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

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

⚠ Electric shock, burning and explosion

- 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 Short 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
- ullet 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

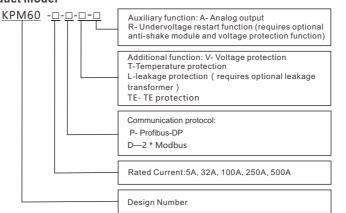
3.1 Symbol comparison table

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
Ise	Rated leakage current	F	Frequency
la, lb, lc	A, B,C Phase current	PF	Power factor
Ig	Ground current	Ep	Active energy
Is	Leakage current	Eq	Rective energy
I1	Positive sequence current	12	Negative sequence current
S	Apparent power		_

11	Positive sequence cu
ď	Apparent not

S	А	pparent power		
3.2 Technica	lindica	itors		
Paramet	er		Indic	ator
Rated input v	oltage		380V,	660V
Rated input c	urrent		5A, 32A, 100A	, 250A, 400A
Overload coe	fficient		Voltage: 1.5 times	, current 10 times
measurement a	ccuracy		Voltage/Current: 1%,	electrical energy: 2%
Relay out	put	4-way relay is	solated output, contac	t capacity 5A/ 250VAC, 5A/30VDC
Auxiliary po	wer		85-264VAC, 1	00- 370V DC
Communication	on port		Rective	energy
Analog transmi	ssion	Negative sequence current		
Working enviro	onment	Operating temper	ature:-25 ° C~ 70 ° C,	Storage temperature: -30 ° C ~75 ° C
Safety		Withstand voltage: power frequency withstand voltage 2kV, insulation: greater than 100 MΩ		
Electromagnetic Compatibility		Electrical fast transi Electrostatic discha	unity test (IEC61000-4 ent burst immunity tes rge immunity test (IEC ti-interference test (IEC	et (IEC61000-4-5), level 3 61000-4-4), level 3
Reference Standard		JB/T10613-2006 AC motor protector General rules for lot Low voltage electro Control circuit electrical app	JB/T10736-2007 w-voltage switchgear a mechanical contactors rical and switching con diances GB14048.5	and control equipment GB14048.1 s and motor starters GB14048.4 nponents electromechanical control safety automatic devices GB/T7261-

4.Product model



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).

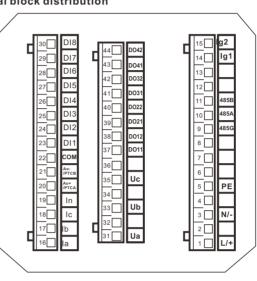
5 Function setting

Function	Content	Standard	Optional	Description
Function	Content	Configuration	Configuration	Description
	Three-phase current	•		
	Three-phase Voltage		•	
	Active power		•	
	Reactive power		•	Nood to income walkens
	Power factor		•	Need to increase voltage function
Measurement	Frequency		•	
	Active energy		•	
	Reactive energy		•	
	Ground current	•		
	Leakage current		•	Need to increase the leakage function
	Heat capacity	•		
	Overload protection	•		
	locked rotor protection	•		
	Blocking protection	•		
	External fault protection	•		
	Current imbalance	•		
	protection			<u> </u>
	Start timeout protection	•		
	Ground protection	-:-		
	Phase failure protection	•		
	Contactor breaking current protection	•		
	Underload protection	•		
Protection			•	Need to increase the leakage
	Leakage protection			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			4
	Power factor protection		<u>·</u>	
Communication	Modbus-RTU		<u>:</u>	
	Modbus-RTP		•	+
Analog output	1 channel 1-24mA transmission output, programmable project		•	Need to increase analog output
Switch input	8-channel passive dry node optically isolated input	• _		
Relay output	8-way relay output	•		

