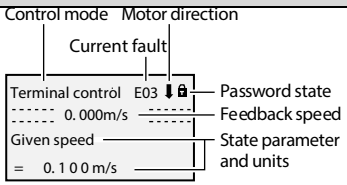


Figure 5-3 Fault alarm status

Status display interface

Display content and description	
	
Control mode	Panel control, emergency operation, overhaul operation, analog control, multi-speed speed maintenance operation, multi-speed control, multi-speed 0, multi-speed 1, multi-speed 2, multi-speed 3, multi-speed 4, multi-speed 5, multi-speed 6, multi-section speed 7 and other ways
Current fault	The fault code is displayed when there is a fault, and is not displayed when there is no fault.
Running direction	⬇ Elevator down, ⬆ Elevator up
Password status	User password, No user password
Parameters	Display the run / stop status parameters (F15.02 - F15.13), press ◀ or ▶ can display in turns
Responding speed	Display responding speed

5.2.2 Four-layer Menu Description

The four-layer menu is: operation as shown in Figure 5-4, the button description is shown in Table 5-1.

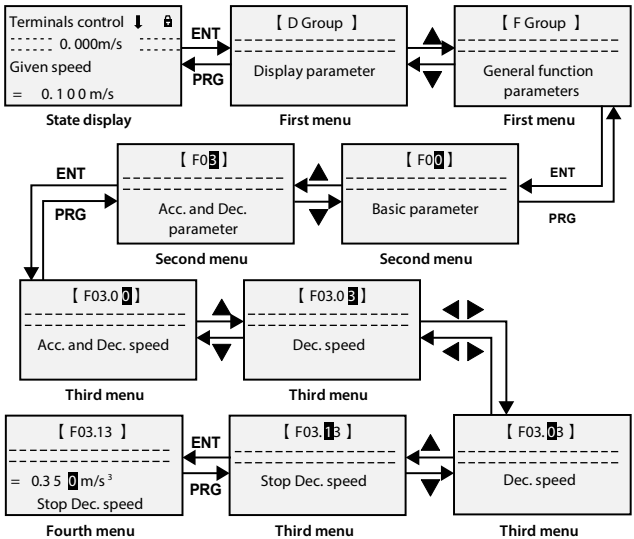


Figure 5-4 Four-layer menu description

Table 5-1 Four levels of menu instructions

Button	1st menu	2nd menu	3rd menu	4th menu
PRG	Fault, return to fault display; Fault cleared, return to run or stop status display	Return to first-level menu	Return to second-level menu	Do not save the present value and return to third-level
ENT	Enter to second-level menu	Enter to third-level menu	Enter to fourth-level menu	Save the present value and return to third-level
▲	Select function group. Cycle according to D-F-Y-U	Modify No. function. Increase by 1 when press this key one time	Modify the internal No. of function group. Increase by 1 according to the present modified bit	Modify function value. Increase by 1 according to the present modified bit
▼	Select function group. Cycle according to U-Y-F-D	Modify No. function. Decrease by 1 when press this key one time	Modify the internal No. of function group. Decrease by 1 according to the present modified bit	Modify function value. Decrease by 1 according to the present modified bit
◀	Invalid	Invalid	Unit position, ten-digit switch	Unit, ten, hundred, thousand, ten thousand switching
▶	Invalid	Invalid	Unit position, ten-digit switch	Unit, ten, hundred, thousand, ten thousand switching

5.2.3 Example for Keypad

Parameter setting

For example: To modify the setting value of the F00.07 from 1.500m/s to 1.000m/s, refer to Figure 5-5.

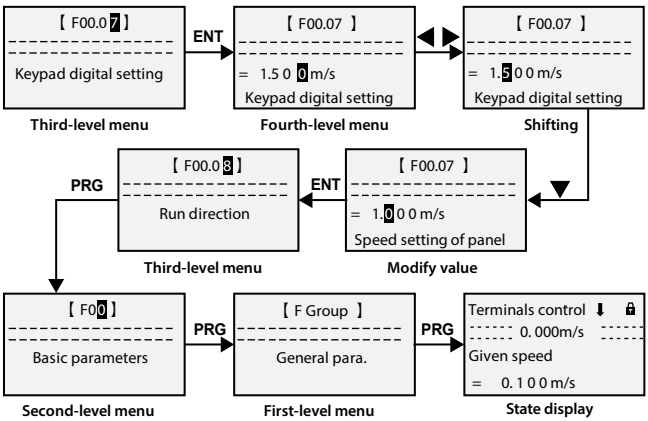


Figure 5-5 Parameter setting

When setting fourth-level menu, if the parameter is not in anti-color displaying, it indicates that this parameter can't be modified. The possible reasons are as follows:

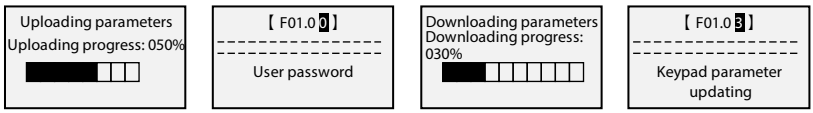
- The function parameter can't be modified, such as the actual detected parameters or recorded parameters etc.
- Only when the controller stops can the function parameter be modified.
- Only input the correct password can it edit the function parameter due to the valid password.

Upload and download parameters

Upload: When F01.03 = 1, it uploads the setting value to the keypad. When the upload is finished, the keypad will jump to display F01.00.

Download: When F01.02 = 2, it downloads the setting value from the keypad. When the download is finished, the keypad will jump to display F01.03.

The upload and download parameters are as shown in Figure 5-6.



Uploading | Uploaded | Downloading | Parameter downloaded

Figure 5-6 Display upload and download parameters

Note:

1. Parameter uploading and downloading can only be performed under mode of keypad control.

2. When downloading parameters, it displays "dFAiL" which means that the EEPROM storage parameters of keypad do not match with function parameters of MONT72.
First, upload the setting value of the correct function code to the EEPROM of keypad, and then download.

3. When uploading / downloading parameters, it displays "E0022" (keypad EEPROM fault). It will jump to next function code 10 seconds later. The troubleshooting is in Chapter 8 (on page 85).

5

User password operation

For example, if the user successfully sets the password "00003" (F01.00 = 00003) and there is no fault.

User password clearing and modification must enter the setting parameter layer F01.00. The operation flow is shown in Figure 5-7.

- No user password, when there is no fault, the keypad directly displays the “Status Display Interface”.
- No user password. When there is a fault, the keypad directly displays the “Fault Display Interface”.
- When there is a user password, if there is no fault, after entering the correct password, the keypad directly displays the “Status Display Interface”.
- If there is a user password, if there is a fault, after entering the correct password, the keypad will display “Fault Display Interface”.
- “Status Display Interface” see section 5.2.1 for details; “Fault Display Interface” see section 5.2.1 for details.

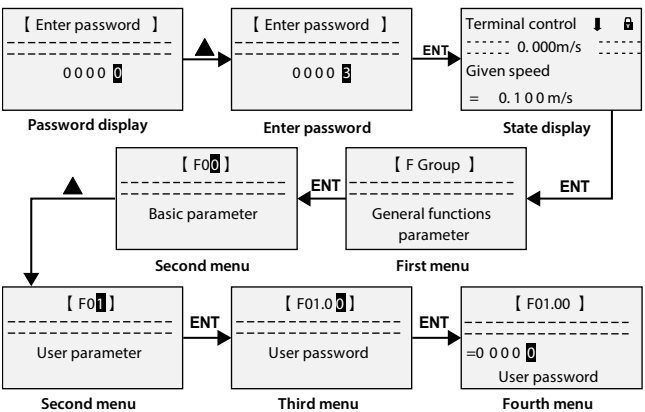


Figure 5-7 Enter the password parameter operation flow

User password clear

After entering the setting parameter layer F01.00 (F01.00 is always set to 00000), press the ENT key directly to clear the password.

User password modification and settings

After entering the setting parameter layer F01.00 (F01.00 is always set to 00000), set the password directly, press the ENT key to save.

If the operation panel button is not detected within 5 minutes, the user password will take effect; If the operation panel button is detected, the 5 minute timer will restart.

Note:

If the user forgets to set the password, he can contact the elevator manufacturer for password clearing.

5.3 Phone APP

APP debugging software is based on Android 4.3 platform, Bluetooth 4.0 development. The main functions are shown in Table 5-2.

Table 5-2 APP function description

Function	Description
Bluetooth module connection	Search for Bluetooth device MT70-BLE-A, connect mobile phone and elevator machine. Initial matching PIN code 000001
Permission settings	Select APP monitoring, operation rights and password operations
Elevator monitoring	Display current elevator system status and fault reset operation
Function parameters	Common application macro parameters, express commissioning
Expert debugging	Integrated machine parameter reading and writing, restore factory parameters, clear fault information, parameter upload and download operation
Fault handling	Current fault, historical fault, fault diagnosis, fault help, operation

Supporting Bluetooth module (MT70-BLE-A) use the mobile phone to operate the MONT72, connect the MONT72 main control board through the Bluetooth interface CN12.

***Note:** The Bluetooth module cannot be used as a USB flash drive. Cannot be plugged into the computer USB port.*

Recommended configuration of Android phone:

- CPU: Main frequency 1G or more
- Memory: 512MB or more
- Built-in capacity of the phone: At least 256MB free space
- Screen resolution: 960*540 or higher
- Recommended mobile phone brands: Huawei, Samsung, Sony, Xiaomi, Nexus
- Operating system: Android 4.3 or above

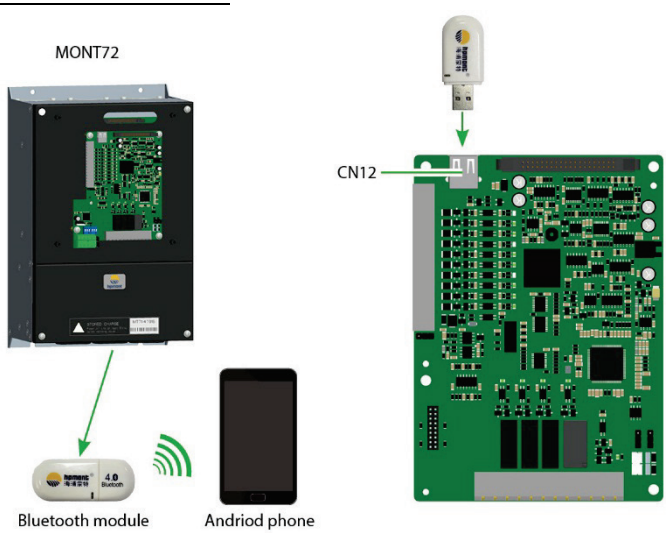


Figure 5-8 Mobile phone debugging MONT72 through Bluetooth module

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Elevator monitoring

The elevator monitoring interface display is shown in Figure 5-9 and Table 5-3.

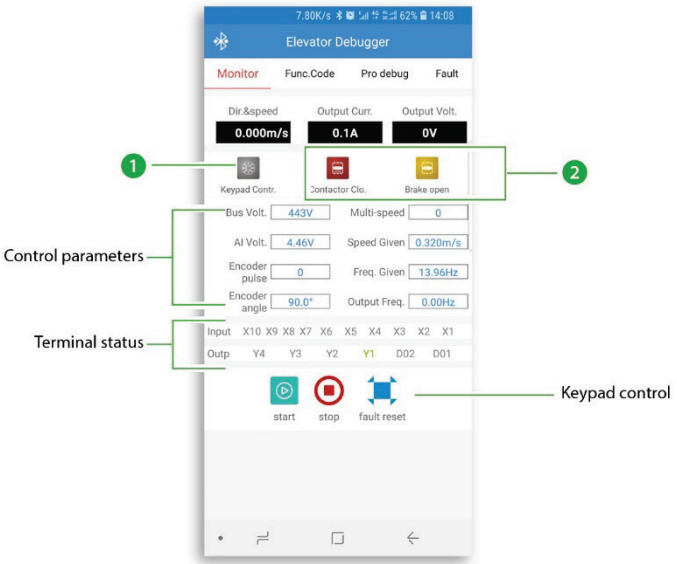

Figure 5-9 Elevator monitoring interface

Table 5-3 Elevator monitoring interface description

Function	Description				
① Contactor status	Panel control	Inspection	Multi-speed	Analog	Emergency
② Contactor status	Brake contactor is disconnected	The brake contactor is closed	Running contactor is disconnected	Running contactor is closed	
Direction and speed	Show the current running direction and speed of the elevator				
Output voltage / current	Display current output voltage and current				
Control parameters	Display the current control parameters of MONT72				
Terminal status	Displays the status of the current input and output terminals of MONT72. 0 stands for invalid while 1 stands for valid				
Keypad control	Running: Under the keypad control, press the "Run" button, the elevator runs at the panel control speed				
	End: Under the operation panel control, click the "End" button, the elevator deceleration stops the elevator				
	Fault reset: When the elevator fails, press "Fault reset" elevator reset current fault				

Chapter 6 Function Introduction

This chapter will provide user with detail function introduction of each group.

Display Parameters:

General Function Parameters:

6.1 Group D: Display Parameters

Group D is status display parameters. The users can directly check the status parameters by checking the function code of Group D.

6.1.1 D00: System Status Parameters

Ref. Code	Function Description	Setting Range [Default]
D00.00	Controller series	[Actual value]
D00.01	Rated power	[Actual value]
D00.02	Rated current	[Actual value]
D00.03	Software version of DSP	[Actual value]
D00.04	Special software version of DSP	[Actual value]
D00.05	Software version of keypad	[Actual value]
D00.06	Special software version of keypad	[Actual value]

6.1.2 D01: Drive Status Parameters

Ref. Code	Function Description	Setting Range [Default]
D01.00	Control mode	[Actual value]
D01.01	Setting speed (m/s)	[Actual value]
D01.02	Setting speed (after Acc. / Dec.) (m/s)	[Actual value]
D01.03	Feedback speed (m/s)	[Actual value]
D01.04	Setting frequency	[Actual value]
D01.05	Setting frequency (after Acc. / Dec.)	[Actual value]
D01.06	Output frequency	[Actual value]
D01.07	Output voltage	[Actual value]
D01.08	Output current	[Actual value]
D01.09	Output torque	[Actual value]
D01.10	Output power	[Actual value]
D01.11	DC bus voltage	[Actual value]
D01.12	Set Rpm	[Actual value]
D01.13	Running Rpm	[Actual value]

6.1.3 D02: Analogue Status Display Parameters

<table>
<tr><th>Ref. Code</th><th>Function Description</th><th>Setting Range [Default]</th></tr>
<tr><td>D02.00</td><td>AI1 voltage</td><td>[Actual value]</td></tr>
<tr><td>D02.01</td><td>AI1 voltage (after calculating)</td><td>[Actual value]</td></tr>
<tr><td>D02.02</td><td>Heatsink temperature</td><td>[Actual value]</td></tr>
<tr><td>D02.03</td><td>Input terminal status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display input terminal status. Each bit (binary) of this parameter stands for different physical channels which are in the below table.
• 0: Digital input terminals disconnects with common terminals.
• 1: Digital input terminals connects with common terminals.
<table>
<tr><td>Bit9</td><td>Bit8</td><td>Bit7</td><td>Bit6</td><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>X10</td><td>X9</td><td>X8</td><td>X7</td><td>X6</td><td>X5</td><td>X4</td><td>X3</td><td>X2</td><td>X1</td></tr>
</table></td></tr>
<tr><td>D02.04</td><td>Output terminal status</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">Display output terminal status. Each bit (binary) of this parameter stands for different physical channels which are in the below table.
• Positive logic: 0 stands for invalid while 1 stands for valid.
• Negative logic: 0 stands for valid while 1 stands for invalid.
<table>
<tr><td>Bit5</td><td>Bit4</td><td>Bit3</td><td>Bit2</td><td>Bit1</td><td>Bit0</td></tr>
<tr><td>Y4</td><td>Y3</td><td>Y2</td><td>Y1</td><td>DO2</td><td>DO1</td></tr>
</table></td></tr>
<tr><td>D02.05</td><td>Elevator running state</td><td>[Actual value]</td></tr>
<tr><td></td><td colspan="2">The elevator running status is displayed, displayed in 16-bit binary, as shown in the following table:
<table>
<tr><td>Bit15: Reserved</td><td colspan="2">Bit14 & Bit13: Control mode
0: Keypad control
1: Analogue control
2: Terminal multi-speed control</td><td>Bit12: Running direction
0: Down
1: Up</td></tr>
<tr><td>Bit11: Running contactor
0: Invalid
1: Valid</td><td>Bit10: Brake output
0: No output
1: Output</td><td>Bit9: Emergency running
0: Not emergency
1: Emergency</td><td>Bit8: Multi-speed terminal 3
0: Invalid
1: Valid</td></tr>
<tr><td>Bit7: Multi-speed terminal 2
0: Invalid
1: Valid</td><td>Bit6: Multi-speed terminal 1
0: Invalid
1: Valid</td><td>Bit5: Contactor feedback input
0: Invalid
1: Valid</td><td>Bit4: Brake feedback input
0: Invalid
1: Valid</td></tr>
<tr><td>Bit3: Analogue running
0: Not analogue
1: Analogue</td><td>Bit2: Multi-speed
0: Not multi-speed
1: Multi-speed</td><td>Bit1: Inspection running
0: Not inspection
1: Inspection</td><td>Bit0: Driver enable
0: Not enable
1: Enable</td></tr>
</table></td></tr>
</table>

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Ref. Code	Function Description	Setting Range [Default]
D02.06	**Driver status**	[Actual value]

