4.Product model compere

<u>KPM60</u>

KPM60 Low-voltage Motor Protector User InstructionsV1.2

▲ Danger and Warning

The device may only be installed by professionals. Caused any malfunction due to not follow the instructions in this manual, Manufacturers will not bear any responsibility

Electric shock, burning and explosion

Devices can only be qualified by the staff to install and maintain

Before any operation on the Devices, should be isolated from the voltage input and power supply, and the secondary windings of all current transformers are Shor circuit.

Verify that the device is live before operation

All mechanical parts and covers should be restored in place before the device is energized

Device in use should provide the correct voltage.

Do not pay attention to these precautions may cause serious injury.

1. Summary

KPM60 series low voltage motor protection controller is suitable for the application of three-phase asynchronous motor with rated voltage of 380V to 660V and rated current of 800A. It can realize the functions of protection, control, measurement and fault management of the motor, greatly simplifying the secondary control protection circuit of the motor, providing perfect protection and control measures, and implementing the network camp of the motor based on various presidential communication methods. In this case, the application of the controller greatly improves the design and production efficiency, and reduces the workload of on-site commissioning and maintenance. This product adopts modular structure design, small size, compact structure and convenient installation. It can be directly installed and used in low-voltage control

terminal cabinet and 1/2 module and above drawers. It is suitable for coal mine, petrochemical, smelting, electric power, etc. 2.Features

♦ KPM65's auxiliary power supply supports 85~264VAC, 100~370VDC

+ 8-channel programmable input DI with optical isolation, passive dry node access + 4 -way relay isolation outputs are used to control the protection motor and output warning signs

• A variety of detection features. Measuring three-phase current, three-phase voltage, frequency, power factor, and electrical energy, can be viewed through the KPM60's own LCD screen or remotely via the communication interface

+ Complete motor protection: Basic protection includes protection from start-up, overload, stall, phase failure, current balance, grounding, underload, blocking, etc. Protection functions can also be selected as needed (leakage protection, temperature protection, overvoltage protection, undervoltage protection, underpower protection, power factor protection, phase sequence protection, etc.)

• Supports a variety of motor control modes: protection mode, direct start, two-way reversible start, star / triangle start, self-turning transformer start, resistance barrier

 \blacklozenge The protection setting parameters can be set by the professional according to the actual parameters of the field motor, and the power failure is not lost • Record 10 recent fault information, time information, fault site electrical parameters

Friendly human-machine interface, Chinese / English LCD display 3. Technical Parameters

3.1 Symbol comparison table

Symbol	Implication	Symbol	Implication
le	Motor rated current	Uab, Ubc, Uca	Three phase line voltage
Ue	Rated line voltage of the motor	Р	Active power
Pe	Rated power	Q	Reactive power
lse	Rated leakage current	F	Frequency
la, lb, lc	A, B,C Phase current	PF	Power factor
lg	Ground current	Ep	Active energy
ls	Leakage current	Eq	Rective energy
11	Positive sequence current	12	Negative sequence current
S	Apparent power		

Parameter	Indicator				
Rated input voltage	380V, 660V				
Rated input current	5A, 32A, 100A, 250A, 400A				
Overload coefficient	Voltage: 1.5 times, current 10 times				
measurement accuracy	Voltage/Current: 1%, electrical energy: 2%				
Relay output	4-way relay isolated output, contact capacity 5A/ 250VAC, 5A/30VDC				
Auxiliary power	85-264VAC, 100- 370V DC				
Communication port	Rective energy				
Analog transmission	Negative sequence current				
Working environment	Operating temperature: -25 ° C~ 70 ° C, Storage temperature: -30 ° C ~75 ° C				
Safety	Withstand voltage: power frequency withstand voltage 2kV, insulation: greater than 100 $M\Omega$				
	Surge (impact) immunity test (IEC61000-4-2), level 3				
Electromagnetic Competibility	Electrical fast transient burst immunity test (IEC61000-4-5), level 3				
Electromagnetic Compatibility	Electrostatic discharge immunity test (IEC61000-4-4), level 3				
	Oscillatory wave anti-interference test (IEC61000-4-8)level 3				
	General technical conditions for digital motor integrated protection devices JB/T10613-2006				
	AC motor protector JB/T10736-2007				
	General rules for low-voltage switchgear and control equipment GB14048.1				
Reference Standard	Low voltage electromechanical contactors and motor starters GB14048.4				
	Control circuit electrical and switching components electromechanical control circuit electrical appliances GB14048.5				
	Basic test method for relay protection and safety automatic devices GB/T7261-				

-_-_-Auxiliary function: A- Analog output R- Undervoltage restart function (requires optional anti-shake module and voltage protection function) Additional function: V- Voltage protection T-Temperature prote L-leakage protection (requires optional leakage transformer) TE- TE protection Communication protocol: C-Modbus-RTU P- Profibus-DF D—双Modbus通讯 Rated Current:5A, 32A, 100A, 250A, 500A Design Number

Selection instructions

+Each KPM60 requires at least one host and one current transformer. The host has its own LCD screen and 5 buttons, which can display the on-site power grid parameters, modify the protection settings, modify the system parameters, and query the fault records. It is also possible to control the starting, stopping and resetting of the motor as needed.