6.Protection parameter list

Item	Content	Range
Motor	Rated current le	5A,(1A~5A), 32A(5A~32A), 100A(32A~100A) 250A(100A~250A) 500A(250A~500A)
	Rated voltage Ue	380V~660V
	Rated power Pn	0.5~280.0kW
01-11	Protection method	Alarm, Trip, Exit
Start timeout protection	Time setting	1~100s
	Protection method	Alarm, Trip, Exit
	Heating time constant	30~600s
Overload protection	Heat dissipation coefficient	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
2.coming protection	Time setting	0.1~5s
	Protection method	Alarm, Trip, Exit
Phase failure protection	Time setting	0.1~20s
	· · ·	
0	Protection method	Alarm, Trip, Exit
Current imbalance protection	Action setting	10%le~60%le
	Time setting	0.1~60s
Ground/Leakage protection	Protection method Action setting	Alarm, Trip, Exit 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
Oliderioad protection	Time setting	0.1~99.99s
	Protection method	Alarm, Trip, Exit
Overvoltage protection	Action setting	105%Ue~150%Ue
Overvoitage protection	Time setting	0.1~25.5s
	Protection method	
Hadamakan antartian	Action setting	Alarm, Trip, Exit 50%Ue~95%Ue
Undervoltage protection		
	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
TE protection	Protection method	Alarm, Trip, Exit
	Time setting	1.0~15.0s
Contactor breaking current	Protection method	Put in, Exit
protection	Action setting	600%le~1000%le
	Protection method	Put in, Exit
Undervoltage restart	Recovery voltage	70%Ue~100%Ue
2Joi voitago rootait	Power loss time	0.5~60.0s
	Delayed start time	0.1~300.0s
Phase sequence protection	Protection method	Alarm, Trip, Exit
i nade sequence protection	Time setting	0.1~5s
	Protection method	Alarm, Trip, Exit
Power factor protection	Time setting	0.1~60.0s
	Power factor setting	0.1~1s
	Protection method	Alarm, Trip, Exit
External fault protection	Time setting	0.1~25s
	Protection method	Put in, Exit
Temperature protection		

7. Terminal block distribution



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

temperature function can only choose one KPM60 has 160*160 LCD screen and 5 buttons for motor control operation and viewing setting parameters.

active, apparent and powe

and reactive power statistics

8 circuit breaker status

4 realay output

Total motor downtime The motor runs time

Recent 1 to 5 faults record

Zana Zana

ocal address code, baud rate start mode, control authority

Direction of the second

Rated voltage, rated curre current ratio, CT model

efficient ,Backlight time

Firmware version

motor heat damage, to this end, the device provides start-up timeout protection

current≥1.1 times the rated current, Start time-out protection immediate action.

12. Protection Function Description

Protection action

Setting time

12.1 Start time-out protection

Protective action characteristics

Related parameters

Function

Start time-out

←∑...

Actual data query Switch status query Run record Fault record

Parameters setting

assword, Backlight

ransmission object ansmission ratio ,Tin

elay start A, delay star

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

Start time-out prote

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

→ 8-DI stabilization time

DI6,DI7,DI8 Programmable settings

ated voltage,rated currer urrent ratio,CT types

Rated power Ise value, Start mode, Control

No.	Name	Function	Remark
1	L/+	Auxiliary power input L	
'	L/+	DC power input (+)	
3	N/-	Auxiliary power input N	
3	IN/-	DC power input (-)	
5	PE	Protective ground for auxiliary power input	
9	485G	Modbus Communication shield ground	
10	485A	Modbus Communication terminal	
11	485B	Modbus Communication terminal	
14	lg1	I askess to sefero a incort to seize	1 -4 1-2
15	lg2	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	
20	Ao+/PTCA	Transmitter output +	Only one of the transmission function and PT100 function can
20	A0+/PTCA	or PT100 input	be selected.
21	Ao-/PTCB	Transmitter output - or	
21	AU-/FICB	PT100 input	
22	COM	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	
29	DI7	Programmable DI input	
30	DI8	Programmable DI input	
31	Ua	Ua voltage input terminal	
33	Ub	Ub voltage input termina	
35	Uc	Uc voltage input termina	
37	DO11	Relay1 output terminal	Control relay A output
38	DO12	Relay Fourput terminal	Control relay A output
39	DO21	IPolou2 output terminal	Control rolay B output
40	DO22	Relay2 output terminal	Control relay B output
41	DO31	Bolov2 output terminal	Foult information out
42	DO32	Relay3 output terminal	Fault information output
43	DO41	Delevis automateurinal	C-lf didi
44	DO42	Relay5 output terminal	Self-diagnostic output