Display drive controller status, displayed in 16-bit binary, as shown in the following table:

Bit15: Reserved	**Bit14:** Reserved	**Bit13:** Stop signal 0: No signal 1: Signal	**Bit12:** Contactor output 0: Invalid 1: Valid
Bit11: Brake output 0: Invalid 1: Valid	**Bit10:** Running is ready 0: Not ready 1: Ready	**Bit9:** Speed arrival 0: Not arrival 1: Arrival	**Bit8:** Parameter auto-tuning 0: Not auto-tuning 1: Auto-tuning
Bit7: Zero-speed running 0: Not zero-speed 1: Zero-speed	**Bit6:** Zero-speed signal 0: Invalid 1: Valid	**Bit5 & Bit4:** Acc. / Dec. / constant speed 00: Constant 01: Acc. 11: Reserved 10: Dec.	
Bit3: Down running 0: Not down running 1: Down running	**Bit2:** Up running 0: Not up running 1: Up running	**Bit1:** Running / stop 0: Stop 1: Running	**Bit0:** Controller fault 0: No fault 1: Fault

6.1.4 D03: Running Status Parameters

Ref. Code	Function Description	Setting Range [Default]
D03.00	**Current fault**	[Actual value]
D03.01	**Current fault sub-code**	[Actual value]
D03.02	**Acculated power-on time (hours)**	[Actual value]
D03.03	**Acculated running time (hours)**	[Actual value]
D03.04	**High bit of running times**	[Actual value]
D03.05	**Running times**	[Actual value]

6.1.5 D04: Encoder Status Parameters

Ref. Code	Function Description	Setting Range [Default]
D04.00	**C phase value of SINCOS encoder**	[Actual value]
D04.01	**D phase value of SINCOS encoder**	[Actual value]
D04.02	**A phase value of SINCOS encoder**	[Actual value]
D04.03	**B phase value of SINCOS encoder**	[Actual value]
D04.04	**UVW status of UVW encoder**	[Actual value]
D04.05	**Electrical angle**	[Actual value]
D04.06	**Pulses of PG**	[Actual value]
	Displaying number of encoder pulses can be used to check the encoder is connected correctly. If the encoder is connected correctly, when the motor is rotated, D04.08 value is incremented or decremented in accordance with the running direction.	
D04.07	**Pulse monitoring of start slip**	[Actual value]

6.2 Group F: General Function Parameters

6.2.1 F00: Basic Parameters

Ref. Code	Function Description	Setting Range [Default]
F00.00	**Motor type**	**0,1 [0]**
	0: Asyn. motor. 1: Syn. motor.	
F00.01	**Control mode**	**0 - 2 [2]**
	0: V/f control. Constant voltage / frequency ratio control. • It is applicable for special elevator occasion. This mode does not need the encoder and the control effect is not so good as the vector control. • When select V/f control, properly set the V/f control parameter of Group F07 to achieve proper efficiency. 1: SVC control. Sensorless vector control. It is only applicable for asyn. motor. 2: Closed-loop vector control. Sensor vector control. • Closed-loop vector and applicable for high accuracy speed control occasion. Generally the elevator will take this mode. ***Note:*** *1. V/f and SVC control are temporary running modes applicable when the motor does not install encoder and the elevator is in inspection running.* *2. Set motor parameter auto-tuning when select SVC or closed-loop vector control mode.* *Auto-tuning steps: Correctly set the motor nameplate parameters (F07.00 - F07.04 / F10.00 - F10.05), then start the motor parameter auto-tuning to obtain the right parameters. Meanwhile set vector control parameters of Group F08 to achieve excellent vector control efficiency.*	
F00.02	**Rated speed of elevator**	**0.100 - 4.000 [1.500m/s]**
	Refers to nominal rated speed of elevator. All speed setting value in the parameters must < F00.02.	
F00.03	**Max. output frequency**	**5.00 - 100.00 [50.00Hz]**
	Defines the max. frequency that MONT72 is allowed to output. Be careful to set reasonable parameters according to the nameplate of the motor and the actual operating conditions.	
F00.04	**Mechanical parameters of motor**	**10.0 - 6000.0 [60.0]**
	Defines the relationship between the elevator speed and the motor rotary speed. • The mechanical parameters are calculated based on the motor parameters. They determine the control precision and must be correctly set. The relationship of elevator speed and rotary speed of motor is: $$\text{Elevator speed (m/s)} = \frac{\text{Rotary speed of motor (rpm)}}{60} \times \frac{\text{F00.04}}{1000}$$ The formula for calculating F00.04 is: $$\text{F00.04} = \frac{\pi \times \text{D}}{\text{i} \times \text{Winding mode}}$$ D: Diameter of motor (mm); i: Dec. rate; Winding mode: The way that the hoist cable is wound, set according to the actual elevator setting.	
F00.05	**Operating mode**	**0 - 2 [0]**
	0: Keypad control. • Controlled by pressing the RUN or STOP key of the keypad. Set the run speed in F00.07. 1: Terminal analogue control. • The run command is controlled by UP and DN of the terminal; And the run speed is set by analogue input terminals.	

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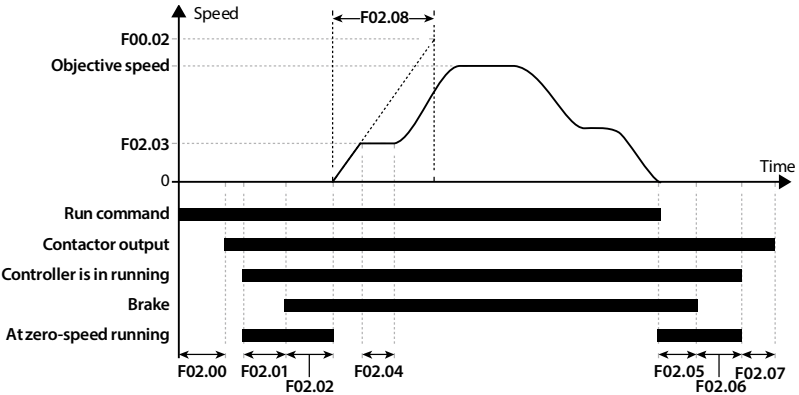
Ref. Code	Function Description	Setting Range [Default]
	2: Terminal MS control. • The run command is controlled by UP and DN of the terminal; And the run speed is set by MS1 - MS3 multi-step speed terminal combination.	
F00.07	**Keypad speed digital setting**	**0.000 - F00.02 [1.500m/s]**
	When F00.05 = 0, set target speed.	
F00.08	**Running direction selection**	**0,1 [0]**
	0: Same direction. 1: Reversed direction.	

6.2.2 F01: Protection of Parameters

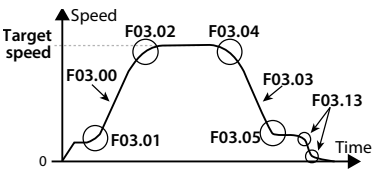
Ref. Code	Function Description	Setting Range [Default]
F01.00	**User's password**	**00000 - 65535 [0]**
	XXXXX: To enable the password protection function, set any non-zero number as the password. • Once the password is set, and detect that there is no press on the keypad within 5 minutes, the user's password will be valid. • To change the parameters, input correct password. Otherwise can not change any parameter via keypad, but only check. 00000: The factory setting and no user's password. • If user unlocks the password, it means clearing the user's password. • To unlock, change and clear the user's password, refer to section 5.2.3.	
F01.01	**Menu mode**	**0,1 [0]**
	0: Full menu mode. • All parameters can be displayed. 1: Checking menu mode. • Only parameters different from factory setting can be displayed.	
F01.02	**Function code parameter initialization**	**0 - 3 [0]**
	0: No operation. MONT72 is in regular parameter read / write status. • Whether can change the parameter depends on the user's password status and the actual operating conditions of MONT72. 1: Restore to factory settings. • Except Group F01, F07.00 - F07.14, Group F10, Group F11, F15.00, F17.11 - F17.27, Group F18 and Group Y. • Steps: If set F01.02 = 1, press to ensure and the parameters are restored to factory settings. The keypad dispalys "loading defualt para.". Then the keypad will display parameters in stop status after finish restoring to factory setting. 2: Parameter download. • Except Group F01, F17.11 - F17.27, Group F18 and Group Y. • Motor parameters, encoder parameters and magnetic pole angle etc. will be downloaded. Record the original parameters such as motor parameters, encoder parameters and magnetic pole angle etc. Or restart parameter auto-tuning. 3: Clear fault information. The fault history of F17.11 - F17.27 will be cleared.	
F01.03	**Keypad EEPROM parameter initialization**	**0,1 [0]**
	0: No operation. • MONT72 is in regular parameter read / write status. 1: Parameter upload. • Upload the current function code settings to the keypad EEPROM parameter. *Note: Group F01, F17.11 - F17.27, Group F18 and Group Y do not upload.*	

6.2.3 F02: Start & Stop Parameters

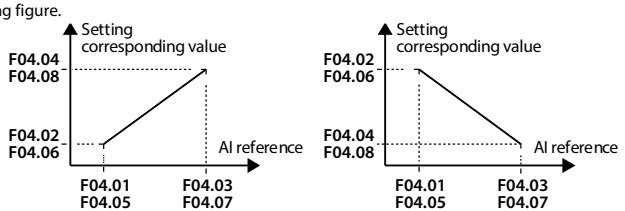


Ref. Code	Function Description	Setting Range [Default]
F02.00	**Start delay time**	**0.000 - 4.999 [0.000s]**
	When MONT72 receives the run command, it will wait for the delay time set by F02.00 and then start running. • When controlled by keypad (F00.05 = 0), F02.00 is invalid.	
F02.01	**Brake open delay time**	**0.000 - 4.999 [0.000s]**
	Defines the time from zero-speed running to output brake-open command. • F02.01 enables MONT72 to enter running status before the brake open, so as to alleviate the impact at start.	
F02.02	**Retention time of start zero-speed**	**0.000 - 4.999 [0.500s]**
	Defines the retention time from brake-open to output with speed. During the retention time, the motor has output torque, which makes more comfortable. • F06.00 = 4 (no weighing auto-compensation is used), the value of F02.02 should exceed 0.5s.	
F02.03	**Start speed**	**0.000 - 0.400 [0.000m/s]**
	Defines the initial speed required for starting the controller. • The start speed, when properly set, can minimize the start jerk.	
F02.04	**Retention time of start speed**	**0.000 - 4.999 [0.000s]**
	Defines the time in which MONT72 runs at start speed (F02.03).	
F02.05	**Brake close delay time**	**0.000 - 4.999 [0.200s]**
	Defines the time interval from zero-speed running to output brake-closed command.	
F02.06	**Retention time of stop zero-speed**	**0.000 - 4.999 [0.300s]**
	Defines the time during which the motor runs at zero-speed and has output torgue at stop, which makes more comfortable.	
F02.07	**Contactor close delay time**	**0.000 - 4.999 [0.000s]**
	Defines the running contactor delay release time after the run command is revoked.	
F02.08	**Start ramp time**	**0.000 - 2.000 [0.000s]**
	Defines the time that elevator takes to accelerate from zero to the rated speed (F00.02). • F02.08 = 0, the elevator starts from start speed directly.	

6.2.4 F03: Acc. / Dec. Parameters

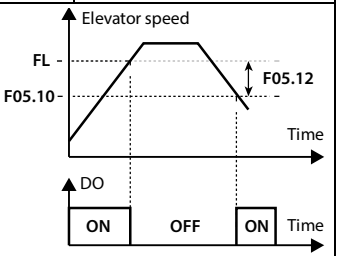
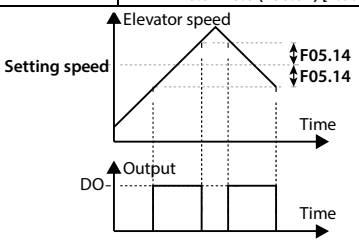
Ref. Code	Function Description	Setting Range [Default]
F03.00	**Acc. speed**	**0.020 - 9.999 [0.700m/s²]**
F03.01	**Start Acc. jerk**	**0.020 - 9.999 [0.350m/s³]**
F03.02	**End Acc. jerk**	**0.020 - 9.999 [0.600m/s³]**
F03.03	**Dec. speed**	**0.020 - 9.999 [0.700m/s²]**
F03.04	**Start Dec. jerk**	**0.020 - 9.999 [0.600m/s³]**
F03.05	**End Dec. jerk**	**0.020 - 9.999 [0.350m/s³]**
	F03.00 - F03.05 adjust the elevator speed via S-curve which can cushion the shock at elevator start / stop and improve riding comfort. • Acc. jerk: The change ratio of Acc. • See the right figure for the adjustment of S-curve. • The S-curve becomes steeper when parameter values are raised; • The S-curve becomes slower when parameter values are decreased. 	
F03.06	**Inspection Acc. speed**	**0.020 - 9.999 [0.200m/s²]**
F03.07	**Inspection Dec. speed**	**0.020 - 9.999 [1.000m/s²]**
	Defines the Acc. / Dec. speed of elevator at inspection run mode.	
F03.08	**Battery driven Acc. speed**	**0.020 - 9.999 [1.000m/s²]**
F03.09	**Battery driven Dec. speed**	**0.020 - 9.999 [1.000m/s²]**
	Defines the Acc. / Dec. speed of elevator at battery driven mode.	
F03.10	**Auto-tuning Acc. speed**	**0.020 - 9.999 [0.100m/s²]**
F03.11	**Auto-tuning Dec. speed**	**0.020 - 9.999 [0.100m/s²]**
	Defines the Acc. / Dec. speed at auto-tuning of motor.	
F03.12	**Abnormal Dec. speed**	**0.020 - 9.999 [1.000m/s²]**
	Defines the Dec. speed at valid forced or wrong run mode.	
F03.13	**Stop Dec. jerk**	**0.020 - 9.999 [0.350m/s³]**
	Defines Dec. change rate from non-zero speed to zero speed. • It can adjust the smooth stop of the elevator and ass riding comfort.	
F03.14	**Asyn. motor field-weakening optimization**	**0 - 2 [0]**
	0: No field-weakening optimization. 1: Optimize according to voltage. 2: Optimize according to current. F03.14 = 1 or 2, it can reduce the current noise and improve the dynamic performance of asyn. motor.	
F03.15	**Field-weakening Kp**	**0 - 5000 [4000]**
F03.16	**Field-weakening Ki**	**0 - 5000 [1000]**
F03.17	**Field-weakening voltage limit**	**4000 - 5000 [4126]**
	F03.15 - F03.17 is used to adjust the effect of asyn. motor field-weakening so that user need not regulate them usually.	
F03.19	**Sincos encoder CD phase learning**	**0,1 [0]**
	0: Learning. 1: Not learning.	

6.2.5 F04: Analogue Curve Parameters

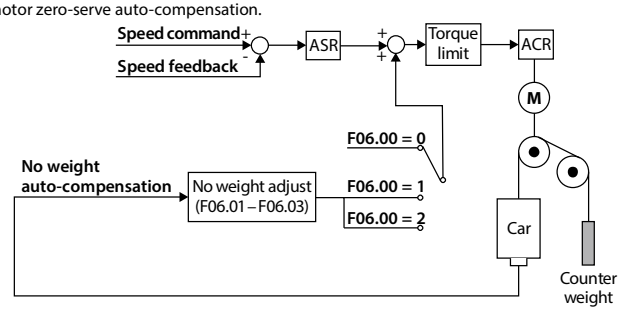
Ref. Code	Function Description	Setting Range [Default]
F04.00	**Setting curve**	**0000 - 1111 [0000]**
	Unit: AI1 characteristic curve selection **Ten / Hundred / Thousand: Reserved** Each bit setting: • 0: Line 1. • 1: Line 2.	
F04.01	**Line 1 min. setting**	**0.0 - F04.03 [0.0%]**
F04.02	**Corresponding value of line 1 min. setting**	**0.0 - 100.0 [0.0%]**
F04.03	**Line 1 max. setting**	**F04.01 - 100.0 [100.0%]**
F04.04	**Corresponding value of line 1 max. setting**	**0.0 - 100.0 [100.0%]**
F04.05	**Line 2 min. setting**	**0.0 - F04.07 [0.0%]**
F04.06	**Corresponding value of line 2 min. setting**	**0.0 - 100.0 [0.0%]**
F04.07	**Line 2 max. setting**	**F04.05 - 100.0 [100.0%]**
F04.08	**Corresponding value of line 2 max. setting**	**0.0 - 100.0 [100.0%]**
	F04.01 - F04.04 define the line 1. F04.05 - F04.08 define the line 2. • Both line 1 and line 2 can independently achieve positive and negative characteristics as shown in following figure. 	