+Use the appropriate range of transformers to match the host: CT-primary rated current 5A (for motor rated current 1A~5A), 32A (5A~32A), 100A (32A~100A), 250A (100A~250A), 500A (250A~500A). +When the user doesn't use the leakage transformer, the product does not have leakage protection

function. Product is configured with ground protection at this time. +If the user needs to use the power failure restart function, the voltage function needs to be selected.

+For example, KPM60-32A-C-VL-A indicates that the product has 1-road Modbus-RTU port, current range of 32A. It has voltage protection, leakage protection and analog transmission. When the leakage function is selected, it is necessary to add a leakage transformer (1A/0.5m A, which can be purchased at our company).

5.Function setting

Function	Content	Standard Configuration	Optional Configuration	Description
	Three-phase current	•	Ŭ	
Measurement	Three-phase Voltage		•	
	Active power		•	1
	Reactive power		•	-
	Power factor		•	Need to increase voltage
	Frequency		•	function
Measurement	Active energy		•	-
	Reactive energy		•	-
	Ground current	•		
	Leakage current		•	Need to increase the leakage
	Heat capacity	•		
	Overload protection	•		
	locked rotor protection	•		
	Blocking protection	•		
	External fault protection	•		
	Current imbalance	-		
	protection	•		
	Start timeout protection	•		
	Ground protection	•		
	Phase failure protection	•		
	Contactor breaking current protection	•		
	Underload protection	•		
Protection	Leakage protection		•	Need to increase the leakage function
	TE protection		•	Suitable for increased- safety motors
	Temperature protection		•	Need to increase temperature protection
	Overvoltage protection		•	
	Undervoltage protection		•	
	Underpower protection		•	Need to increase voltage
	Undervoltage restart		•	function
	Phase sequence protection		•	
	Power factor protection		•	-
	Modbus-RTU		•	1
Communication	Modbus-RTP		•	
Analog output	1 channel 1-24mA transmission output, programmable project		•	Need to increase analog outpu
Switch input	8-channel passive dry node optically isolated input	•		
Relay output	8-way relay output	•		

		5A,(1A~5A), 32A(5A~32A)
Motor	Rated current le	100A(32A~100A) 250A(100A~250A) 500A(250A~500A)
	Rated voltage Ue	380V~660V
	Rated power Pn	0.5~280.0kW
	Protection method	Alarm, Trip, Exit
Start timeout protection	Time setting	1~100s
	Protection method	Alarm, Trip, Exit
	Heating time constant	30~600s
Overload protection	Rated current le Rated power Pn Protection method Time setting Protection method Heating time constant Heating time constant Heating time constant Heating time constant Heatins pation coefficient Negative sequence heating coefficient Negative sequence heating coefficient Negative sequence heating coefficient Negative sequence heating coefficient Action setting Time setting Protection method Action	0.01~10
	Negative sequence heating coefficient	3.0~10.0
	Protection method	Alarm, Trip, Exit
locked rotor protection	Action setting	400%le~800%le
	Time setting	0.1~60.00s
	Protection method	Alarm, Trip, Exit
Blocking protection	Action setting	50%le~800%le
	Time setting	0.1~5s
	Protection method	Alarm, Trip, Exit
Phase failure protection	Time setting	0.1~20s
	Protection method	Alarm, Trip, Exit
Current imbalance protection	Action setting	10%le~60%le
	Time setting	0.1~60s
	Protection method	Alarm, Trip, Exit
Ground/Leakage protection	Action setting	Ground: 20%le~100%le Leakage: 20%lse~100%lse
	Time setting	0.1~60.0s
	Protection method	Alarm, Trip, Exit
Underload protection	Action setting	20%le~95%le
-	Time setting	0.1~99.99s
	Protection method	Alarm, Trip, Exit
Overvoltage protection	Action setting	105%Ue~150%Ue
	Time setting	0.1~25.5s
	Protection method	Alarm, Trip, Exit
Undervoltage protection	Action setting	50%Ue~95%Ue
	Time setting	0.1~25.5s
	Protection method	Alarm, Trip, Exit
Underpower protection	Action setting	50%Pe~95%Pe
	Time setting	0.1~99.99s
	Protection method	Alarm, Trip, Exit
TE protection	Time setting	1.0~15.0s
Contractor boundary and	Protection method	Put in Exit
protection	Action setting	600% le~1000% le
•	Protection method	Put in Exit
	Recovery voltage	70%Ue~100%Ue
Undervoltage restart	Power loss time	0.5~60.0s
	Delayed start time	0.1~300.0s
	Protection method	Δlarm Trin Evit
Phase sequence protection	Time setting	0.1~5c
	Protection method	Alarm Trip Evit
Dowor factor		Alarm, Trip, EXit
Power factor protection	I ime setting	0.1~60.0s
	Power factor setting	U.1~1s
External fault protection	Protection method	Alarm, Trip, Exit
-	I ime setting	0.1~25s
Temperature protection	Protection method	Put in, Exit
	Time setting	20~200°C

7.Terminal block distribution

6.Protection parameter list



The KPM60 has an 8-channel digital input terminal with a 24V DC power supply. It can only be connected to the dry node switching signal. These 8-channel digital inputs have different definitions in different control modes. Provide 4 relay output signals, all of which are normally open contacts.