6.2.6 F05: Speed Parameters

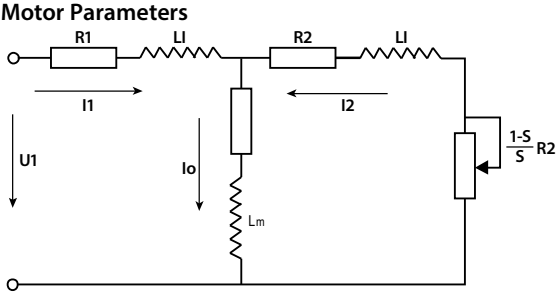
Ref. Code	Function Description	Setting Range [Default]
F05.00	**Multi-speed 0**	**0.000 - F00.02 [0.000m/s]**
F05.01	**Multi-speed 1**	**0.000 - F00.02 [0.000m/s]**
F05.02	**Multi-speed 2**	**0.000 - F00.02 [0.000m/s]**
F05.03	**Multi-speed 3**	**0.000 - F00.02 [0.000m/s]**
F05.04	**Multi-speed 4**	**0.000 - F00.02 [0.000m/s]**
F05.05	**Multi-speed 5**	**0.000 - F00.02 [0.000m/s]**
F05.06	**Multi-speed 6**	**0.000 - F00.02 [0.000m/s]**
F05.07	**Multi-speed 7**	**0.000 - F00.02 [0.000m/s]**
	F05.00 - F05.07 define the MS running speed which use in MS run mode. • F00.02 defines the rated speed of elevator.	
F05.08	**Inspection run speed**	**0.000 - 0.630 [0.200m/s]**
	Defines the running speed of elevator in the inspection mode. • When F00.02 is less than 0.630, the maximum value of F05.08 is F00.02. • When F00.02 is greater than 0.630, the maximum value of F05.08 is 0.630.	
F05.09	**Battery driven run speed**	**0.000 - F00.02 [0.100m/s]**
	Defines the running speed of elevator in the battery driven run mode.	

Ref. Code	Function Description	Setting Range [Default]
F05.10	**Speed detection level 1 (FDT1)**	**0.0 - 100.0 (F00.02) [90.0%]**
F05.11	**Speed detection level 2 (FDT2)**	**0.0 - 100.0 (F00.02) [90.0%]**
F05.12	**Speed detection hysteresis level FDT1**	**0.0 - 100.0 (F00.02) [1.0%]**
F05.13	**Speed detection hysteresis level FDT2**	**0.0 - 100.0 (F00.02) [1.0%]**
	When the running speed is lower than a certain speed (F05.10 + F05.12), as shown in the figure FL, the ON indication signal is output until the running speed is less than F05.10. • For F05.11, F05.13 see parameters F05.10, F05.12.	
F05.14	**Speed within FAR range**	**0.0 - 20.0 (F00.02) [1.0%]**
	The pulse signal will output if elevator speed is within the FAR range. As shown in the right figure.	
F05.15	**Over-speed setting**	**80.0 - 120.0 (F00.02) [115.0%]**
F05.16	**Over-speed detection time**	**0.0 - 2.0 [0.2s]**
	When the actual elevator speed exceeds F05.15 and the duration time exceeds F05.16, MONT72 alarms E0032 fault (motor over speed). • F05.16 = 0, MONT72 does not detect motor over speed fault.	
F05.17	**Detected value of speed deviation**	**0.0 - 30.0 (F00.02) [20.0%]**
F05.18	**Detected time of speed deviation**	**0.0 - 2.0 [1.0s]**
	When the deviation of setting speed (after Acc. / Dec.) and actual run speed of motor exceeds F05.17 and the duration time exceeds F05.18, MONT72 alarms E0018 fault (excessive speed deviation). • F05.17 or F05.18 = 0, MONT72 does not detect the excessive speed deviation fault of motor.	

6.2.7 F06: Weighing Compensation Parameters

Ref. Code	Function Description	Setting Range [Default]
F06.00	**Pre-torque selection**	0 - 2 [0]
	The pre-torque function can output the load balancing torque in advance to avoid reverse and reduce the start impact. 0: No pre-torque function. 1: No weighing auto-compensation. • This mode is available for all types of encoders. 2: Asyn. motor zero-serve auto-compensation. 	
F06.01	**No weighing current coefficient**	0 - 9999 [3000]
F06.02	**No weighing speed-loop KP**	1 - 9999 [500]
F06.03	**No weighing speed-loop KI**	1 - 9999 [500]
	F06.01 - F06.03 are used to adjust the effect of no weighing auto-compensation (F06.00 = 1). • The system response can be expedited through increasing F06.01 - F06.03, but system oscillation and overshoot may occur if the value of F06.01 - F06.03 is too high. • Generally, it can smoothly start elevator via adjusting F06.01 when debugging. • Increase F06.01 to avoid sliding vehicle at starting moment. Decrease F06.01 to avoid shake at starting moment.	

6.2.8 F07: Asyn. Motor Parameters



R1=F07.07 (Stator resistance) Ll=F07.09 (Leakage inductance)
R2=F07.08 (Rotor resistance) Lm=F07.10 (Mutual inductance)
Io=F07.11 (Excitation current) S=Slip ratio

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Fax:۰۲۱ - ۴۴۹۹۴۶۴۲
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روبروی پالایشگاه نفت پارس، پلاک ۱۲

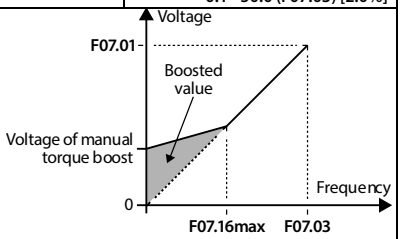
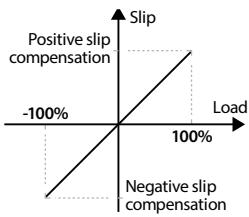
The relationship between rated torque current, excitation current and rated current of motor is:

Rated torque current = F07.05 × F07.02

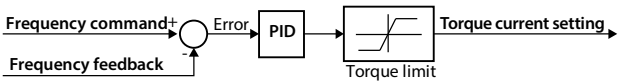
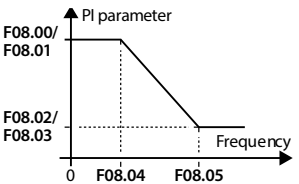
Excitation current $F07.11 = \sqrt{1 - F07.05^2} \times F07.02$

Mutual inductance $F07.10 = \frac{F07.01}{2\sqrt{3}\pi \times F07.03 \times F07.11} - F07.09$

Ref. Code	Function Description	Setting Range [Default]
F07.00	Rated power of asyn. motor	0.2 - 500.0kW [Depend on MT72]
F07.01	Rated voltage of asyn. motor	0V - Controller rated voltage [Depend on MT72]
F07.02	Rated current of asyn. motor	0.0 - 999.9A [Depend on MT72]
F07.03	Rated frequency of asyn. motor	1.00 - 100.00 [50.00Hz]
F07.04	Rated Rpm of asyn. motor	1 - 24000 [1440rpm]
F07.05	Power factor of asyn. motor	0.001 - 1.000 [Depend on MT72]
F07.06	Parameter auto-tuning of asyn. motor	0 - 2 [0]
	0: No action. 1: Stationary auto-tuning. 2: Rotary auto-tuning. **Motor auto-tuning:** • In the process of motor stationary auto-tuning, the stator resistance (F07.07), rotor resistance (F07.08) and leakage inductance (F07.09) will be auto-measured and written into corresponding parameters automatically. • For mutual inductance (F07.10) and excitation current (F07.11) • At stationary auto-tuning (F07.06 = 1), it will auto calculate according to F07.05 and F07.02, then write the result into F07.10 and F07.11; • At rotary auto-tuning (F07.06 = 2), the motor will be at rotary status and the auto-measured value will be written into F07.10 and F07.11. • When the motor is in rotary status, the oscillation and even the overcurrent might occur. In this case, press the STOP key to stop auto-tuning and then properly adjust the F07.18 (Oscollation-suppression mode) and F07.19 (Oscollation-suppression coefficient) to mitigate the possible oscillation. *Note: The auto-tuning is enabled only in keypad control mode (F00.05 = 0).* **Auto-tuning steps:** 1. Input correct motor parameters as per its nameplate (F07.00 - F07.04). 2. F07.06 = 2, set proper Acc. speed (F03.10) and Dec. speed (F03.11) and make sure the motor is disconnected with the load for security. 3. F07.06 = 1 or 2, then press the ENT key, and there with press RUN key to start auto-tuning. The LCD will display "Motor para. auto-tuning". 4. When the auto-tuning is completed, the keypad will return to stop display status and F07.06 resets to 0.	
F07.07	Stator resistance of asyn. motor	0.000 - 65.535Ω [Depend on MT72]
F07.08	Rotor resistance of a syn. motor	0.000 - 65.535Ω [Depend on MT72]
F07.09	Leakage inductance of asyn. motor	0.0 - 6553.5mH [Depend on MT72]
F07.10	Mutual inductance of asyn. motor	0.0 - 6553.5mH [Depend on MT72]
F07.11	Excitation current of asyn. motor	0.0 - 999.9A [Depend on MT72]

Ref. Code	Function Description	Setting Range [Default]
F07.12	**Asyn. motor torque boost**	0.1 - 30.0 [0.1%]
F07.13	**Torque boost end-point of asyn. motor**	0.1 - 50.0 (F07.03) [2.0%]
	To compensate the torque drop at low frequency, MONT72 can boost the voltage so as to boost the torque. F07.13 is relative to percentage of rated frequency of motor (F07.03). 	
F07.14	**Slip compensation gain of asyn. motor**	0.0 - 300.0 [100.0%]
F07.15	**Slip compensation filter time of asyn. motor**	0.1 - 10.0 [0.1s]
F07.16	**Slip compensation limit of asyn. motor**	0.0 - 250.0 [200.0%]
	The slip of motor changes with the load torque, which results in the variance of motor speed. Through slip compensation (MONT72 will auto adjust its output frequency according to the motor load torque) can reduce the influence. • In driving status (actual speed < setting speed) and in generating status (the actual speed > setting speed), the slip compensation gain (F07.14) can be increased gradually. • The value of auto slip compensation depends on rated slip of motor, so make sure the rated frequency (F07.03) and rated Rpm (F07.04) are set correctly. Range of slip compensation = F07.16 × Rated slip. Rated slip = F07.03 - F07.04 × Np / 60. • Np is the number of motor pole pairs. 	
F07.17	**AVR function**	0 - 2 [1]
	0: Disabled. 1: Enabled all the time. 2: Disabled in Dec. process. • The output voltage can be regulated to maintain constant via AVR. Thus, normally the AVR function should be enabled, especially when the input voltage is higher than the rated voltage. • In Dec. process, if F07.17 = 0 or 2, the running current will be a little higher; While if F07.17 =1, the motor will decelerate steadily and the current will be smaller.	
F07.18	**Oscillation-suppression mode of asyn. motor**	0,1 [0]
	0: Depend on exciting component. 1: Depend on torque component.	
F07.19	**Oscillation-suppression coefficient of asyn. motor**	0 - 200 [100]
	This function is used to damp oscillation when output current is continually unstable. • This function helps to keep the motor running smoothly through correctly adjusting the setting of F07.19.	

6.2.9 F08: Motor Vector Control Speed-loop Parameters

Ref. Code	Function Description	Setting Range [Default]
F08.00	Low speed ASR Kp	1 - 9999 [500]
F08.01	Low speed ASR KI	0 - 9999 [500]
F08.02	High speed ASR Kp	1 - 9999 [500]
F08.03	High speed ASR KI	0 - 9999 [500]
F08.04	ASR PI switching frequency 1	0.00 - 50.00 [10.00Hz]
F08.05	ASR PI switching frequency 2	0.00 - 50.00 [15.00Hz]
	F08.00 - F08.05 and F08.07 confirm the PID parameters of ASR. The structure of ASR is shown in figure.  As the right figure: • When MONT72 operates with 0 - F08.04, the PI parameters of vector control are F08.00 and F08.01; • When MONT72 operates above F08.05, the PI parameters of vector control are F08.02 and F08.03; • When MONT72 operates within F08.04 - F08.05, P is the linear interpolation between F08.00 and F08.02, while I is the linear interpolation between F08.01 and F08.03.  • The system response can be expedited through increasing the ASR KP (F08.00, F08.02), but oscillation may occur if the value of KP is too high. • The system response can be expedited through increasing the ASR KI (F08.01, F08.03), but oscillation and high overshoot happen easily if the value of KI is too high. • If F08.01 / F08.03 = 0 and the integral function is disabled, the speed-loop works only as a proportional regulator. • Generally, adjust the KP firstly to the max. condition that the system does not vibrate, and then adjust the KI to shorten the response time without overshoot. • To shorten dynamic response time during low frequency running, increase KP and KI.	
F08.06	ASR integral limit	0.0 - 200.0 (F07.02) [180.0%]
	It is used to limit the max. value of the vector control speed-loop integral.	
F08.07	ASR differential time	0.000 - 1.000 [0.000s]
	Defines the vector control speed-loop differential time. • Generally, it doesn't need to set F08.07 except for expediting the dynamic response. • F08.07 = 0, there is no speed-loop differential.	
F08.08	ASR output filter time	0.000 - 1.000 [0.008s]
	It is used to filter the output of ASR regulator. • F08.08 = 0, the speed-loop filter is unused.	
F08.09	Torque limit	0.0 - 200.0 (F07.02) [180.0%]
	Used to set the upper limit of the torque, the set value is relative to the rated current of the motor. • If the torque is too small, the running speed may deviate from the set value. *Note: Users generally do not need to modify F08.06 - F08.09.*	

6.2.10 F09: Current-loop Parameters

Ref. Code	Function Description	Setting Range [Default]
F09.00	Current-loop KP	1 - 4000 [500]
F09.01	Current-loop KI	1 - 4000 [500]
	F09.00 and F09.01 are the PI regulator parameter of current ring (ACR). • Increasing F09.00 or F09.01 can fasten the system dynamic response to the output torque, while decreasing F09.00 or F09.01 can build up system stability. • Too big F09.00 or F09.01 makes the system apt to oscillate, while too small F09.00 or F09.01 affects the system torque output.	
F09.02	Current-loop output filter time	0.000 - 1.000 [0.000s]
F09.04	Current loop execution cycle	2 - 10 [6k]
	Only valid when F10.20 Bit15 is set to 1 (vibration optimization new method).	

6.2.11 F10: Syn. Motor Parameters

Ref. Code	Function Description	Setting Range [Default]
F10.00	Syn. motor type	0,1 [0]
	0: IPM. 1: SMPM.	
F10.01	Rated power of syn. motor	0.4 - 400.0kW [Depend on MT72]
F10.02	Rated voltage of syn. motor	0 - Rated voltage of MT72 [Depend on MT72]
F10.03	Rated current of syn. motor	0.0 - 999.9A [Depend on MT72]
F10.04	Rated frequency of syn. motor	1.00 - 100.00 [19.20Hz]
F10.05	Rated rpm of syn. motor	1 - 24000 [96rpm]
F10.06	Stator resistance of syn. motor	0.000 - 9.999 [0.000Ω]
F10.07	Quadrature axis inductance of syn. motor	0.0 - 999.9 [0.0mH]
F10.08	Direct axis inductance of syn. motor	0.0 - 999.9 [0.0mH]
F10.09	Back EMF of syn. motor	0 - Rated voltage of MT72 [0V]
F10.10	Angle auto-tuning of syn. motor	0 - 2 [0]
	0: No action. 1: Stationary auto-tuning. 2: Rotary auto-tuning. • Refer to section 7.1.2 Motor Auto-tuning.	
F10.11	Stationary auto-tuning voltage setting of syn. motor	0.0 - 100.0 (F10.02) [100.0%]
	If syn. motor reports over-current fault at stationary auto-tuning, the setting value should be smaller.	
F10.12	Start angle of syn. motor	0.0 - 359.9 [0.0°]
F10.13	Z pulse start angle of syn. motor	0.0 - 359.9 [0.0°]
F10.14	SINCOS encoder C amplitude of syn. motor	0 - 9999 [2048]
F10.15	SINCOS encoder C zero-bias of syn. motor	0 - 9999 [2048]
F10.16	SINCOS encoder D amplitude of syn. motor	0 - 9999 [2048]
F10.17	SINCOS encoder D zero-bias of syn. motor	0 - 9999 [2048]

Ref. Code	Function Description	Setting Range [Default]
F10.18	**Sincos encoder CD phase**	**0,1 [0]**
	0: C phase ahead of D phase. 1: D phase ahead of C phase. *Note: At motor parameter auto-tuning, F10.18 can self-learn without manual changes.*	
F10.20	**Synchronous performance optimization**	**0 - 65535 [1028]**
	Bit0 - Bit1: Reserved **Bit2: Subdivision speed measurement function** 0: Not open. 1: Open. **Bit3: Reserved** **Bit5 & Bit4: Synchronous motor start current limit** 00: Normal. 01: 2 times. 10: 4 times. 11: 8 times. **BIT6: Start comfort** 0: Mode 0. 1: Mode 1. **Bit7 - Bit8: Reserved** **Bit10 & Bit9: Performance optimization** 00: Mode 0. 01: Method 1. 10: Method 2. 11: Method 3. **Bit11: Reserved** **Bit12: Synchronous motor starts to suppress oscillation** 0: Not inhibited. 1: Suppress the shock. **Bit13: Start optimization 2** 0: Not enabled. 1: Enabled. **Bit14: Reserved** **Bit15: Vibration suppression** 0: Old method. 1: New method.	

6.2.12 F11: PG Parameters

In elevator application, the PG is necessary for the motor. Please refer to section 4.5 for PG.

Ref. Code	Function Description	Setting Range [Default]
F11.00	**MONT72 PG interface board**	**1 - 4 [1]**
	1: HD-PG2-OC-FD is valid. Only for asyn. motor. 2: HD-PG6-UVW-FD is valid. Only for syn. motor. 3: HD-PG5-SINCOS-FD is valid. Only for syn. motor. 4: HD5L-PG1-SC is valid. Only for syn. motor. (support Endat)	
F11.01	**PG P/R**	**1 - 9999 [2048]**
F11.02	**PG direction setting**	**0,1 [0]**
	Defines the connection sequence of PG whether the same as that of the drive-motor connection. • In order to change the connection of AB two phases of the PG, you can change this parameter. 0: The same direction. 1: The reverse direction.	
F11.03	**PG signal filter coefficient**	**0x00 - 0x77 [0x11]**
	Unit: Low-speed filter coefficient. Ten: High-speed filter coefficient.	
F11.04	**The protocol of serial communication PG**	**0 - 9 [0]**
	0: Endat. 1 - 9: Reserved.	
F11.05	**Detecting time of PG wire disconnection**	**0.00 - 2.00 [1.00s]**
	F11.05 specifies the duration time for detecting PG wire disconnection fault. MONT72 detects the PG wire disconnection and the duration time exceeds F11.05, then the controller reports E0031 fault (PG disconnection). • No detection will be conducted when F11.05 = 0.	

6.2.13 F12: Digital I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F12.00	**Input terminal filter time**	**0.000 - 1.000 [0.010s]**
	Defines filter time of digital input terminal and to set input terminal sensibility. • The input terminals are susceptible to interference which will result in misoperation, so F12.00 can be increased. But too long filter time will affect sensibility.	
F12.01	**X1 terminal function**	**000 - 134 [1]**
F12.02	**X2 terminal function**	**000 - 134 [2]**
F12.03	**X3 terminal function**	**000 - 134 [3]**
F12.04	**X4 terminal function**	**000 - 134 [4]**
F12.05	**X5 terminal function**	**000 - 134 [5]**
F12.06	**X6 terminal function**	**000 - 134 [6]**
F12.07	**X7 terminal function**	**000 - 134 [0]**
F12.08	**X8 terminal function**	**000 - 134 [0]**
F12.09	**X9 terminal function**	**000 - 134 [0]**
F12.10	**X10 terminal function**	**000 - 134 [0]**

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Ref. Code	Function Description	Setting Range [Default]

Note: Hundred digit = 0, normally open input selected; = 1, normally closed input selected.

0: Unused. Terminal function is unused. MONT72 ignores the signal input via this terminal.

- The unused terminal is recommended to be set as 0 so as to avoid wrong connection or action.

1: Controller enabled (EN).

- When enabled, MONT72 is enabled to run;
- When unused, MONT72 is unused to run and will be in coasts to stop status.
- When no terminal selects this function, it defaults that MONT72 is at enabled status.

2, 3: UP / DN.

- Set control terminal to control up and down of elevator. The terminals are in below table.

(UP) terminal (No.2 function)	(DN) terminal (No. 3 function)	Elevator state
0	0	Stop
0	1	Down
1	0	Up
1	1	stop

4 - 6: Multi-speed terminal 1 - 3 (MS1 - MS3).

- The operating curve of the 8-segment speed can be achieved by the logical combination of the terminals, see the table below.

Multi-speed terminal 3 (function No. 4)	Multi-speed terminal 2 (function No. 5)	Multi-speed terminal 1 (function No. 6)	Multi-speed setting
0	0	0	Multi-speed 0 (F05.00)
0	0	1	Multi-speed 1 (F05.01)
0	1	0	Multi-speed 2 (F05.02)
0	1	1	Multi-speed 3 (F05.03)
1	0	0	Multi-speed 4 (F05.04)
1	0	1	Multi-speed 5 (F05.05)
1	1	0	Multi-speed 6 (F05.06)
1	1	1	Multi-speed 7 (F05.07)

7: Inspection input (INS).

- If enabled, elevator will do inspection running.
- This signal, when used together with UP / DN (No. 2 or No. 3 function) command, can control the elevator to go up or down during inspection.

8: Battery-driven input (BAT).

- If enabled, elevator will enter battery-driven running status.

9: Contactor feedback input (CSM).

10: Brake feedback input (BSM).

11: Governor feedback input (OSG).

15: Motor overheat input (OH).

16: Fault reset input (RST).

- When MONT72 alarms fault, reset it by this terminal.
- The function of RST terminal is the same as the **STOP** key.

34: External fault (EXT).

- The fault signal of external equipment can be input through this terminal, so MONT72 can monitor that equipment and respond accordingly. MONT72 alarms E0024 fault (external fault) when receives the EXT signal.

Ref. Code	Function Description	Setting Range [Default]
F12.13	**Filter time of multi-speed terminal**	**0.000 - 2.000 [0.000s]**
	Defines the MS filter time to make up for the time error of MS input terminals. • Change F12.13 according to the change asynchronous level of numbers of MS input terminals.	
F12.15	**DO1 terminal function**	**0 - 16 [0]**
F12.16	**DO2 terminal function**	**0 - 16 [0]**
F12.17	**Y1 relay function**	**0 - 16 [2]**
F12.18	**Y2 relay function**	**0 - 16 [3]**
F12.19	**Y3 relay function**	**0 - 16 [14]**
F12.20	**Y4 relay function**	**0 - 16 [6]**
	0: Reserved. • Disable functions of output terminals and make them no any actions. 1: Controller is ready. • Signal ON will output if MONT72 has no fault. 2: Controller is running. • MONT72 is in running status and outputs indicating signal. 3: Zero-speed running. • ON signal will output if output speed of MONT72 is zero but MONT72 is in run status. 4: Zero-speed. • ON signal will output if output speed of MONT72 is zero. 5: Contactor output control. • To open / close the output contactor. 6: Brake output control. • To open / close the brake. 7, 8: FDT1, FDT2. • Refer to F05.12 - F05.13. 9: Speed within FAR signal. • The indication signal will output when output speed of MONT72 is within the FAR range. The detect range is set by F05.16 (Speed within FAR range). • The indication signal will also output at stop. 10,11: Up / Down signal output. • ON signal will output when the elevator is at up / down running. 12: Under-voltage. • ON signal will output when MONT72 is in under-voltage status. 14: Controller fault. • ON signal will output when MONT72 has fault. 15: Elevator stop signal. • When the elevator stops, MONT72 will stop and outputs 2s pulse signal, according to which MONT72 revokes run command. 16: Speed outputs.	

Ref. Code	Function Description	Setting Range [Default]
F12.21	**Output terminal logic setting**	**00 - 0x3F [0]**

Defines that each bit (binary) represents different physical sources.

- 0: Positive logic.
  - When output terminals are connected to corresponding common port, this logic is enabled. Otherwise the logic is disabled.
- 1: Negative logic.
  - When output terminals are connected to corresponding common port, this logic is disabled. Otherwise the logic is enabled.

Ten				Unit			
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
-	-	Y4	Y3	Y2	Y1	DO2	DO1

6.2.14 F13: Analogue I/O Terminal Parameters

Ref. Code	Function Description	Setting Range [Default]
F13.00	**AI1 terminal function**	**0 - 2 [0]**
	0: No function. 1: Speed is given. 2: Motor overheat signal input.	
F13.01	**AI1 bias**	**0.0 - 100.0 [0.0%]**
F13.02	**AI1 gain**	**0.00 - 10.00 [1.00]**
F13.03	**AI1 filter time**	**0.01 - 10.00 [0.05s]**

When select AI1 as open-loop frequency setting source, the relationship between the analogue input and the analogue value after calculating is shown as figure:

- The formula is: Analogue value after calculating = Gain × Analogue actual value + Bias
  - Here: Y is the analog after the operation, X is the value before the adjustment, k is F13.02, and b is F13.01.
- F13.06 defines the channel filtering time to filter the input signal.
  - The longer filter time is, the higher immunity level is, the response time is prolonged.
  - The shorter filter time is, the quicker response time is, the lower the immunity level is.

6.2.15 F15: Display Control Parameters

Ref. Code	Function Description	Setting Range [Default]
F15.00	**Language selection**	**0 - 9 [0]**
	Define the language displayed on the LCD operator panel. 0: Chinese. 1: English. 2: Turkish. 3: Persian. 4: Russian. 5 - 9: Reserved.	
F15.01	**Display contrast of LCD keypad**	**1 - 8 [6]**
	To select LCD display contrast.	
F15.02	**Set parameter 1 of run status**	**0 - 32 [5]**
F15.03	**Set parameter 2 of run status**	**0 - 32 [6]**
F15.04	**Set parameter 3 of run status**	**0 - 32 [7]**
F15.05	**Set parameter 4 of run status**	**0 - 32 [8]**
F15.06	**Set parameter 5 of run status**	**0 - 32 [0]**
F15.07	**Set parameter 6 of run status**	**0 - 32 [0]**
F15.08	**Set parameter 1 of stop status**	**0 - 32 [4]**
F15.09	**Set parameter 2 of stop status**	**0 - 32 [11]**
F15.10	**Set parameter 3 of stop status**	**0 - 32 [18]**
F15.11	**Set parameter 4 of stop status**	**0 - 32 [28]**
F15.12	**Set parameter 5 of stop status**	**0 - 32 [29]**
F15.13	**Set parameter 6 of stop status**	**0 - 32 [0]**
	The keypad displays parameters which is the run status (F15.02 - F15.07) and stop status (F15.08 - F15.13). • It can be cycling displayed by ◀ key on the keypad. • Each display parameter of content can be set corresponding to 32 statuses. • For instance: When set F15.08 as 6, the stop parameter is setting Rpm at initial power on. 0: Reserved. 1: Drive controller rated power. 2: Drive controller rated current. 3: Operation mode channel. 4: Given speed. 5: Given speed (after Acc. and Dec.). 6: Set the frequency. 7: Set the frequency (after Acc. and Dec.). 8: Output frequency. 9: Output current. 10: Output torque. 11: Output power. 12: DC bus voltage. 13: Set the speed. 14: Running speed. 15: AI1 input voltage. 16: AI1 input voltage (after processing). 17: Radiator temperature. 18: Input terminal status. • Bit0 - Bit9 corresponds to X1 - X10. 19: Output terminal status. • Bit0 - Bit5 corresponds to DO1, DO2, Y1 - Y4.	

6.2.16 F16: Function-boost Parameters

Ref. Code	Function Description		Setting Range [Default]
F16.00	**Zero-speed running signal delay time**		**0.00 - 10.00 [0.30s]**
	Defines the delay time of MONT72 from zero-speed run status to zero-speed run signal output.		
F16.01	**Zero-speed signal delay time**		**0.00 - 10.00 [0.30s]**
	Defines the delay time of MONT72 from zero-speed status to zero-speed signal output.		
F16.02	**Current keep time after stop**		**0 - 9999 [0ms]**
	To eliminate the current noise of motor at stop, when the brake is finished, the cut-off run signal will reduce the current to zero after the time of F16.02.		
F16.03	**Fan control mode**		**0 - 2 [0]**
	Defines the fan control mode. If there is overheat protection, the fan will run all the time. 0: Auto stop. • The fan runs all the time when MONT72 is in run status. After MONT72 stops for the time of F16.04, the fan continues running if overheat protection is activated. 1: Immediately stop. • The fan runs all the time when MONT72 is in running status, but stops when MONT72 stops. 2: Run when power on. • The fan runs continuously after MONT72 is switched on.		
F16.04	**Fan control delay time**		**0.0 - 600.0 [300.0s]**
F16.05	**Brake unit action voltage**	**220V:**	**360 - 450 [380V]**
		380V:	**630 - 750 [720V]**
	Note: The braking action enables only in run status.		
F16.06	**Contactor fault detect time**		**0.1 - 10.0 [2.0s]**
F16.07	**Multi-speed inspection**		**0 - 7 [0]**
	When the DI terminals are not enough, the MS1 - MS3 can achieve the inspection run. • DI terminal = inspection terminal INS (No. 7 function), only need set F16.07 as 0 to enter terminal inspection run. • DI terminals ≠ inspection terminal INS (No. 7 function), the MS1 - MS3 can achieve inspection run. • Value of MS1 - MS3 = value of F16.07, enter MS inspection run at MS run speed (F05.00 - F05.07). *Note: When MS run speed (F05.00 - F05.07) exceeds 0.630m/s, run at 0.630m/s.*		
F16.08	**Zero-speed threshold**		**0.001 - 0.010 [0.003m/s]**
	When the present run speed ≤ F16.08, the system run speed will be considered as 0. After zero-speed delay signal, the zero-speed signal will output.		
F16.09	**Selection at motor overheat fault**		**0,1 [0]**
	0: When detect that the motor is overheated, alarms E0020 fault (motor overheat) after motor stops. 1: When detect that the motor is overheated, alarms E0020 fault (motor overheat) at once.		
F16.11	**Stationary auto-tuning and current limit of syn. motor**		**20 - 200 [120%]**
F16.12	**Delay time of run output signal**		**0.00 - 1.00s [0.00s]**
	F16.12 is used to delay the controller running signal (output = No. 2 function) so as to control MONT72 to open the brake.		

Ref. Code	Function Description	Setting Range [Default]
F16.13	**UPS running direction auto-determine enable**	**0 - 4 [0]**
	0: Not enabled. 1: Determine the running direction based on the current. 2: Determine the running direction according to the encoder direction. 3: Determine the running direction according to the current (no start compensation and zero speed hold). 4: Determine the running direction according to the encoder direction (no start compensation and zero speed hold). *Note: 2 and 4 must select closed loop vector control (F00.01 = 2) and the elevator brake is controlled by MONT72.*	
F16.14	**Running min. current limit**	**0 - 100 (F07.11) [20%]**
F16.15	**Running min. detect time**	**0.0 - 5.0 [0.0s]**
	When the elevator run current is less than F16.14 and duration exceed F16.05, MONT72 will alarm E0025 fault (too small running current).	
F16.16	**Governor fault detection time**	**0.0 - 2.0 [1.0s]**
	When the detection terminal of governor detects signal and exceed F16.16, MONT72 alarms E0037 fault (governor fault).	
F16.17	**DC braking current at stop**	**0 - 150 [100%]**
F16.18	**Starting frequency of DC braking current at stop**	**0.20 - 10.00 [0.50Hz]**
F16.19	**Brake release frequency**	**0.00 - 10.00 [0.00Hz]**
F16.20	**Start DC braking current**	**50 - 150 [100%]**
F16.21	**Start DC braking current duration**	**0.0 - 3.0 [0.50s]**
F16.22	**Output ground detection before operation**	**0,1 [0]**
	0: Detection. 1: Not detected.	

6.2.17 F17: Fault Protect Parameters

Traction machine overheating fault (F17.00 - F17.02)

The thermistor input embedded in the stator coil of the motor can be connected to AI1. According to this input, the motor can be overheated. For the connection diagram, refer to section 4.4.3 Terminals Wiring, page 21.

Ref. Code	Function Description	Setting Range [Default]
F17.00	**Input voltage at motor overheat**	**0.00 - 10.00 [0.00V]**
F17.01	**Thermistor type**	**0 - 2 [0]**
	0: Not detect the motor overheat (NC). 1: Positive charateristic (PTC). • When AI1 input exceeds F17.00, MONT72 alarms E0020 fault (motor overheat). 2: Negative charateristic (NTC). • When AI1 input is less than F17.00, MONT72 alarms E0020 fault (motor overheat).	

Input and output phase loss fault (F17.03 - F17.06)

Ref. Code	Function Description	Setting Range [Default]
F17.03	**The detection base of lack of input**	**0 - 100 [30%]**
F17.04	**The detection time of lack of input**	**0.0 - 5.0 [1.0s]**
	F17.03 is a percentage of rated voltage of MONT72. When MONT72 detects certain input voltage does not hit the detection base (F17.03) and exceeds the preset detection time (F17.04), MONT72 alarms E0015 fault (lack of input). • F17.03 or F17.04 = 0 or in the battery driven run mode, MONT72 will not detect input phase loss fault.	
F17.05	**The detection base of lack of output**	**0 - 100 [20%]**
F17.06	**The detection time of lack of output**	**0.0 - 20.0 [3.0s]**
	F17.05 is a percentage of rated current of MONT72. When MONT72 detects certain output current does not hit the detection base (F17.05) and exceeds the detection time (F17.06), MONT72 alarms E0016 fault (lack of output). • F17.05 or F17.06 = 0, MONT72 will not detect output phase loss fault.	

Motor fault (F17.07)

Ref. Code	Function Description	Setting Range [Default]
F17.07	**Motor overload protect factor**	**20.0 - 110.0 [100.0%]**
	The motor overload protection factor can be set as 100% when MONT72 drives a motor of the same power class. To protect the motor when the motor power is smaller than the standard matched power, user needs to set proper motor overload protection factor (F17.07). The factor can derive from the following formula: $$\text{Motor overload protect factor (F17.07)} = \frac{\text{Rated current of motor (F07.02 / F10.03)}}{\text{Rated output current of MONT72}} \times 100\%$$	

Fault auto-reset function and fault relay action (F17.08 - F17.10)

Auto reset function enables MONT72 to reset the fault as per the preset times and interval.