There is 1 channel leakage transformer input, 1 channel 485 input, transmission function and temperature function can only choose one

KPM60 has 160*160 LCD screen and 5 buttons for motor control operation and viewing setting parameters.

Meaning of the terminal

No.	Name	Function	Remark
		Auxiliary power input L	
1	L/+	Or DC power input (+)	
_		Auxiliary power input N	
3	N/-	Or DC power input (-)	
5	PE	Protective ground for auxiliary power input	
9	485G	Modbus Communication shield ground	
10	485A	°	
11	485B	Modbus Communication terminal	
14	lg1		
15	la2	Leakage transformer input terminal	Lg1, lg2 have no wiring direction
16	la	CT secondary side A phase access	
17	lb	CT secondary side B phase access	
18	lc	CT secondary side C phase access	
19	In	CT secondary side common access	
		Transmitter output +	Only one of the transmission
20	Ao+/PTCA	Or PT100 input	function and PT100 function can
	1	Transmitter output -	De selected.
21	Ao-/PTCB	OF PT100 input	
22	СОМ	Programmable DI common terminal	
23	DI1	Programmable DI input	
24	DI2	Programmable DI input	
25	DI3	Programmable DI input	
26	DI4	Programmable DI input	Reset signal input
27	DI5	Programmable DI input	Local/remote switching
28	DI6	Programmable DI input	g
29	DI7	Programmable DI input	
30	DI8	Programmable DI input	
31	lla	La voltage input terminal	
33	Ub	Lib voltage input termina	
35	LIC	Lic voltage input termina	
37	D011	oc voltage input termina	
38	D012	Relay1 output terminal	Control relay A output
30	D021		
40	D022	IRelay2 output terminal	Control relay B output
40	D022		
41	D031	Relay3 output terminal	Fault information output
42	D032		
43	D041	Relay5 output terminal	Self-diagnostic output
44	0042		

8.Motor control and other functions

8.1 Division of motor operating conditions

This product divides motor operation into five states: ready state, starting state, operating state, parking cooling state, and parking state.

Ready state: The motor can be immediately started when it is in a cold state Starting state: The motor runs after receiving the start command until it reaches the state before steady state operation.

Operating status: normal motor operation

Parking cooling state: After the motor receives the parking command, it stops running, the temperature drops, and the heat capacity drops to 15%. Parking status: The motor heat capacity drops to less than 15%. At this time, if there is fault information, the motor is in the group lock state and does not accept the start

command. In case of emergency, it can be reset to clear the fault information, then the motor switches to the ready state 8.2 Start and stop operation

Motor start and stop have three modes of operation: local operation (motor protector host key operation, hereinafter referred to as host key), remote terminal operation (via terminal operation), remote communication control operation 8.3 Local/Remote selection

The operating authority of the controller can be set via the terminal DI5 input of the motor. There are three modes of operation: "Local Operation", "Remote Terminal" and "Remote Communication".

When DI5 is normally open, the operation mode of the controller is "local operation" or "remote communication". The operation limit can be modified by remote communication or host button. When set to local operation, the motor start/stop can only be controlled by the host button.

When the protection action occurs, the reset operation can be performed by the host key and the DI terminal. When the remote communication limit is set, the motor start/stop control can only be performed by communication. When the protection action occurs, the remote communication and the DI terminal can be used. Reset operation.

When DI5 is switched to closed, the default operation authority is switched to the remote terminal; at this time, the motor start/stop control and reset operation can only be performed through the remote terminal. At this time, the host and remote communication can be viewed, but the operation authority cannot be changed

8.4 Protection/Control

Protection (control)relay output has the double function of starting and stopping control of AC contact and protecting tripping. When the motor is in normal operation, the operation key can make the corresponding ready to carry out normal parking to the motor. When the fault occurs, if the protective action is set to trip, the trip signal is automatically associated to the corresponding relay to stop the motor running Note: Circuit breakers can only be jumped in protection mode and direct start mode.

8.5 Fault information output

The motor has the motor fault information output relay, the contact is normally open. After the controller sends out the alarm or trip the fault information, the fault ready ontact point is closed; if the fault information is clear, then the relay contact are opened 8.6 Reset

After the controller protects the trip and enters the parking lot, if need to operate again, it is necessary to reset the fault information firstly. Reset in a variety of ways: The host has a reset button , the controller has a reset terminal, and through the communication port to achieve remote reset

9.Switch input and relay output setting

The KPM60 provides three programmable input points DI6, DI7, DI8, programmable inputs can be defined as the following functions:

1.General DI input, 2. External fault input, 3. Delay start A (forward rotation), 4. Delay start B (reverse).When the wiring check function is turned off, DI6, DI7, DI8 are programmable input points. When the check function is turned on, DI6, DI7, DI8 will be as shown in the table below.