The following faults do not have the auto reset function:

E0008: Power module fault
E0010: Brake unit fault
E0014: Current detection fault
E0021: Control board EEPROM read and write failure
E0022: Operation panel EEPROM read and write failure
E0024: External device failure
E0036: Brake contactor pull-in / off failure

Ref. Code	Function Description	Setting Range [Default]
F17.08	**Fault auto reset times**	**0 - 100 [0]**
F17.09	**Fault auto reset interval**	**2.0 - 20.0 [5.0s/times]**
	When F17.08 = 0, it means "auto reset" is unused and the protective device will be activated in case of fault. • If no other fault is detected within 5 minutes, the auto reset count will be automatically cleared. • On condition of external fault reset, auto reset count will be cleared.	
F17.10	**Faulty relay action**	**00 - 11 [00]**
	Bit0: In auto reset process **Bit1: In undervoltage process** • 0: Faulty relay doesn't act. • 1: Faulty relay acts. *Note: Relay needs to be set as No. 14 function. (Controller fault)*	

Fault history (F17.11 - F17.27)

Ref. Code	Function Description	Setting Range [Default]
F17.11	The 5th fault type (the latest one)	[Actual value]
F17.12	Setting freqency at the lastest fault	
F17.13	Running freqency at the lastest fault	
F17.14	DC bus vlotage at the lastest fault	
F17.15	Output voltage at the lastest fault	
F17.16	Output current at the lastest fault	
F17.17	Input terminal status at the lastest fault	
F17.18	Output terminal status at the lastest fault	
F17.19	The lastest fault fault interval	
F17.20	NO.4 fault type	
F17.21	NO.4 fault interval	
F17.22	NO.3 fault type	
F17.23	NO.3 fault interval	
F17.24	NO.2 fault type	
F17.25	NO.2 fault interval	
F17.26	NO.1 fault type	
F17.27	NO.1 fault interval	
	F17.12 - F17.19 record status parameters of MONT72 at the last fault. F17.20 - F27 record the type and interval per time of four faults before the latest. The unit of interval is 0.1 hour.	

6

6.2.18 F18: PWM Parameters

Ref. Code	Function Description	Setting Range [Default]
F18.00	**Carrier frequency**	**1 - 16kHz [Depend on MT72]**
	Defines the carrier frequency of PWM output wave. Controller power / Setting range / Factory setting 0.2 - 22kW / 1 - 16kHz / 8kHz 30 - 45kW / 1 - 12kHz / 6kHz • The carrier frequency will affect the operating noise of the motor. The higher the carrier frequency, the lower the noise made by the motor. Please properly set the carrier frequency. • When the value is higher than the factory setting, MONT72 should be derated by 5% when per 1kHz is increased compared to the factory setting.	
F18.01	**Carrier freqency auto adjust selection**	**0,1 [0]**
	0: Prohibited. 1: Allowed.	
F18.02	**PWM overmodulation enable**	**0,1 [1]**
	0: Disable. 1: Enable.	
F18.03	**PWM overmodulation mode**	**0,1 [0]**
	0: Two phase / Three phase switch. 1: Three phase.	

6.3 Y Group: Manufacturer Function Parameters

Group Y is required to replace the motherboard, please contact your local agent.

6.4 U Group: Application Macro Parameters

The U group is an application macro parameter that helps the user to set or view the courier.

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U00.00	F00.00	U00.04	F00.04	U00.08	F11.01
U00.01	F00.01	U00.05	F00.05	U00.09	F11.02
U00.02	F00.02	U00.06	F00.08	U00.10	F18.00
U00.03	F00.03	U00.07	F11.00		

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U01.00	F12.00	U01.07	F12.07	U01.14	F12.17
U01.01	F12.01	U01.08	F12.08	U01.15	F12.18
U01.02	F12.02	U01.09	F12.09	U01.16	F12.19
U01.03	F12.03	U01.10	F12.10	U01.17	F12.20
U01.04	F12.04	U01.11	F12.13	U01.18	F12.21
U01.05	F12.05	U01.12	F12.15		
U01.06	F12.06	U01.13	F12.16		

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U02.00	F10.00	U02.09	F10.09	U02.18	F10.18
U02.01	F10.01	U02.10	F10.10	U02.19	F10.20
U02.02	F10.02	U02.11	F10.11	U02.20	D04.00
U02.03	F10.03	U02.12	F10.12	U02.21	D04.01
U02.04	F10.04	U02.13	F10.13	U02.22	D04.02
U02.05	F10.05	U02.14	F10.14	U02.23	D04.03
U02.06	F10.06	U02.15	F10.15	U02.24	D04.04
U02.07	F10.07	U02.16	F10.16	U02.25	D04.05
U02.08	F10.08	U02.17	F10.17	U02.26	D04.06

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U03.00	F07.00	U03.04	F07.04	U03.08	F07.08
U03.01	F07.01	U03.05	F07.05	U03.09	F07.09
U03.02	F07.02	U03.06	F07.06	U03.10	F07.10
U03.03	F07.03	U03.07	F07.07	U03.11	F07.11

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U04.00	F05.00	U04.04	F05.04	U04.08	F05.08
U04.01	F05.01	U04.05	F05.05	U04.09	F05.09
U04.02	F05.02	U04.06	F05.06	U04.10	F16.07
U04.03	F05.03	U04.07	F05.07		

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U05.00	F04.01	U05.03	F04.04	U05.06	F13.02
U05.01	F04.02	U05.04	F13.00	U05.07	F13.03
U05.02	F04.03	U05.05	F13.01		

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U06.00	F06.00	U06.02	F06.02	U06.04	F10.20
U06.01	F06.01	U06.03	F06.03		

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U07.00	F08.00	U07.03	F08.03	U07.06	F09.04
U07.01	F08.01	U07.04	F09.00	U07.07	F10.20
U07.02	F08.02	U07.05	F09.01		

Group U	Application macro parameters	Group U	Application macro parameters	Group U	Application macro parameters
U08.00	F02.00	U08.05	F02.05	U08.10	F06.01
U08.01	F02.01	U08.06	F02.06	U08.11	F06.17
U08.02	F02.02	U08.07	F02.07	U08.12	F06.18
U08.03	F02.03	U08.08	F02.08	U08.13	F06.19
U08.04	F02.04	U08.09	F06.00		

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Chapter 7 Elevator Application Guidance

It is recommended that you thoroughly analyze the actual application requirements before designing the electrical schematic and wiring of the elevator system.

The basic configuration of the elevator system consisting of MONT72 is shown in Figure 7-1.

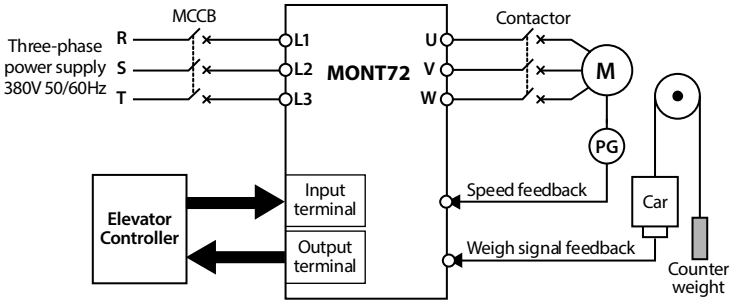

Figure 7-1 Elevator system

7.1 Basic Commissioning Procedures

7.1.1 Set Basic Parameters

1	Correctly set F00.00 (Motor type) and F00.01 (Control mode) according to motor type.
2	Set Group F07 for the asyn. motor, set Group F10 for the syn. motor.
3	Set F00.02 (Rated speed of elevator) and F00.04 (Mechanical parameters of motor) according to the elevator requirement and motor parameters.
4	Set encoder relevant parameters of Group F11 according to the encoder configured to motor.
5	Set digital I/O terminal parameters of Group F12 according to the actual wiring.
6	Set the parameter according to the actual running mode: **Terminal MS running mode:** • Set MS parameters of Group F05 according to the actual requirement of elevator and the controller. Set Acc. / Dec. curve parameters of Group F03 according to the elevator speed. **Terminal analogue running mode:** • Set analogue curve parameters of Group F04 and analogue I/O terminal parameters of Group F13 according to the actual requirement of elevator and the controller. • The bigger Acc. / Dec. curve parameters of Group F03 are set, the quicker MONT72 catch the speed command of elevator controller.

7.1.2 Motor Auto-tuning

Note: *The crane car is needed for the rotary auto-tuning but not for the stationary auto-tuning.*

Asyn. motor parameter auto-tuning

1	Manually open the brake (rotary auto-tuning).
2	Set F07.06 as 1 (stationary auto-tuning) or 2 (rotary auto-tuning), then press **RUN** key to start parameter auto-tuning. The motor will rotate at rotary auto-tuning, while it will not rotate at stationary auto-tuning.

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Syn. motor rotary auto-tuning

1	Manually open the brake (rotary auto-tuning).
2	Set F10.10 as 2 (rotary angle auto-tuning), then press **RUN** key to start parameter auto-tuning.
3	**A/B/Z/U/V/W encoder** Auto-tuning steps: The controller with DC fixes the motor to one direction, then slowly starts the motor for a while and finally stops. When finishes auto-tuning, F10.12 (Motor start angle) will be obtained.
	SINCOS encoder Auto-tuning steps: The controller with DC fixes the motor to one direction, then slowly starts the motor for one cycle and finally stops. When auto-tuning finishes, F10.14 - F10.17 (Encoder relevant parameters) and F10.12 (Motor start angle) will be obtained.
Note	
1	*If the system has syn. motor radial contactor, the short-circuit signal of radial contactor should be removed. Otherwise it will cause over-current fault.*

Syn. motor stationary auto-tuning

1	Set F10.10 as 1 (stationary angle auto-tuning), then press **RUN** key to start parameter auto-tuning.
2	During auto-tuning, the controller will make a serial pulse voltage and the motor will buzz. When buzz is over and the keypad returns to stop status, please check and record D04.05.
3	Restart step 1 and step 2, check and record D04.05. Then compare the twice obtained value of D04.05. • If the comparison value is smaller than 5000, it means that the steps are successful. Otherwise check the encoder connection and then restart step 2 - 4. • If the comparison value is too large, count it according to the following formula. And if the result is smaller than 5000, it means that the above steps are also successful. • Formula: 65535 + smaller value - larger value < 5000
4	**A/B/Z/U/V/W encoder** Set inspection run command and direction so that the motor slowly runs, F10.12 (Motor start angle) will be obtained the auto-tuning process is finished.
	SINCOS encoder Set inspection run command and direction so that the motor slowly runs for a circle then keeps at zero-speed. When revoke run command and direction at the moment, the auto-tuning process is finished, and obtain F10.14 - F10.17 (Encoder relevant parameters) and F10.12 (Motor start angle). When auto-tuning is finished, give inspection running and direction signal again to observe that the motor runs normally. If not, check encoder C and D phase connection, then restart step 1 - 4.
Note	
1	*If the system has syn. motor radial contactor, the short-circuit signal of radial contactor should be removed. Otherwise it will cause over-current fault.*
2	*If the system is power off before step 4 finishes, restart auto-tuning.*
3	*When troubleshooting the operation in step 4, you should also pay attention to the following situations:* *1* ***The setting direction and the actually running direction are not the same.*** *Take measures: Set the reverse value of F00.08 (Run direction), then restart auto-tuning.* *2* ***There is fault such as over-current or encoder reversion enabled etc. It may be encoder reversion enabled.*** *Take measures: Set F11.02 as 1 (the reverse direction of PG interface board), then restart auto-tuning.*

7.1.3 Inspection Running

Before inspection running	
1	After motor parameter auto-tuning, motor output U / V / W connections and encoder connection are not changed.
2	Set F03.06 (Inspection Acc. speed) and F03.07 (Inspection Dec. speed).
Inspection running	
1	If the actual running direction of motor is not the command direction, set F00.08 (Run direction) = 1.
2	Make sure that the motor can run normally.
3	Make sure the motor can run normally and the signals of the brake and power circuit etc. can act normally, then it will do high speed running.

7.1.4 High Speed Running

1	Give the floor normal run command so that to the elevator can run normally. Then set Group F02 of start & stop parameters, start stopping parameters, adjust starting & stopping brake and motor running time sequence to make sure that the elevator does not shake at start & stop. • For asyn. motor, adjust Group F02 to avoid obviously shaking at start & stop. • For syn. motor, set Group F06 additionally to avoid elevator brake at start. • If syn. motor has SINCOS encoder, it can achieve elevator smooth start using weigh less method (Group F06). And F02.02 (Retention time of start zero-speed) is set at least as 0.5s.
2	If the elevator has slight shake at running, properly adjust Group F08.

7.1.5 Leveling Accuracy Adjustment

Prerequisites for ensuring leveling accuracy	
1	Accurate leveling must first ensure that the installation position of the door sensor and the magnetic isolation plate is very accurate, that is, it is required to be installed in the elevator: • The length of the magnetic plate of each door must be accurate and consistent; • The bracket must be firm. The installation position of the magnetic isolation board must be very accurate. When the car is in the flat position, the center point of the magnetic isolation board coincides with the center point of the distance between the two door sensor, otherwise the leveling point of the station will appear. Move, that is, upper and lower are higher than the flat point or lower than the flat point.
2	If a magnetic induction switch is used, it should be ensured that the magnetic isolation plate is inserted deeply enough during installation, otherwise it will affect the operation time of the induction switch, resulting in the phenomenon of high and low level in the leveling layer of the landing.
3	In order to ensure the leveling, the system also requires the elevator to have a short crawl before parking. • Check the elevator feedback speed through D01.13 to determine if there is crawling speed when parking.
4	In the actual adjustment, you should first adjust an intermediate layer until it is leveled. Then based on this parameter, adjust the other layers.
5	By adjusting the speed loop ratio of the F08 group and adjusting the integral gain, it should be ensured that the parking position is repetitive when the elevator is parked from the up and down to the middle floor.

Parameters		Range	Value
F03.00	Acc.	0.020 - 9.999	0.700m/s^2
F03.01	Rapid Acc. at beginning	0.020 - 9.999	0.350m/s^3
F03.02	Rapid Acc. at end	0.020 - 9.999	0.600m/s^3
F03.03	Dec.	0.020 - 9.999	0.700m/s^2
F03.04	Rapid Dec. at beginning	0.020 - 9.999	0.600m/s^3
F03.05	Rapid Dec. at end	0.020 - 9.999	0.350m/s^3
F03.13	Rapid Dec. at stop	0.020 - 9.999	0.350m/s^3

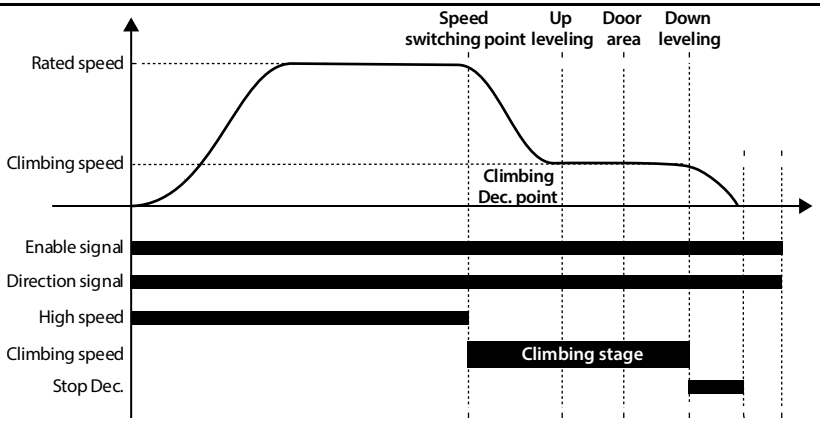

Figure 7-2 Multi-speed running process timing diagram

Leveling accuracy adjustment method	
No crawling or crawling for too long	The system requires the elevator to firstly enter the crawling state after Dec. This is the basic condition for ensuring the elevator leveling. If there is no crawling, the Dec. curve is too slow or the elevator main board creep speed point is too short. Debugging method: • The curve is too slow, increase the value of F03.03, F03.04, F03.05. • The elevator main board crawling Dec. point position is too short, increase the distance of the elevator control board crawling speed over-change point, that is, the value. • If the crawling time is too long, the Dec. curve is too fast. At this time, the Dec. curve should be adjusted so that it is crawling, but not too long, and the values of F03.03, F03.04, F03.05 are reduced.
Low up, down high or up high, low down	When the parking is low, the downward trend is high, indicating that the crawling speed is low; When the parking is high, the downward trend is high, indicating that the crawling speed is high. At this time, the crawling speed should be adjusted.
Low up, low down or high up, down high	When the parking occurs, the uplink is low, the downlink is low or the upstream is high, and the downward is high, indicating that the position of the door panel is biased. At this time, the position of the door panel should be adjusted.
The installation position of the upper and lower stations is incorrect	Incorrect installation position of the upper and lower stations will affect the leveling accuracy of the elevator at both ends. For the above end station as an example, the adjustment steps of the end station position are as follows: • Install the end station switch at a position greater than the speed change distance; • The elevator runs quickly to the end station, and the uneven layer will appear after stopping the speed change; • Immediately set the system to an inspection state; • Measure the distance of the elevator from the leveling layer, which is the distance that the upper station needs to adjust upwards. Similarly, the adjustment of the lower station can be performed.
Flat-level fine-tuning	After the basic leveling is achieved by the curve parameter of the F03 group, the leveling accuracy is adjusted by adjusting F03.13 (Stop Dec. jerk) when the crawling speed is normal. When leveling the layer, increase the value of F03.13, the level of the leveling When, reduce the value of F03.13.

7.2 Terminal MS Run Application

The elevator controller can calculate the motor present running direction (digital) and objective speed (digital) according to the elevator control logic and send them to MONT72.

MONT72 receives the objective speed of MS form and calculate the speed curve according to the S-curve parameter setting, then control the motor to run.

Example: A certain elevator with rated speed of 1.750m/s uses a controller in terminal MS control (F00.05 = 2).

The elevator controller controls the running contactor and the MONT72 controls the brake.

- Inspection running: The elevator controller outputs the multi-speed command.
- Operating speed: Obtained from the speed combination of the multi-speed terminal.

When the MONT72 receives the enable, direction and multi-speed signal of the elevator controller, after the F02.01 time at zero speed, the brake is opened, and the MONT72 operates according to the speed of the elevator controller.

When the machine is stopped, the elevator controller sends a multi-speed zero-speed running command. After F02.05 time, the brake is released and the elevator stops at zero speed.

Note:

If use gearless permanent magnet syn. motor with SINCOS encoder, MONT72 needs the SINCOS encoder interface board with FD. MONT72 receive the sine-cosine signal from the encoder as speed signal, meanwhile MONT72 can output pulse signal of no-FD or 2 - 126 odd-times FD to the elevator controller without any weigh compensation device.

Control Part Connection

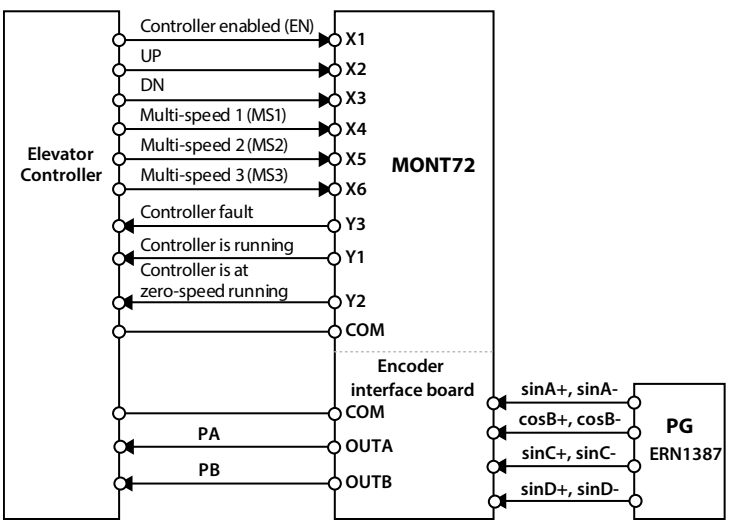

Figure 7-3 Terminal MS running connection

Set Parameter

The setting content of terminal MS general function code is shown as Table 7-1 and setting content of special function code is shown as Table 7-2.

Table 7-1 General parameter

Function		Value	Remark
F00.00	Motor type	Depend on actual value	
F00.01	Control mode	Depend on actual value	
F00.02	Rated speed of elevator	Depend on actual value	
F00.03	Max output frequency	Depend on actual value	
F00.04	Mechanical parameters of motor	Depend on actual calculate value	
F07.00 / F10.01	Rated power of motor	Depend on actual value	Motor nameplate parameters.
F07.01 / F10.02	Rated voltage of motor	Depend on actual value	
F07.02 / F10.03	Rated current of motor	Depend on actual value	
F07.03 / F10.04	Rated frequency of motor	Depend on actual value	
F07.04 / F10.05	Rated rpm of motor	Depend on actual value	
F08.00 / F08.02	ASR proportional gain 1 / 2	500	Adjust according to running effect. Generally use the default value.
F08.01 / F08.03	ASR integral coefficient 1 / 2	500	
F08.04	ASR switching frequency 1	10.00Hz	
F08.05	ASR switching frequency 2	15.00Hz	
F08.09	Electrical torque limit	180.0%	
F11.00	PG board	Depend on actual value	
F11.01	PG P/R	Depend on actual value	
F11.02	PG direction setting	Depend on actual value	

Table 7-2 Terminal MS run

Function		Value	Remark
F00.05	Operating mode	2	Terminal MS control
F02.02	Retention time of start zero-speed	0.5s	Adjust according the situation of running contactor and brake at motor start & stop.
F02.06	Retention time of stop zero-speed	0.5s	
F03.00	Acc. speed	0.700m/s^2	Set according the elevator speed and running effect.
F03.01	Start Acc. jerk	0.350m/s^3	
F03.02	End Acc. jerk	0.600m/s^3	
F03.03	Dec. speed	0.700m/s^2	
F03.04	Start Dec. jerk	0.600m/s^3	
F03.05	End Dec. jerk	0.350m/s^3	
F03.06	Inspection Acc. speed	0.200m/s^2	
F03.07	Inspection Dec. speed	1.000m/s^2	
F03.13	Stop Dec. jerk	0.350 m/s^3	
F05.00	Multi-speed 0	0	As design
F05.01	Multi-speed 1	Re-leveling speed	

7

Function		Value	Remark
F05.02	Multi-speed 2	Creeping speed	
F05.03	Multi-speed 3	Battery driven speed	
F05.04	Multi-speed 4	Inspection speed	
F05.05	Multi-speed 5	Normal low speed	
F05.06	Multi-speed 6	Normal mid speed	
F05.07	Multi-speed 7	Normal high speed	
F06.00	Pre-torque selection	4	No weighing auto-compensation
F06.01	No weighing current coefficient	3000	Commission according to the running effect; Increase the three parameter values in the motor non oscillatory situation.
F06.02	No weighing speed-loop KP	2000	
F06.03	No weighing speed-loop KI	2000	
F12.01	X1 terminal function	1	Controller enabled (EN)
F12.02	X2 terminal function	2	UP
F12.03	X3 terminal function	3	DN
F12.04	X4 terminal function	4	MS1
F12.05	X5 terminal function	5	MS2
F12.06	X6 terminal function	6	MS3
F12.15	DO1 terminal function	2	Controller is running
F12.16	DO2 terminal function	3	Controller is at zero-speed running
F12.17	Y1 relay function	14	Controller fault
F16.07	Multi-sped inspection	4	Multi-speed inspection select

7.3 Terminal Analogue Run Application

The elevator controller can calculate the motor present running direction (digital) and running speed (analogue) according to the elevator control logic and send them to MONT72. MONT72 control the motor to run according to the controller's command and speed.

Example: A certain elevator with rated speed of 1.750m/s uses a drive in analogue run mode. The brake and the running contactor are controlled by the elevator controller. The controller sends the direction signal to MONT72 in the form of digital and output the running speed to drive in the form of analogue.

Use analogue weighing device and AI1 as analogue speed setting and AI2 as analogue weigh.

Control Part Connection

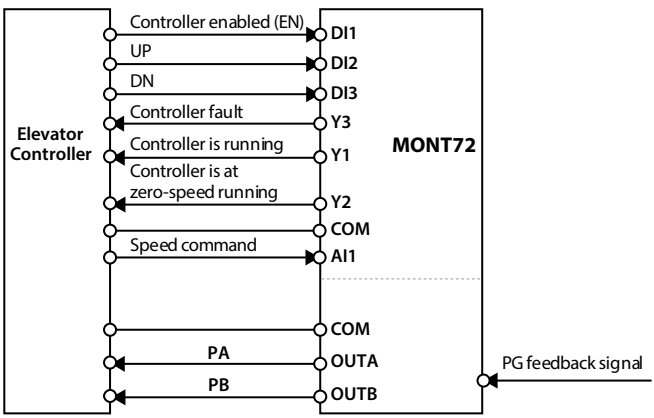

Figure 7-4 Terminal analogue running connection

Set Parameter

Refer to Table 7-1 for the general function code.

The terminal analogue special function code setting content is shown as Table 7-3.

Table 7-3 Terminal analogue run parameter

Ref. Code	Function	Value	Remark
F00.05	Operating mode	1	Terminal analogue control.
F02.02	Retention time of start zero-speed	0.5s	Adjust according the situation of running contactor and brake at motor start & stop.
F02.06	Retention time of stop zero-speed	0.5s	
F03.00	Acc. speed	9.999m/s^2	
F03.01	Start Acc. jerk	9.999m/s^3	
F03.02	End Acc. jerk	9.999m/s^3	
F03.03	Dec. speed	9.999m/s^2	
F03.04	Start Dec. jerk	9.999m/s^3	
F03.05	End Dec. jerk	0.350m/s^3	

Ref. Code	Function	Value	Remark
F04.00	Setting curve	00000	Change according to the characteristics of analogue curve.
F04.01	Line 1 min. setting	0.0%	
F04.02	Corresponding value of line 1 min. setting	0.0%	
F04.03	Line 1 max. setting	100.0%	
F04.04	Corresponding value of line 1 max. setting	100.0%	
F04.05	Line 2 min. setting	0.0%	
F04.06	Corresponding value of line 2 min. setting	0.0%	
F04.07	Line 2 maxi. setting	100.0%	
F04.08	Corresponding value of line 2 max. setting	100.0%	
F06.00	Pre-torque selection	1	Automatic compensation without weighing device
F12.01	X1 terminal function	1	Drive controller enable (EN)
F12.02	X2 terminal function	2	(UP)
F12.03	X3 terminal function	3	(DN)
F12.15	DO1 terminal function	2	The drive controller is running
F12.16	DO2 terminal function	3	Drive controller running at zero speed
F12.17	Y1 relay function	14	Drive controller fault output
F13.00	AI1 terminal function	1	Speed reference
F13.01	AI1 bias	0.0%	Adjust according to actual conditions
F13.02	AI1 gain	1.00	
F13.03	AI1 filter time	0.05s	

7.4 Application of Power Failure Emergency Operation Mode

During the use of the elevator, if the system's power supply suddenly loses power, it may cause the passenger to be locked in the car. The MONT72 can use the power failure emergency operation mode (UPS power supply operation).

UPS power supply operation: MONT72 inverter circuit and elevator controller power supply are powered by UPS, for emergency operation of power failure.

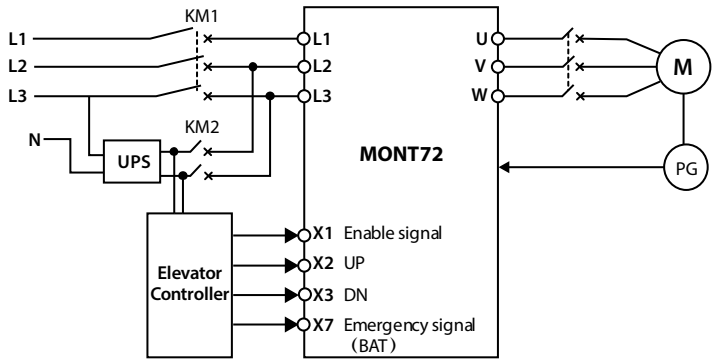

Figure 7-5 Battery driven run connection

Parameters		Value	Default
F12.01	X1 terminal input function	1 (enable)	1
F12.02	X2 terminal input function	2 (up)	2
F12.03	X3 terminal input function	3 (down)	3
F12.07	X7 terminal input function	8 (emergency)	0
F03.08 / F03.09	Emergency operation Acc. / Dec.	1.000m/s^2	1.000m/s^2
F05.09	Emergency operation speed	0.100m/s	0.100m/s
F16.13	UPS state elevator running direction is automatically judged	0: Not enabled 1: Determine the running direction based on the current 2: Determine the running direction according to the encoder direction 3: Determine the running direction according to the current (no start compensation and zero speed hold) 4: Determine the running direction according to the encoder direction (no start compensation and zero speed hold) *Note: 2 and 4 must select closed loop vector control (F00.01 = 2) and elevator brake MONT72 control output.*	

Sequency	
1	When mains power fails, the KM1 is disconnected, the delay is a few seconds, the KM2 is pulled in, and the UPS supplies power to the elevator controller and the MONT72, and elevator controller outputs battery driven running command (BAT).
2	After some time delay, the elevator controller outputs running command (UP / DN). When MONT72 receives the command, the running contactor will be closed and the brake will be opened. Through F16.13 (Automatic judgment of UPS running direction), the elevator runs in the light load direction. MONT72 accelerates at the line rate of F03.08 (Battery driven Acc. speed) till the speed of F05.09 (Battery driven run speed).
3	When running to the leveling position, the elevator controller stops outputting the emergency running command (BAT), and the MONT72 starts to decelerate with F03.09 (Battery driven Dec. speed).
4	After the elevator is reduced to zero speed, the MONT72 closes the brake. After a certain delay, the controller stops outputting the running command (up / down), the MONT72 releases the contactor, and the emergency operation process ends.

Note	
1	*The emergency power supply voltage should be greater than 150VAC to ensure that the drive controller controls the power supply to work normally.*
2	*In emergency mode, the drive controller does not detect input phase loss.*
3	*Use UPS operation, elevator to open the gate to determine the light load direction, you need to use MONT72 to control the brake output, in order to open F16.13 = 2 or 4 (the UPS direction is automatically judged by the encoder).*

Chapter 8 Troubleshooting and Maintenance

If a fault occurs, the keypad will display the fault alarm status. Meanwhile, faulty relay acts, accordingly MONT72 stops output and the motor coasts to stop.

When fault alarm occurs, user should record the fault in detail and take proper action according to the following table. If technical help is needed, contact the suppliers or directly call Shenzhen Hpmont Technology Co., Ltd.

After the fault is eliminated, reset MONT72 by any of the following methods:

1. Keypad reset.
2. External reset terminal (DI terminal = No. 16 function).
3. Communication fault reset.
4. Switching on MONT72 after completely power off.

<table>
<tr><td colspan="2">Lu: DC bus undervoltage</td><td>Counter-measures</td></tr>
<tr><td colspan="2">Cause of issue:
1: At the begining of power on and at the end of power off
2: Input voltage is too low
3: Improper wiring leads to undervoltage of hardware</td><td>1: It is normal status of power on and power off
2: Check input power voltage
3: Check wiring and wire MONT72 properly</td></tr>
<tr><td colspan="2">E0001: Acc. overcurrent</td><td>Counter-measures</td></tr>
<tr><td>Fault subcode:
101: Software Acc. overcurrent
102: Hardware Acc. overcurrent</td><td>Cause of issue:
1: Drive controller and motor are not wired correctly
2: Motor parameters are incorrect
3: Drive controller power selection is too small
4: Acc. and Dec. time is too short</td><td rowspan="6">1: Correct the drive controller and motor wiring
2: Set the correct motor parameters
3: Choosing the right drive controller power
4: Set the appropriate Acc. and Dec. time
5. Check the operation and brake contactor for damage
6. Check if the brake is open
7. Motor line, motor phase or short circuit to ground</td></tr>
<tr><td colspan="2">E0002: Dec. overcurrent</td></tr>
<tr><td>Fault subcode:
201: Software Dec. overcurrent
202: Hardware Dec. overcurrent</td><td>Cause of issue:
Same as E0001 failure</td></tr>
<tr><td colspan="2">E0003: Constant speed overcurrent</td></tr>
<tr><td>Fault subcode:
301: Software zero speed or constant speed over current
302: Hardware zero speed or constant speed over current</td><td>Cause of issue:
Same as E0001 failure</td></tr>
</table>

E0004: Acc. overvoltage		Counter-measures
Fault subcode: 401: Software accelerated overvoltage	Cause of issue: 1: Input voltage is too high 2: Dec. time is too short 3: Unregulated wiring leads to hardware overvoltage	1: Check the input supply voltage 2: Set the appropriate Acc. and Dec. time 3: Check system wiring, standard wiring 4. Check if the braking resistor selection is reasonable
E0005: Dec. overvoltage		
Fault subcode: 501: Software Dec. overvoltage	Cause of issue: Same as E0004 failure	
E0006: Constant speed overvoltage		
Fault subcode: 601: Software constant speed overvoltage	Cause of issue: Same as E0004 failure	
E0008: Power module fault		Counter-measures
Fault subcode: 800: FO fault protection (edge trigger)	Cause of issue: 1: Phase-to-phase output short circuit or short to ground 2: Output current is too large 3: Power module is damaged	1: Check wiring, standard wiring 2: Check wiring and machinery 3: Contact the factory for repair
E0009: Heatsink overheat		Counter-measures
Fault subcode: 901: Software over temperature 902: Hardware over temperature	Cause of issue: 1: Ambient temperature exceeds specification 2: The drive controller is poorly ventilated outside 3: Fan failure 4: Temperature detection circuit failure	1: Derating, power amplification 2: Rectify the external ventilation of the drive controller 3: Replace the fan 4: Seeking technical support
E0010: Braking unit fault		Counter-measures
Fault subcode: 1000: Brake unit failure	Cause of issue: 1: Brake circuit failure	1: Seek technical support
E0012: Motor auto-tuning fault		Counter-measures
Fault subcode: 1202: Synchronous motor static auto-tuning detection current is too small 1203: Synchronous motor static auto-tuning timeout 1204: Stator resistance self-tuning current is too large 1205: Stator resistance auto-tuning timeout 1206: Rotor resistance auto-tuning timeout 1207: No-load current self-tuning is too small	Cause of issue: 1: Parameter auto-tuning timeout	1: Check the motor wiring 2: Enter the correct nameplate parameters 3: Seeking technical support

E0014: Current detection fault		Counter-measures
Fault subcode: 1401: Current detection failure 1402: U / W phase current detection fault 1403: Current correction circuit failure	Cause of issue: 1: Current detection circuit is damaged	1: Contact factory to repair
E0015: Input phase loss		Counter-measures
Fault subcode: 1500: Input phase loss	Cause of issue: 1: For three-phase input drive controller, three-phase input power supply phase loss	1: Check three-phase input power supply 2: Seeking technical support
E0016: Output phase loss		Counter-measures
Fault subcode: 1600: Output phase loss detected during operation	Counter-measures 1: Drive controller three-phase output disconnected or missing phase 2: The three-phase load of the drive controller is seriously unbalanced	1: Check the wiring between the drive controller and the motor 2: Check the motor
E0017: Drive controller overload		Counter-measures
Fault subcode: 1600: Drive controller overload	Cause of issue: 1: Acc. time setting is too short 2: Improper setting of V/f curve or torque boost causes excessive current 3: The grid voltage is too low 4: The motor load is too large	1: Adjust the Acc. time 2: Adjust V/f curve or torque boost 3: Check the input grid voltage 4: Select power matching drive controller
E0018: Motor speed deviation is too large		Counter-measures
Fault subcode: 1801: Motor speed deviation is too large	Cause of issue: 1: Brake failure or running contactor failure 2: Encoder pulse number setting error 3: F05.19, F05.20 setting is unreasonable 4: Drive controller output torque is insufficient 5: The speed loop PI parameter is set incorrectly	1: Replace the fault contactor 2: Reasonably set the encoder pulse parameters 3: Modify F05.19, F05.20 parameters 4: Select a larger capacity drive controller 5: Correctly set the speed loop PI parameter
E0019: Motor overload		Counter-measures
Fault subcode: 1900: Motor overload	Cause of issue: 1: V/f curve is set incorrectly 2: The grid voltage is too low 3: Improper setting of motor overload protection factor 4: The motor is blocked or the load is too large	1: Adjust the appropriate V/f curve 2: Check the input power 3: Reasonably set the motor overload protection factor 4: Check load and mechanical transmission