9.1 Protect mode

2008

Application annotation Input signal Application Annotatio Relay output Motor protection Relay 1 output DO1 DI2 Universal input DI DI3 Universal input D







ocal address Bai assword, Backlight

elay start A, delay star , effictive level, wiring

Clear log, Clear the fault log, Clear clectric energy log Restore factory setting

nase fault protection, irrent unbalanced protection ounded/leakage protection ontactor breaking current

rvoltage protectio ervoltage protecti ervoltage protecti

Power factor protection Ecternal fault protection

→ 8-DI stabilization time

DI6,DI7,DI8 Programmable

ated voltage,rated curren Current ratio,CT types

Rated power lse value, Start mode,Control

Start time-out prot

Blocking pro

ransmission object ansmission ratio ,Tin

Data

The following table shows several sets of operating time when the motor is overloaded

action time	Heat time constant unit: S					
leq/le	100	200	300	400	500	600
1.1	930.2	1860.5	2790.7	3720.9	4651.2	5581.4
1.2	296.3	592.6	888.9	1185.2	1481.5	1777.8



9.2 Direct Startup Mode

Input signal	Application Annotation	Relay output	Application annotation	
DI1	Starting signal input	DO1	Motor protection A Relay	
DI2	Universal DI input	DOT	output	
DI3	Stop input	D02	Trip breaker	
DI4	Reset signal input	002		
D15	Local/Remote terminal	DO3	Fault message output of	
D16	Contact CI status input	503	motor	
DI17	Universal DI input	D04	Power-lossing self	
DI18	Break status input	004	closed contact)	

9.3 Bi-directional Start Mode

Input signal	Application Annotation	Relay output	Application 1nnotation	
DI1	Starting A signal input (forward)	(forward)		
DI2	Starting B signal input (reversal)	DOT	Relay1output	
DI3	Stop signal input	002	Motor protection Relay2 output	
DI4	Reset signal input	002		
D15	Local place/long-distance terminal	DO3	Fault message output of	
D16	Contactor C1 status input		motor	
DI17	Contactor C2 status input	DO4	Power- lossing self	
DI18	Breaker status input	DO4	closed contact)	

9.4 Star/Triangle and Autotransformer starting mode

Input signal	Application Annotation	Relay output	Application Annotation	
DI1	Starting signal input	DO1	Motor protection Relay 1	
DI2	General DI input	DOT	output	
DI3	Stop signal input	DO2	Motor protection Relay 2	
DI4	Reset signal input	002	output	
DI5	Local/Remote terminal	DO3	Fault message output of	
D16	Contactor C1 status input	003	motor	
DI17	Contactor C2 status input	D04	Power-lossing self	
DI18	Breaker status input	D04	diagnostic output(normaliy-	

10.Installation Dimensions



After the device is turned on, the default is the control interface., press "FUNC" button to enter query/setup interface, in the root interface "parameter setting" option "ENTER/STOP" enter the protection password input interface, enter the four-digit password and press the "ENTER/STOP" button, the fault password is 1111, if the password is correct, enter the parameter setting interface, if the password is incorrect, prompt password wrong.

The meaning of the keys in different interfaces

Button name	Query interface	Setting interface	Control interface
RUN-A	Flip view parameters	Increase the value of the modified bit or switch to the next parametes	Positive start motor
VILIN-A	Flip view parameters	Move to modify the bit or switch to the next parameter	Reverse start motor (Valid in bidirectional reversible start mode only)
ENTER	Invalid or enter subordinate menu page	Confirm the parameter or go to the submenu page	Stop motor
RESET	Back to previous, if it is in ontology and the operating modes is not protected, back to control interface	Cancel parameter or back to the previous page	Under this interface, When the motor is in the parked state, press this key clears the fault message,controller exits the alarm/trip status
FUNC	Enter query/setting root interface	Enter query/setting root interface	Under this interface, press this key the display screen switch from the controller interface to query/setting interface

Power measurement:active active, apparent and powe Power statistics:power statistics and reactive power statistics ←∽ Temperature mea 8 circuit breaker status Anna -V. Motor contro interface € 4 realay output Total trip times, total number of stops, total motor running 1 runc Total motor downtime The motor runs time Actual data query Switch status query Run record Fault record Ana Zana The startup time Parameters setting Recent 1 to 5 faults record nd actio Recent 6 to 10 faults reco and action modes ocal address code, baud rate start mode, control authority And Dans Rated voltage,rated curre current ratio,CTmodel

> motor heat damage, to this end, the device provides start-up timeout protection Protective action characteristics In the process of starting the motor, if the set start time to the rear, the current of any phase current≥1.1 times the rated current, Start time-out protection immediate action.

The motor starting current is relatively large, if the start time is too long, easy to make the

Transmit obi-

Firmware version

12. Protection Function Description

12.1 Start time-out protection

DI parameter settings Motor parameters settings

efficient ,Backlight time

Function	Parameter name	Setting range	Default value	Define		
Start time-out	Protection action	Alarm,trip,disabl e	Trip			
protection	Setting time	1-100S	10.0S			

12.2 Overload protection

A motor overheating protection is a common protection function, used to protect the motor overload for a long time lead to winding heat, resulting in damage to the motor winding insulation damage to the motor. Overload protection prevents the motor from being damaged by heat due to overload operation. This protection is started after the start, the protection is based on the ratio of the equivalent current to the rated current, according to the following characteristic equation, when the time is met, the overload protection action. When leq > 1.05 * le, the heat accumulation, thermal protection equation is:

$$t = \frac{\text{Tfr}}{\left(\frac{I_{eq}}{I_e}\right)^2 - 1.05^2}$$

When leq <1.05 * le, the heat dissipation protection equation is:



among them, $I_{eq} = \sqrt{k_1 l_1^2 + k_2 l_2^2}$, K1, K2 are positive and negative sequence current heating time constant, in the start time K1 take 0.5, after running, take "1",k2 take 3~10, generally set to 6; I1 I2 is positive and negative sequence current.

in the above formula:Tsr = Tfr * Ksr

Tfr: Overheating time constant; ksr: Cooling coefficient, generally take 4; When the heat accumulation value reaches a certain level, the relay output adjusts, after tripping, the heat capacity does not fall below 15%, does not allow the starting motor emergency press the parking reset button, can manually remove the thermal memory value.

telated parameters						
Function	Parameter name	Setting range	Default value	Define		
Overload protection	Protection action	Alarm,trip,disabl e	Trip			
	Heating time constant	30-600	300			
	Negative sequence current coefficient	3-10	6			
	Setting time	0.01-10	4			

1.5	07.1	174.5	201.4	040.0	400.7	522.3
2	34.5	69.0	103.5	138.1	172.6	207.1
3	12.7	25.3	38.0	50.6	63.3	76.0
4	6.7	13.4	20.1	26.9	33.6	40.3
5	4.2	8.4	12.6	16.7	20.9	25.1
6	2.9	5.7	8.6	11.5	14.3	17.2
7.2	2.0	3.9	5.9	7.9	9.9	11.8
8	1.6	3.2	4.8	6.4	7.9	9.5

12.3 Locked-rotor protection

Locked-rotor protection is to prevent the motor during the start, due to the rotor stuck to stop the rotation, causing the current rise, resulting in motor damage. Locked rotor protection is input during the motor starting process. According to the ratio of the maximum phase current and the rated current as the judgment basis, when the current ratio is greater than the setting value, the stall protection is started and executed according to the time limit.

Related parameters

-				
Function	Parameter name	Setting range	Default value	Define
	Protection action	Alarm, trip, disable	Disable	
Locked-rotor protection	Action setting value	50%le~800%l e	600%le	
	Time setting value	0.1~60s	5.0s	

12.4 Blocking protection

Blocking protection is to prevent serious overload of the motor during operation, the motor rotor stops turning, damaging the motor due to increasing current. The blocking protection is put into operation after the motor is running, according to the maximum phase current and rated current ratio as the basis for judging, when the current ratio is greater than the set value, the protection starts, and according to the time-limit, Related parameters

Setting range Default value Function Parameter name Define Alarm, trip, disable Protection action Disable Blocking protection Action setting value 400%le~800%le 300%le 5.0s Time setting value 0.1~60s

12.5 Phase Failure Protection

Broken phase fault operation is very harmful to the electrical machine, and it is put into operation in the process of starting. Broken phase fault operation of the motor is also very great harmful to motor, if this protection is turned on by the user, it is protected during motor start-up.

Protective action characteristics: When the controller detects the phase fault, protection active time delay.

Related parameters

Function	Parameter name	Setting range	Default value	Define
Phase failure	Protection action	Alarm, trip, disable	Disable	put into operation at startup and operation
protection	Action setting value	0.1~20s	4.0s	

12.6. Current Unbalance Protection

Current unbalance protection prevents overheating of the motor due to unbalanced three-phase current. Unbalanced protection can be closed, if the user is protected at this time to open, in the start of the process is put into.

Because the motor's data is relatively small, so set the standard is based on the experience of the imbalance. For a known equilibrium condition, the starting value of 50% is recommended as a starting point. The starting value can be lowered to a level higher than the frequent trip. For a mild load motor, a lot of unbalance current will not cause damage to the motor, such cases can be raised, can also set a longer delay time. The calculation formula is:

Pun=IImax(Imin)-Iavl/llavl×100%

Where Pun is the current unbalance rate, Imax is the maximum value, Imin is the ninimum value. Pun takes Imax and Imin into the maximum calculated above.

During the start and run of the motor, the controller calculates the three-phase current unbalance of the motor. When the current imbalance is detected greater than the set value, the current unbalance protection is activated and executed in a definite time. Related parameters

Function	Parameter name	Setting range	Default value	Define
Blocking	Protection action	Alarm, trip, disable	Disable	
protection	Action setting value	10%~60%le	50%le	
	Time setting value	0.1~60s	5.0s	

12.7 Ground Fault/Leakage Protection

The ground protection current signal is calculated by the three-phase current vector and the current signal of the leakage protection is taken from the external current transformer. Earth leakage protection and ground protection can only take one of the two. The magnitude of the ground fault current depends on the position of the fault on the coil of the motor, and it is desirable to set a low ground fault action value to protect as many stator coils as possible and to prevent the motor housing from becoming dangerous due to charging. Protection action characteristics: If the ground current ≥ set the value to the end of the delay time, ground protection and reliable action. Protection action characteristics: If the leakage current ≥ set the value of the delay time

is over, the ground protection reliable action.