E0020: Motor overheated		Counter-measures
Fault subcode: 2000: Motor overheating (terminal) 2001: Motor overheating (analog)	Cause of issue: 1: Motor overheated 2: Motor overheat terminal (digital or analog input terminal) wiring error 3: The motor parameter setting is wrong	1: Reduce the load, increase the Acc. / Dec. time, repair, replace the motor 2: Detect if the overheat detection input terminal signal is correct 3: Set the motor parameters according to the motor nameplate
E0021: Control board EEPROM read and write failure		Counter-measures
Fault subcode: 2101: In-board EEPROM write data error 2102: On-board EEPROM read data error 2103: On-board EEPROM read data error too many times 2104: On-board EEPROM read operation timed out 2105: On-board EEPROM write operation timed out	Cause of issue: 1: The control board EEPROM storage circuit has failed	1: Contact the factory for repair
E0022: Operation panel EEPROM read and write failure		Counter-measures
Cause of issue: 1: Does not affect the normal operation of the drive controller 2: The operation panel EEPROM storage circuit has failed	*Note:* *Operation panel display only, drive controller no protection.*	1: Replace the operator panel 2: Contact the factory for repair
Fault subcode: 2301: Permanent magnet synchronous traction machine self-tuning selection F07.07 2302: Asynchronous traction machine self-tuning selection F10.10 2304: Motor rated current is 0 2305: Motor no-load current is too large 2306: F08 group speed loop PI switching frequency 1/2 setting error 2317: F11.01 is set to 1 when permanent magnet synchronous traction machine	Cause of issue: 1: The rated power of the traction machine and the rated power of the drive controller are too far apart 2: The traction machine parameter setting is improper	1: Select the traction machine that matches the power of the drive controller 2: Set the traction machine parameters correctly
E0024: External device failure		Counter-measures
Fault subcode: 2401: External device failure	Cause of issue: 1: External device fault terminal action	1: Check external device

E0025: Output current is too small fault		Counter-measures
Fault subcode: 2501: Output current is too small fault	Cause of issue: 1: When the asynchronous motor starts running, the detected current is too small *This fault can effectively prevent the risk of opening the brake when the output circuit is abnormal.*	1: Check the drive controller UVW wiring, run the contactor, the motor to the running contactor, etc. 2: Drive controller is damaged
E0030: Encoder reverse		Counter-measures
Fault subcode: 3000: Encoder reverse fault 3001: Static self-tuning with UVW encoder detected encoder reverse fault	Cause of issue: 1: Encoder wiring phase sequence does not match the traction machine phase sequence	1: F11.02 value is reversed
E0031: Encoder disconnection		Counter-measures
Fault subcode: 3101: Encoder AB is broken	Cause of issue: 1: Encoder has no input signal	1: Check encoder wiring
E0032: Traction machine speed overspeed		Counter-measures
Fault subcode: 3203: Elevator running speeding 3204: Elevator overspeed detected when the all-in-one stops output	Cause of issue: 1: Encoder pulse number setting error 2: Drive controller output torque is insufficient 3: The speed loop PI parameter is set incorrectly	1: Set the encoder pulse parameter reasonably 2: Select a larger capacity drive controller 3: Correctly set the speed loop PI parameter
E0035: Running contactor pull / disconnect fault		Counter-measures
Fault subcode: 3500: Running contactor feedback exception 3501: Running contactor pull-in failure 3502: Running contactor disconnection	Cause of issue: 1: Contactor damage 2: Feedback contact wiring problem	1: Replace contactor 2: Check wiring
E0036: Brake contactor pull-in / off failure		Counter-measures
Fault subcode: 3600: Brake contactor feedback is abnormal	Cause of issue: 1: Contactor damage 2: Feedback contact wiring problem	1: Replace contactor 2: Check wiring
E0037: Speed limiter failure		Counter-measures
Fault subcode: 3700: Speed limiter failure	Cause of issue: 1: Set the speed limiter input, the speed limiter terminal has input	1: Check the speed limiter input terminal

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Appendix A Parameters

Property modification:

"*": The actual parameters cannot be modified.

"×": Cannot be modified during operation.

"○": It can be modified during operation.

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
D00: System Status Parameters (see page 46 - 46)						
D00.00	Controller series	MONT72	Actual value		*	
D00.01	Rated power	0.1 - 99.9kW	Actual value		*	
D00.02	Rated current	0.1 - 999.9A	Actual value		*	
D00.03	Software version of DSP	0.00 - 9.99	Actual value		*	
D00.04	Special software version of DSP	0.00 - 9.99	Actual value		*	
D00.05	Software version of keypad	0.00 - 9.99	Actual value		*	
D00.06	Special software version of keypad	0.00 - 9.99	Actual value		*	
D01: Drive Status Parameters (see page 46 - 47)						
D01.00	Control mode	0 - 2	Actual value		*	
D01.01	Setting speed	0.000 - 9.999m/s	Actual value		*	
D01.02	Setting speed (after Acc. / Dec.) (m/s)	0.000 - 9.999	Actual value		*	
D01.03	Feedback speed	0.000 - 9.999 m/s	Actual value		*	
D01.04	Setting frequency	0.01 - 100.00Hz	Actual value		*	
D01.05	Setting frequency (after Acc. / Dec.)	0.01 - 100.00Hz	Actual value		*	
D01.06	Output frequency	0.01 - 400.00Hz	Actual value		*	
D01.07	Output voltage	0 - 999V	Actual value		*	
D01.08	Output current	0.1 - 999.9A	Actual value		*	
D01.09	Output torque	0.0 - 300.0% (motor rated torque)	Actual value			
D01.10	Output power	0.0 - 200.0% (motor rated power)	Actual value		*	
D01.11	DC bus voltage	0 - 999V	Actual value		*	
D01.12	Set Rpm	0 - 60000rpm	Actual value		*	
D01.13	Running Rpm	0 - 60000rpm	Actual value		*	
D02: Analogue Status Display Parameters (see page 47 - 48)						
D02.00	AI1 voltage	0.00 - 10.00V	Actual value		*	
D02.01	AI1 voltage (after calculating)	0.00 - 10.00V	Actual value		*	
D02.02	Heatsink temperature	0.0 - 999.9°C	Actual value		*	
D02.03	Input terminal status	A 16-bit binary number, from high to low, is:	Actual value		*	

A

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
		Bit9 - Bit0 corresponds to X10 - X1				
D02.04	Output terminal status	A 16-bit binary number, from high to low, is: Bit5 - Bit2 corresponds to Y4 - Y1 Bit1 - Bit0 corresponds to DO2 - DO1	Actual value		*	
D02.05	Elevator running state	A 16-bit binary number: Bit0: Driver enable Bit1: Inspection running Bit2: Multi-speed Bit3: Analog running Bit4: Brake feedback input Bit5: Contactor feedback input Bit6: Multi-speed terminal 1 Bit7: Multi-speed terminal 2 Bit8: Multi-speed terminal 3 Bit9: Emergency running Bit10: Brake output Bit11: Running contactor Bit12: Running direction Bit14 & Bit13: Control mode Bit15: Reserved	Actual value		*	
D02.06	Driver status	A 16-bit binary number: Bit0: Controller fault Bit1: Running / stop Bit2: Up running Bit3: Down running Bit4 & Bit5: Acc./ Dec. / constant speed Bit6: Zero-speed signal Bit7: Zero-speed running Bit8: Parameter auto-tuning Bit9: Speed arrival Bit10: Running is ready Bit11: Brake output Bit12: Contactor output Bit13: Stop signal Bit14, Bit15: Reserved	Actual value		*	
D03: Running Status Parameters (see page 48 - 48)						
D03.00	Current fault		Actual value		*	
D03.01	Current fault sub-code	0 - 100	Actual value		*	
D03.02	Acculated power-on time	0 - 65535hours	Actual value		*	
D03.03	Acculated running time	0 - 65535hours	Actual value		*	
D03.04	High bit of running times	0 - 65535	Actual value		*	
D03.05	Running times	0 - 65535	Actual value		*	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
D04: Encoder Status Parameters (see page 48 - 49)						
D04.00	C phase value of SINCOS encoder	0 - 4095	Actual value		*	
D04.01	D phase value of SINCOS encoder	0 - 4095	Actual value		*	
D04.02	A phase value of SINCOS encoder	0 - 4095	Actual value		*	
D04.03	B phase value of SINCOS encoder	0 - 4095	Actual value		*	
D04.04	UVW status of UVW encoder	0 - 7	Actual value		*	
D04.05	Electrical angle	0 - 65535	Actual value		*	
D04.06	Pulses of PG	0 - 65535	Actual value		*	
D04.07	Pulse monitoring of start slip	0 - 65535	Actual value		*	
F00: Basic Parameters (see page 49 - 50)						
F00.00	Motor type	0: Asyn. Motor 1: syn. motor	0	1	×	
F00.01	Control mode	0: V/f control 1: SVC control 2: Closed-loop vector control	2	1	×	
F00.02	Rated speed of elevator	0.100 - 4.000m/s	1.500m/s	0.001m/s	×	
F00.03	Max output freqency	5.00 - 100.00Hz	50.00Hz	0.01Hz	×	
F00.04	Mechanical parameters of motor	10.0 - 6000.0	60.0	0.1	×	
F00.05	Operating mode	0: Keypad control 1: Terminal analogue control 2: Terminal MS control	0	1	×	
F00.07	Keypad speed digital setting	0.000m/s - F00.02	1.500m/s	0.001m/s	○	
F00.08	Running direction selection	0: Same direction 1: Reversed direction	0	1	×	
F01: Protection of Parameters (see page 50 - 51)						
F01.00	User's password	00000 - 65535	0	1	○	
F01.01	Menu mode	0: Full menu mode 1: Checking menu mode.	0	1	○	
F01.02	Function code parameter initialization	0: No operation 1: Restore to factory settings 2: Parameter download 3: Clear fault information	0	1	×	
F01.03	Keypad EEPROM parameter initialization	0: No operation 1: Parameters upload	0	1	○	
F02: Start & Stop Parameters (see page 51 - 52)						
F02.00	Start delay time	0.000 - 4.999s	0.000s	0.001s	×	
F02.01	Brake open delay time	0.000 - 4.999s	0.000s	0.001s	×	