Function	Parameter name	Setting range	Default value	Define
	Protection action	Alarm, trip, disable	Disable	General ground protection settings of not less than 50% le, leakage protection according to the need to adjust the set value
Ground Fault/Leakage Protection	Action setting value	Ground 20%~100%le Leakage 20%~100le	50%le	
	Protection function selection	Ground Fault/Leakage	Ground	This protection is preferred for this setting
	Time setting value	0.1~60s	5.0s	







Rated current of 500A current acquisition unit Specification

Rated current of 250A current acquisition unit Specifications



Note: The colors of A, B, C, ar l are yellow, green, red, and blue

11. Operating Description

11.1 Brief KPM60 man-machine interface can provide local data query, fault information display and set tuning parameters. There are five button on the panel, used for parameter tuning and interface switching; the

• Display list: Control interface, Query interface, Set interface.

+ After the electrical operation on the display module, the default display is control interface, under the interface, if the operation authority of the controller is local display, user action buttons can be control start-up and shutdown of motor; if the operation authority of the controller is remote terminal or remote nication the device's buttons can not control the motor start and stop.

+ By operating the buttons, the display interface can be switched from the control interface to the query / setup root interface, under the inte parameters of the host.

 By operating the buttons, the display in
 / setup root interface, the user operates ettings and system parameters

11.3 Button

◆ PUMG650 front panel has 5 buttons, fro

Button name	Query interface	Setting interface	Control interface
RUNA	Flip view parameters	Increase the value of the modified bit or switch to the next parametes	Positive start motor
RUN-A	Flip view parameters	Move to modify the bit or switch to the next parameter	Reverse start motor (Valid in bidirectional reversible start mode only)
ENTER	Invalid or enter subordinate menu page	Confirm the parameter or go to the submenu page	Stop motor
RESET	Back to previous, if it is in ontology and the operating modes is not protected, back to control interface	Cancel parameter or back to the previous page	Under this interface, When the motor is in the parked state, press this key clears the fault message,controller exits the alarm/trip status
FUNC	Enter query/setting root interface	Enter query/setting root interface	Under this interface, press this key the display screen switch from the controller interface to query/setting interface

rface, user operation buttons can query all measurement	
terface can be switched from the control interface to the query the button under this interface can set the host's protection	
om left to right.	

display screen uses a 160*160 standard power LCD screen, friendly and convenient display interface.

11.2 Functional Description

12.8 Underload protection

Motor underload is generally not need to be protected, but, the occasion requires underload protection such as load may appear abnormal mutation, for sudden rupture of assembly line conveyor belt and so on. This situation needs to be put into underload protection.

Protection operation characteristic: if average of three current≥ overload setting value until the time is out, underload protection acts reliably. Related parameters

Function	Parameter name	Setting range	Default value	Define
Underrun protection	Protection action	Alarm, trip, disable	Disable	
	Action setting value	Ground 20%~95%le	40%le	
	Time setting value	0.1~00.00c	10.0c	

12.9 Overvoltage protection

Overvoltage will cause the motor core to saturate, greatly increasing the motor excitation current, thereby burning the motor. Overvoltage protection prevents the motor from operating under unacceptable high pressure conditions.

Overvoltage protection, if turned on, has been input, when the maximum line voltage is detected higher than the voltage setting value, the overvoltage protection is activated and executed in a limit time mode.

Related parame	eters			
Function	Parameter name	Setting range	Default value	Define
	Protection action	Alarm, trip, disable	Disable	
	Action setting value	Ground 105%le~150%le	120%le	
Overvoltage	Time setting	0.1~25.5s	5.0s	

12.10 Undervoltage Protection

When the system voltage is too low, the motor torque is insufficient, long-term operation will lead to the motor burn, the undervoltage protection function can avoid the motor in the low voltage conditions are not allowed to run.

The undervoltage protection is energized during the start-up of the motor. When any line voltage is monitored below the voltage setting, the undervoltage protection is initiated and executed in a limit time

Related parameters								
Function	Parameter name	Setting range	Default value	Define				
	Protection action	Alarm, trip, disable	Disable					
	Action setting	Ground	70%/o					

Undervoltage	Time setting value	0.1~25.5s	2.0s	
	value	50%le~95%le	70%16	

12.11 Underpower protection

When the motor is running at low load, the current of the motor is not necessarily small due to the low power factor. The undercurrent protection function protects the motor by monitoring the active power.

Under power protection is applied after the motor has entered the operating state.When the active power is lower than the set setting value, the under-power protection is activated and executed in a limit time.

Related parameters

Function	Parameter name	Setting range	Default value	Define		
	Protection action	Alarm, trip, disable	Disable			
Undernower	Action setting value	Ground 20%le~95%le	40%le			
protection	Time setting value	0.1~99.99s	10.0s			

12.12TE Protection(Adapt to increased safety type motor)

TE time protection is suitable for continuous operation, including easy start and infrequent start-up will not produce significant additional temperature rise, allows the use of anti-time overload protection device of the increased safety explosion-proof motor(example: YA, YA2 series .etc), it is not suitable for motors that are difficult to start or start frequently.