A

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F02.02	Retention time of start zero-speed	0.000 - 4.999s	0.500s	0.001s	×	
F02.03	Start speed	0.000 - 0.400m/s	0.000m/s	0.001m/s	×	
F02.04	Retention time of start speed	0.000 - 4.999s	0.000s	0.001s	×	
F02.05	Brake close delay time	0.000 - 4.999s	0.200s	0.001s	×	
F02.06	Retention time of stop zero-speed	0.000 - 4.999s	0.300s	0.001s	×	
F02.07	Contac tor close delay time	0.000 - 4.999s	0.000s	0.001s	×	
F02.08	Start ramp time	0.000 - 2.000s *0.000: No ramp*	0.000s	0.001s	×	
F03: Acc. / Dec. Parameters (see page 52 - 53)						
F03.00	Acc. speed	0.020 - 9.999m/s^2	0.700m/s^2	0.001m/s^2	×	
F03.01	Start Acc. jerk	0.020 - 9.999m/s^3	0.350m/s^3	0.001m/s^3	×	
F03.02	End Acc. jerk	0.020 - 9.999m/s^3	0.600m/s^3	0.001m/s^3	×	
F03.03	Dec. speed	0.020 - 9.999m/s^2	0.700m/s^2	0.001m/s^2	×	
F03.04	Start Dec. jerk	0.020 - 9.999m/s^3	0.600m/s^3	0.001m/s^3	×	
F03.05	End Dec. jerk	0.020 - 9.999m/s^3	0.350m/s^3	0.001m/s^3	×	
F03.06	Inspection Acc. speed	0.020 - 9.999m/s^2	0.200m/s^2	0.001m/s^2	×	
F03.07	Inspection Dec. speed	0.020 - 9.999m/s^2	1.000m/s^2	0.001m/s^2	×	
F03.08	Battery driven Acc. speed	0.020 - 9.999m/s^2	1.000m/s^2	0.001m/s^2	×	
F03.09	Battery driven Dec. speed	0.020 - 9.999m/s^2	1.000m/s^2	0.001m/s^2	×	
F03.10	Auto-tuning Acc. speed	0.020 - 9.999m/s^2	0.100m/s^2	0.001m/s^2	×	
F03.11	Auto-tuning Dec. speed	0.020 - 9.999m/s^2	0.100m/s^2	0.001m/s^2	×	
F03.12	Abnormal Dec. speed	0.020 - 9.999m/s^2	1.000m/s^2	0.001m/s^2	×	
F03.13	Stop Dec. jerk	0.020 - 9.999m/s^3	0.350m/s^3	0.001m/s^3	×	
F03.14	Asyn. motor field-weakening optimization	0: No field-weakening optimization 1: Optimize according to voltage 2: Optimize according to current	0	1	×	
F03.15	Field-weakening Kp	0 - 5000	4000	1	×	
F03.16	Field-weakening Ki	0 - 5000	1000	1	×	
F03.17	Field-weakening voltage limit	4000 - 5000	4126	1	×	
F03.19	Sincos encoder CD phase learning	0: Learning 1: Not learning	0	1	×	
F04: Analogue Curve Parameters (see page 53 - 53)						
F04.00	Setting curve	Unit: AI1 characteristic curve selection Ten / Hundred / Thousand: Reserved 0: Line 1 1: Line 2	0000	1	×	
F04.01	Line 1 min. setting	0.0% - F04.03	0.0%	0.1%	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F04.02	Corresponding value of line 1 min. setting	0.0 - 100.0%	0.0%	0.1%	○	
F04.03	Line 1 max. setting	F04.01 - 100.0%	100.0%	0.1%	○	
F04.04	Corresponding value of line 1 max. setting	0.0 - 100.0%	100.0%	0.1%	○	
F04.05	Line 2 min. setting	0.0% - F04.07	0.0%	0.1%	○	
F04.06	Corresponding value of line 2 min. setting	0.0 - 100.0%	0.0%	0.1%	○	
F04.07	Line 2 max. setting	F04.05 - 100.0%	100.0%	0.1%	○	
F04.08	Corresponding value of line 2 max. setting	0.0 - 100.0%	100.0%	0.1%	○	
F05: Speed Parameters (see page 53 - 55)						
F05.00	Multi-speed 0	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.01	Multi-speed 1	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.02	Multi-speed 2	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.03	Multi-speed 3	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.04	Multi-speed 4	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.05	Multi-speed 5	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.06	Multi-speed 6	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.07	Multi-speed 7	0.000m/s - F00.02	0.000m/s	0.001m/s	○	
F05.08	Inspection run speed	0.000 - 0.630m/s	0.200m/s	0.001m/s	○	
F05.09	Battery driven run speed	0.000m/s - F00.02	0.100m/s	0.001m/s	○	
F05.10	Speed detection level 1 (FDT1)	0.0 - 100.0% (F00.02)	90.0%	0.1%	○	
F05.11	Speed detection level 2 (FDT2)	0.0 - 100.0% (F00.02)	90.0%	0.1%	○	
F05.12	Speed detection hysteresis level FDT1	0.0 - 100.0% (F00.02)	1.0%	0.1%	○	
F05.13	Speed detection hysteresis level FDT2	0.0 - 100.0% (F00.02)	1.0%	0.1%	○	
F05.14	Speed within FAR range	0.0 - 20.0% (F00.02)	1.0%	0.1%	○	
F05.15	Over-speed setting	80.0 - 120.0% (F00.02)	115.0%	0.1%	○	
F05.16	Over-speed detection time	0.0 - 2.0s	0.2s	0.1s	○	
F05.17	Detected value of speed deviation	0.0 - 30.0% (F00.02)	20%	0.1%	×	
F05.18	Detected time of speed deviation	0.0 - 2.0s *0.0: Not detection*	1.0s	0.1s	×	
F06: Weighing Compensation Parameters (see page 55 - 55)						
F06.00	Pre-torque selection	0: No pre-torque 1: No weighing auto-compensation	0	1	×	
F06.00	Pre-torque selection	2: Asyn. motor zero-serve auto-compensation	0	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F06.01	No weighing current coefficient	0 - 9999	3000	1	×	
F06.02	No weighing speed-loop KP	1 - 9999	500	1	○	
F06.03	No weighing speed-loop KI	1 - 9999	500	1	○	
F07: Asyn. Motor Parameters (see page 55 - 58)						
F07.00	Rated power of asyn. motor	0.2 - 500.0kW	Comfirmed by model	0.1kW	×	
F07.01	Rated voltage of asyn. motor	0V - Controller rated voltage		1V	×	
F07.02	Rated current of asyn. motor	0.0 - 999.9A		0.1A	×	
F07.03	Rated frequency of asyn. motor	1.00 - 100.00Hz	50.00Hz	0.01Hz	×	
F07.04	Rated Rpm of asyn. motor	1 - 24000rpm	1440rpm	1rpm	×	
F07.05	Power factor of asyn. motor	0.001 - 1.000	Comfirmed by model	0.001	×	
F07.06	Parameter auto-tuning of asyn. motor	0: No action 1: Stationary auto-tuning 2: Rotary auto-tuning	0	1	×	
F07.07	Stator resistance of asyn. motor	0.000 - 65.535Ω	Comfirmed by model	0.001Ω	×	
F07.08	Rotor resistance of a syn. motor	0.000 - 65.535Ω		0.001Ω	×	
F07.09	Leakage inductance of asyn. motor	0.0 - 6553.5mH		0.1mH	×	
F07.10	Mutual inductance of asyn. motor	0.0 - 6553.5mH		0.1mH	×	
F07.11	Excitation current of asyn. motor	0.0 - 999.9A	Comfirmed by model	0.1A	×	
F07.12	Asyn. motor torque boost	0.1 - 30.0%	0.1%	0.1%	○	
F07.13	Torque boost end-point of asyn. motor	0.1 - 50.0% (F07.03)	2.0%	0.1%	○	
F07.14	Slip compensation gain of asyn. motor	0.0 - 300.0%	100.0%	0.1%	○	
F07.15	Slip compensation filter time of asyn. motor	0.1 - 10.0s	0.1s	0.1s	○	
F07.16	Slip compensation limit of asyn. motor	0.0 - 250.0%	200.0%	0.1%	×	
F07.17	AVR function	0: Disabled 1: Enabled all the time 2: Disabled in Dec. process	1	1	○	
F07.18	Oscillation-suppression mode of asyn. motor	0: Depend on exciting component 1: Depend on torque component	0	1	○	
F07.19	Oscillation-suppression coefficient of asyn. motor	0 - 200	100	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F08: Motor Vector Control Speed-loop Parameters (see page 58 - 59)						
F08.00	Low speed ASR Kp	1 - 9999	500	1	○	
F08.01	Low speed ASR KI	0 - 9999	500	1	○	
F08.02	High speed ASR Kp	1 - 9999	500	1	○	
F08.03	High speed ASR KI	0 - 9999	500	1	○	
F08.04	ASR PI swithcing frequency 1	0.00 - 50.00Hz	10.00Hz	0.01Hz	○	
F08.05	ASR PI swithcing frequency 2	0.00 - 50.00Hz	15.00Hz	0.01Hz	○	
F08.06	ASR integral limit	0.0 - 200.0% (F07.02)	180.0%	0.1%	○	
F08.07	ASR differential time	0.000 - 1.000s *0.000: No differential*	0.000s	0.001s	○	
F08.08	ASR output filter time	0.000 - 1.000s *0.000: No filter*	0.008s	0.001s	○	
F08.09	Torque limit	0.0 - 200.0% (F07.02)	180.0%	0.1%	×	
F09: Current-loop Parameters (see page 59 - 59)						
F09.00	Current-loop KP	1 - 4000	500	1	○	
F09.01	Current-loop KI	1 - 4000	500	1	○	
F09.02	Current-loop output filter time	0.000 - 1.000s *0.000: No filter*	0.000s	0.001s	○	
F09.04	Current loop execution cycle	2 - 10k	6k	1k	×	
F10: Syn. Motor Parameters (see page 59 - 61)						
F10.00	Syn. motor type	0: IPM 1: SMPM	0	1	×	
F10.01	Rated power of syn. motor	0.4 - 400.0kW	Comfirmed by model	0.1kW	×	
F10.02	Rated voltage of syn. motor	0V - Rated voltage		1V	×	
F10.03	Rated current of syn. motor	0.0 - 999.9A		0.1A	×	
F10.04	Rated frequency of syn. motor	1.00 - 100.00Hz	19.20Hz	0.01Hz	×	
F10.05	Rated rpm of syn. motor	1 - 24000rpm	96rpm	1rpm	×	
F10.06	Stator resistance of syn. motor	0.000 - 9.999Ω	0.000Ω	0.001Ω	×	
F10.07	Quadrature axis inductance of syn. motor	0.0 - 999.9mH	0.0mH	0.1mH	×	
F10.08	Direct axis inductance of syn. motor	0.0 - 999.9mH	0.0mH	0.1mH	×	
F10.09	Back EMF of syn. motor	0V - Rated voltage	0V	1V	×	
F10.10	Angle auto-tuning of syn. motor	0: No action 1: Stationary auto-tuning 2: Rotary auto-tuning	0	1	×	
F10.11	Stationary auto-tuning voltage setting of syn. motor	0.0 - 100.0% (F10.02)	100.0%	0.1%	×	
F10.12	Start angle of syn. Motor	0.0 - 359.9°	0.0°	0.1°	×	
F10.13	Z pulse start angle of syn. motor	0.0 - 359.9°	0.0°	0.1°	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F10.14	SINCOS encoder C amplitude of syn. motor	0 - 9999	2048	1	×	
F10.15	SINCOS encoder C zero-bias of syn. motor	0 - 9999	2048	1	×	
F10.16	SINCOS encoder D amplitude of syn. motor	0 - 9999	2048	1	×	
F10.17	SINCOS encoder D zero-bias of syn. motor	0 - 9999	2048	1	×	
F10.18	Sincos encoder CD phase	0: C phase ahead of D phase 1: D phase ahead of C phase	0	1	×	
F10.20	Synchronous performance optimization	Bit0 - Bit1: Reserved Bit2: Subdivision speed measurement function 0: Not open 1: Open Bit3: Reserved Bit5 & Bit4: Synchronous motor start current limit 00: Normal 01: 2 times 10: 4 times 11: 8 times Bit6: Start comfort 0: Mode 0 1: Mode 1 Bit7 - Bit8: Reserved Bit10 & Bit9: Performance optimization 00: Mode 0 01: Mode 1 10: Mode 2 11: Mode 3 Bit11: Reserved Bit12: Synchronous motor starts to suppress oscillation 0: Not inhibited 1: Suppress the shock Bit13: Start optimization 2 0: Not enabled 1: Enabled Bit14: Reserved Bit15: Vibration suppression 0: Old method 1: New method	1028	1	×	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F11: PG Parameters (see page 61 - 61)						
F11.00	MONT72 PG interface board	1: HD-PG2-OC-FD is valid 2: HD-PG6-UVW-FD is valid 3: HD-PG5-SINCOS-FD is valid 4: HD5L-PG1-SC is valid	1	1	×	
F11.01	PG P/R	1 - 9999	2048	1	×	
F11.02	PG direction setting	0: The same direction 1: The reverse direction	0	1	×	
F11.03	PG signal filter coefficient	0x00 - 0x77 Unit: Low-speed filter coefficient Ten: High-speed filter coefficient	0x11	1	○	
F11.04	The protocol of serial communication PG	0: EnDat 1 - 9: Reserved	0	1	×	
F11.05	Detecting time of PG wire disconnection	0.00 - 2.00s *0.00: Do not detect the PG wire disconnection*	1.00s	0.01s	×	
F12: Digital I/O Terminal Parameters (see page 61 - 64)						
F12.00	Input terminal filter time	0.000 - 1.000s	0.010s	0.001s	×	
F12.01	X1 terminal function	0: Reserved 1: Controller enabled (EN) 2, 3: UP / DN 4 - 6: Multi-speed terminal 1 - 3 (MS1 - MS3) 7: Inspection input (INS) 8: Battery-driven input (BAT) 9: Contactor feedback input (CSM) 10: Brake feedback input (BSM) 11: Governor feedback input (OSG) 15: Motor overheat input (OH) 16: Fault reset input (RST) 34: External fault (EXT) Hundreds of 0 means normally open input, 1 means normally closed input0. *For example, if X1 is set to 107, the corresponding inspection input is disconnected.*	1	1	×	
F12.02	X2 terminal function		2	1	×	
F12.03	X3 terminal function		3	1	×	
F12.04	X4 terminal function		4	1	×	
F12.05	X5 terminal function		5	1	×	
F12.06	X6 terminal function		6	1	×	
F12.07	X7 terminal function		0	1	×	
F12.08	X8 terminal function		0	1	×	
F12.09	X9 terminal function		0	1	×	
F12.10	X10 terminal function		0	1	×	
F12.13	Filter time of multi-speed terminal	0.000 - 2.000s	0.000s	0.001s	×	
F12.15	DO1 terminal function	0: Reserved 1: Controller is ready 2: Controller is running 3: Zero-speed running	0	1	×	
F12.16	DO2 terminal function		0	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F12.17	Y1 relay function	4: Zero-speed 5: Contactor output control 6: Brake output control 7, 8: FDT1, FDT2 9: Speed within FAR signal 10,11: Up / Down signal output 12: Under-voltage 14: Controller fault 15: Elevator stop signal 16: Speed outputs	2	1	×	
F12.18	Y2 relay function		3	1	×	
F12.19	Y3 relay function		14	1	×	
F12.20	Y4 relay function		6	1	×	
F12.21	Output terminal logic setting	Bit0, Bit1: DO1, DO2 output terminal positive or negative logic setting Bit2 - Bit5: RLY1 - RLY4 relay output positive or negative logic setting 0: Positive logic 1: Negative logic	0	1	○	
F13: Analogue I/O Terminal Parameters (see page 64 - 65)						
F13.00	AI1 terminal function	0: No function 1: Speed is given 2: Motor overheat signal input	0	1	×	
F13.01	AI1 bias	0.0 - 100.0%	0.0%	1	○	
F13.02	AI1 gain	0.00 - 10.00	1.00	1	○	
F13.03	AI1 filter time	0.01 - 10.00s	0.05s	0.1s	○	
F15: Display Control Parameters (see page 65 - 66)						
F15.00	Language selection	0: Chinese 1: English 2: Turkish 3: Persian 4: Russian 5 - 9: Reserved	0	1	○	
F15.01	Display contrast of LCD keypad	1 - 8	6	1	○	
F15.02	Set parameter 1 of run status	0: Reserved 1: Drive controller rated power 2: Drive controller rated current 3: Operation mode channel 4: Given speed 5: Given speed (after Acc. and Dec.) 6: Set the frequency 7: Set the frequency (after Acc. and Dec.) 8: Output frequency	5	1	○	
F15.03	Set parameter 2 of run status		6	1	○	
F15.04	Set parameter 3 of run status		7	1	○	
F15.05	Set parameter 4 of run status		8	1	○	
F15.06	Set parameter 5 of run status		0	1	○	
F15.07	Set parameter 6 of run status		0	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F15.08	Set parameter 1 of stop status	9: Output current 10: Output torque 11: Output power 12: DC bus voltage 13: Set the speed 14: Running speed 15: AI1 input voltage 16: AI1 input voltage (after processing) 17: Radiator temperature 18: Input terminal status 19: Output terminal status	4	1	○	
F15.09	Set parameter 2 of stop status		11	1	○	
F15.10	Set parameter 3 of stop status		18	1	○	
F15.11	Set parameter 4 of stop status		28	1	○	
F15.12	Set parameter 5 of stop status		29	1	○	
F15.13	Set parameter 6 of stop status		0	1	○	
F16: Function-boost Parameters (see page 66 - 67)						
F16.00	Zero-speed running signal delay time	0.00 - 10.00s	0.30s	0.01s	×	
F16.01	Zero-speed signal delay time	0.00 - 10.00s	0.30s	0.01s	×	
F16.02	Current keep time after stop	0 - 9999ms	0ms	1ms	×	
F16.03	Fan control mode	0: Auto stop 1: Immediately stop 2: Run when power on	0	1	○	
F16.04	Fan control delay time	0.0 - 600.0s	300.0s	0.1s	○	
F16.05	Brake unit action voltage	220V: 360 - 450V	380V	1V	×	
		380V: 630 - 750V	720V			
F16.06	Contactor fault detect time	0.1 - 10.0s	2.0s	0.1s	×	
F16.07	Multi-speed inspection select	0 - 7	0	1	×	
F16.08	Zero speed threshold	0.001 - 0.010m/s	0.003m/s	0.001m/s	○	
F16.09	Selection at motor overheat fault	0: Report error after motor stop 1: Report error at once	0	1	○	
F16.11	Stationary auto-tuning and current limit of syn. motor	20 - 200%	120%	1%	×	
F16.12	Delay time of run output signal	0.00 - 1.00s	0.00s	0.01s	×	
F16.13	UPS running direction auto-determine enable	0: Not enabled 1: Determine the running direction based on the current 2: Determine the running direction according to the encoder direction 3: Determine the running direction according to the current (no start compensation and zero speed hold)	0	1	×	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F16.13	UPS running direction auto-determine enable	4: Determine the running direction according to the encoder direction (no start compensation and zero speed hold)	0	1	×	
F16.14	Running min. current limit	0 - 100% (F07.11)	20%	1%	×	
F16.15	Running min. detect time	0.0 - 5.0s	0.0s	0.1s	×	
F16.16	Governor fault detection time	0.0 - 2.0s	1.0s	0.1s	×	
F16.17	DC braking current at stop	0 - 150%	100%	1%	×	
F16.18	Starting frequency of DC braking current at stop	0.20 - 10.00Hz	0.50Hz	0.01Hz	×	
F16.19	Brake release frequency	0.00 - 10.00Hz	0.00Hz	0.01Hz	×	
F16.20	Start DC brake current	50 - 150%	100%	1%	×	
F16.21	Start DC braking current duration	0.0 - 3.0s	0.5s	0.1s	×	
F16.22	Output ground detection before operation	0: Detection 1: Not detected	0	1		
F17: Fault Protect Parameters (see page 67 - 69)						
F17.00	Input voltage at motor overheat	0.00 - 10.00V	0.00V	0.01V	×	
F17.01	Thermistor type	0: Not detect the motor overheat (NC) 1: Positive charateristic (PTC) 2: Negative charateristic (NTC)	0	1	×	
F17.03	The detection base of lack of input	0 - 100%	30%	1%	×	
F17.04	The detection time of lack of input	0.0 - 5.0s	1.0s	0.1s	×	
F17.05	The detection base of lack of output	0 - 100%	20%	1%	×	
F17.06	The detection time of lack of output	0.0 - 20.0s	3.0s	0.1s	×	
F17.07	Motor overload protect factor	20.0 - 110.0%	100.0%	0.1%	×	
F17.08	Fault auto restet times	0 - 100 *0: No reset function*	0	1	×	
F17.09	Fault auto reset interval	2.0 - 20.0s/times	5.0s/ times	0.1s/ times	×	
F17.10	Faulty relay action	Bit0: In auto reset process Bit1: In undervoltage process 0: Faulty relay doesn't act 1: Faulty relay acts	00	1	○	

Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F17.11	The 5th fault type (the latest one)	Lu: DC bus undervoltage E0001: Acc. overcurrent E0002: Dec. overcurrent E0003: Constant speed overcurrent E0004: Acc. overvoltage E0005: Dec. overvoltage E0006: Constant speed overvoltage E0008: Power module fault E0009: Heatsink overheat E0010: Braking unit fault E0012: Motor auto-tuning fault E0014: Current detection fault E0015: Input phase loss E0016: Output phase loss E0017: Drive controller overload E0018: Motor speed deviation is too large E0019: Motor overload E0020: Motor overheated E0021: Control board EEPROM read and write failure E0022: Operation panel EEPROM read and write failure (only the operation panel displays, the drive controller does not perform any protection) E0024: External device failure E0025: Output current is too small fault E0030: Encoder reverse E0031: Encoder disconnection E0032: Traction machine speed overspeed E0035: Running contactor pull / disconnect fault E0036: Brake contactor pull-in / off failure E0037: Speed limiter failure Among them: E0008, E0010, E0014, E0021, E0022, E0024, E0035, E0036 fault can not be automatically reset.	Actual value	1	*	

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Ref. Code	Function	Setting Range	Default	Unit	Attribute	Setting
F17.12	Setting freqency at the lastest fault	0.00 - 400.00Hz	0.00Hz	0.01Hz	*	
F17.13	Running freqency at the lastest fault	0.00 - 400.00Hz	0.00Hz	0.01Hz	*	
F17.14	DC bus vlotage at the lastest fault	0 - 999V	0V	1V	*	
F17.15	Output voltage at the lastest fault	0 - 999V	0V	1V	*	
F17.16	Output current at the lastest fault	0.0 - 999.9A	0.0A	0.1A	*	
F17.17	Input terminal status at the lastest fault	0 - 0x1FF	0	1	*	
F17.18	Output terminal status at the lastest fault	0 - 0x3F	0	1	*	
F17.19	The lastest fault fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F17.20	NO.4 fault type	0 - 37	0	1	*	
F17.21	NO.4 fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F17.22	NO.3 fault type	0 - 37	0	1	*	
F17.23	NO.3 fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F17.24	NO.2 fault type	0 - 37	0	1	*	
F17.25	NO.2 fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F17.26	NO.1 fault type	0 - 37	0	1	*	
F17.27	NO.1 fault interval	0.0 - 6553.5h	0.0h	0.1h	*	
F18: PWM Parameters (see page 69 - 70)						
F18.00	Carrier fregency	1 - 16kHz	Comfirmed by model	1kHz	×	
F18.01	Carrier freqency auto adjust selection	0: Prohibited 1: Allowed	0	1	×	
F18.02	PWM overmodulation enable	0: Disable 1: Enable	1	1	×	
F18.03	PWM overmodulation mode	0: Two phase / Three phase swtich 1: Three phase	0	1	×	