Increased the safety and explosion-proof motor nameplate data "tE" time for the AC winding at the maximum ambient temperature to reach the rated operating stability after the temperature, from the time it takes to block the current to the time required to rise to the limit temperature.

When the TE time protection function is turned on, the overload protection function will be automatically turned off. TE time protection function in line with GB3836.3-2010 standard requirements, TE time protection failure must be manually reset.

Function	Parameter name	Setting range	Default value	Define
	Protection action	Alarm, trip, disable	Disable	
TE protection	Action setting value	1.0s~15.0s	4.8s	Allowed to run at times the rated

				current	
TE time protecti	ion property list,	the curve up to t	the standard of IE	C79-7, GB3836.3-	
2000					

la/le Tep	1s	4.0s	4.3s	5.0s	5.5s	6.0s	15.0s
3.0	4.00	16.00	17.20	20.00	22.00	24.00	60.00
3.2	3.48	13.91	14.96	17.39	19.13	20.87	52.17
3.40	3.08	12.31	13.23	15.38	16.92	18.46	46.15
3.60	2.76	11.03	11.86	13.79	15.17	16.55	41.83
3.80	2.50	10.00	10.75	12.50	13.75	15.00	37.5
4.00	2.29	9.14	9.83	11.43	12.57	13.71	34.29
4.20	2.11	8.42	9.05	10.53	11.58	12.63	31.58
4.40	1.95	7.80	8.39	9.76	10.73	11.71	29.27
4.60	1.82	7.27	7.82	9.09	10.00	10.91	27.27
4.80	1.70	6.81	7.32	8.51	9.36	10.21	25.53
5.00	1.60	6.40	6.88	8.00	8.80	9.60	24.00
5.20	1.51	6.04	6.49	7.55	8.30	9.06	22.64
5.40	1.43	5.71	6.14	7.14	7.86	8.57	21.43
5.60	1.36	5.42	5.83	6.78	7.46	8.14	20.34
5.80	1.29	5.16	5.55	6.45	7.10	7.74	19.35
6.00	1.23	4.92	5.29	6.00	6.77	7.38	18.46
6.20	1.18	4.71	5.06	5.88	6.47	7.06	17.65
6.40	1.13	4.51	4.85	5.63	6.20	6.76	16.90
6.60	1.08	4.32	4.65	5.41	5.95	6.49	16.22
6.80	1.04	4.16	4.47	5.19	5.75	6.23	15.58
7.00	1.00	4.00	4.30	5.00	5.5	6.00	15.00
8.00	1.00	4.00	4.30	5.00	5.5	6.00	15.00

12.13 Contactor Breaking Current Protection

Judging whether the maximum phase current is greater than the setting, the contactor allows breaking current, if not, all exports are moves to the contact control export; If so, all protect exports are moves in the circuit breaker points shunt release export control. Contactor breaking current protection if turned on, it has been put into protection, when monitoring the

maximum phase current is greater than the setting of the contactor to allow breaking current, the direct jump circuit breaker. Related parameters Setting range Alarm, trip, disable Function Parameter name Default value Define

Disable

800%le

Protection action breaker rotection Action setting 600%~1000%le

12.14 Undervoltage Auto-restart

Contact

Low voltage motor control power often direct quote from 380V power system when the system voltage appears short fault (commonly known as "shake of voltage"), easily lead to shutdown of the motor. The device provides the motor with the loss of voltage restarting function, so that the motor in the power supply and the system is restored to normal condition, can automatically restart to the normal operation.

Immediately restart: when the motor undervoltage protection parking or lost voltage sags interval in $0.5\,$ seconds, due to inertia that motor rpm drop is very small, can be directly to restart the motor. This function in the power grid, "shaking", can ensure the continuous normal operation of equipment.

Time delay reset: when the motor undervoltage protection parking or lost voltage due to voltage ages time interval in the 0.5s-60s (time can be set). At this time the current change greatly, at the same time to start multiple motor will lead to excessive starting current. Therefore, the device will be in accordance with the restart delay to restart the motor (delay time can be set). Related parameters

Function	Parameter name	Setting range	Default value	Define
	Protection action	Enable/Disable	Disable	
	Restore voltage	70%~100%Ue	85%Ue	
Undervoltage Auto- restart	Power loss time(s)	0.5~60.0s	10.0s	Maximum delayed restart power loss time
	Delay start time(s)	0.1~300.0s	5.0s	Delay start time

12.15 Power Factor Protection

For low-side motors, the power factor changes more frequently than motor current or active power Therefore, power factor protection is particularly suited to the distinction between no-load operation and failure (such as tearing of the conveyor belt or transmission shaft breakage). Related parameters

- [Function	Parameter name	Setting range	Default value	Define
	Dower factor	Protection action	Alarm, trip, disable	Disable	
	Protection	Action setting	0.1~1	0.1	
		Time setting	0.1~60.0s	0.5s	

13.Common Field Wiring Diagram

KPM60 series supports a variety of start control mode, due to limited space, this manual only provides typical wiring diagrams for KPM60 in protected mode, direct start mode and bidirectional start mode, For more typical wiring diagrams, please contact the relevant personnel. If you encounter problems with the use of the product, please contact the company's technical staff.



Protective mode wiring diagram

Description 1. Under protected mode, the normally open contact string of the control relay DO1 is in the coil loop of the contactor KM, when the controller is powered up D01contacts are closed immediately, operation start button SB2 then motor start, the protection trip occurs, relay D01 is disconnected, the contactor KM's coil is de-energized, the contactor KM is released, the motor stops. 2. When the motor has a protection alarm or protection trip, press the reset button to clear the fault indication. The relay D01 will automatically close and

enter the ready state, allowing the motor to start again. 3. Dotted lines indicate optional features.

12 16 External Fault Protection

External fault protection is provided to users by external access, the switch quantity is used as the input point of the external fault signal, access process closing and tripping integrated chain contact, can be used for process chain function; the user can control according to the needs of the motor, using external fault protection to obtain trip or alarm function. External fault protection Access switch input can be selected "normally open" or "normally closed" mode. After the controller is powered on, the switch input status is continuously detected and the limit time protection is provided according to the input state.

Related parameters

Function	Parameter name	Setting range	Default value	Define
External	Protection action	Alarm, trip, disable	Disable	
fault protection	Time setting	0.1~25.0s	0.1s	

12.17 Phase sequence protection

Phase sequence protection can identify phase sequence errors in the three-phase voltage of the motor and avoid motor reversal. In order to avoid the overload protection malfunction, if the phase sequence protection occurs, the corresponding limit should be corrected immediately to ensure the reliable operation of the motor. Phase sequence protection is applied when the motor is ready, starting and running. When the phase sequence of the three-phase voltage is detected, it is time-limited. Related parameters

Function	Parameter name	Setting range	Default value	Define
Phase	Protection action	Alarm, trip, disable	Disable	
protection	Action setting	0.1~5.0s	0.2s	

12.18 Temperature Protection

Temperature protection is the most direct protection of the motor. Insert the PT100 into the motor windings, the resistance of PT100 varies linearly with temperature. Protector according to PT100 features, the motor winding temperature is detected, for motor protection, the protection logic is: When the detected temperature value is greater than the set value, perform a protection action. Polatod paramotor

olatoa paramoto				
Function	Parameter name	Setting range	Default value	Define
Temperature protection	Protection action	Alarm, trip, disable	Disable	
	Temperature setting	20~200°C	100°C	

14. Precautions

14.1 Basic settings

Before operating properly, make sure to set the following system parameters: Rated current of the motor.

Enter the correct CT rated current value.

+ CT ratio is a backup item, is also used by the manufactures to provide 5A CT, external use of other transformers.

+ Set the appropriate contactor breaking current, the default setting is 8 times the le. Confirm the operating mode.

+ Confirm the operating authority

+Confirm the device address and communication baud rate are consistent with the host computer.

+Before the normal operation, you also need to set the protection function to be used for parameter setting.

+ In the protection of the stall, unbalanced protection, grounding / leakage protection, short circuit protection, underload protection, overvoltage protection, undervoltage protection, under power protection, if the protection mode is exited, the protection is disabled; if you need to turn on these protection, set the range of the action values and delay times for each protection in the protection function description

14.2 Common Problem

4.2.00111110111100111100101		
Fault phenomenon	Possible reason	Possible solution
 The device does not start working properly after power- up 	The power supply failed to join the device	Check that the correct operating voltage is added to the device L / + and N / - terminals
	Voltage measurement is incorrect	Check whether the measured voltage matches the device rating
The measured value is	current measurement is incorrect	Check that the measured current matches the device rating parameters Check that the CT ratio setting is correct
incorrect or does	Sensor or signal processing circuit board failure	Check the sensor wiring or repair
 Relay does not operate 	No control commands have been received	Check that the communication link is correct
 Relay error action 	The relay operating mode is not correct	Check that the current relay is in the correct mode
	Device address is incorrect	Check if the device address is consistent with the definition
PC cannot communicate with the device	Device communication baud rate is incorrect	Check whether the device communication baud is consistent with the definition
the device	The communication link is disturbed	Check that the communication shield is well grounded
 The PC cannot start / stop the motor 	Permission is wrong	Check that the control permissions are set correctly
 The set protection function 	function switch is not open	Open the protective function switch
does not operate	Bad contact cable	Check the senor cable
Unable to enter parameter setting	Incorrect password	Contact the dealer or the company after sales service department
Ground fault does not work	Ground protection is not turned on	Turn on the ground protection switch
	Poor cable contact	Check sensor cable

15. Contact

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Wiring principle of bidirectional start mode

1. In the bidirectional start mode, in the ready state, when the protector receives the "start A" command, the internal relay DO1 is closed, the contactor KM1 was forced to pull; when the controller received a stop command or protection trip, DO1 relay is disconnected, contactor KM1 is de-energized, motor stops. In the ready state, when the protector receives the "start B" command, the internal relay DO2 is closed and the contactor KM2 is energized; when the controller receives the stop command or the protection trip occurs, the DO2 relay is disconnected and the contactor KM2 Power loss freed, motor stop. 2. When the motor has a protection alarm or protection trip, press the reset button to clear the fault indication, When the parking process is over, it can receive a restart command when it enters the ready

3.Dotted line marked as optional function