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

Meaning of the terminal

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 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

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

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

a reset button , the controller has a reset terminal, and through the communication port 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

Application Annotation	Relay output	Application affiliation	
Universal input DI	DO4	Motor protection Relay 1	
Universal input DI	1 001	output	
Universal input DI	DOS	Trip breaker	
Reset signal input	1 002		
Universal input DI	DO3	Motor fault information	
Universal input DI	DO3	output	
Universal input DI	DO4	Power-lossing self diagnostic output(normally- closed contact)	
Universal input DI	DO4		
֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜	Universal input DI Universal input DI Reset signal input Universal input DI Universal input DI Universal input DI Universal input DI	Universal input DI Universal input DI Reset signal input DI Universal input DI	

Relay output

DO2

DO3

Application annotation

Motor protection A Relay output

Trip breaker

Fault message output of motor

9.2 Direct Startup Mode Input signal Application Annotation Starting signal input

DI2

DI5

DI5	Local/Remote terminal	DO3	Fault message output of
D16	Contact CI status input	503	motor
DI17	Universal DI input	DO4	Power-lossing self diagnostic output(normally-
DI18	Break status input	D04	closed contact)
9.3 Bi-direction	onal Start Mode		
Input signal	Application Annotation	Relay output	Application 1nnotation
DI1	Starting A signal input (forward)	DO1	Motor protection
DI2	Starting B signal input (reversal)	ВОТ	Relay1output
DI3	Stop signal input	DO2	Motor protection Relay2
DI4	Reset signal input	DO2	output

Breaker status input

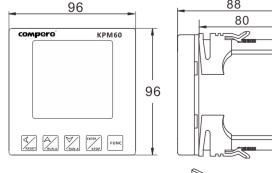
Universal DI input

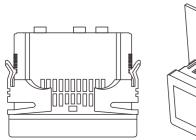
Stop input

9.4 Star/Trian	.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 output					
DI4	Reset signal input	DOZ						
DI5	Local/Remote terminal	DO3	Fault message output of					
D16	Contactor C1 status input	DO3	motor					
DI17	Contactor C2 status input	DO4	Power-lossing self diagnostic output(normally-					
DI18	Breaker status input	504	closed contact)					

10.Installation Dimensions



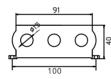






Rated current of 5A, 32A and 100A current acquisition unit specifications:

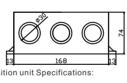


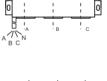
















KPM60 man-machine interface can provide local data query, fault information display and set tuning parameters. There are five button on the panel, used for parameter tuning and interface switching; the display screen uses a 160*160 standard power LCD screen, friendly and convenient display interface.

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.

ullet By operating the buttons, the display interface can be switched from the control interface to the query setup root interface, the user operates the button under this interface can set the host's protection

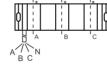
button, the fault password is 1111, if the password is correct, enter the parameter setting interface, if

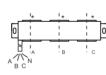
the password is incorrect, prompt password wrong. ♦ The meaning of the keys in different interfaces

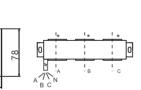
Button name	Query interface	Setting interface	Control interface
RUN-A	Flip view parameters	Increase the value of the modified bit or switch to the next parametes	Positive start motor
NUN-A	Flip view parameters	Move to modify the bit or switch to the next parameter	Reverse start motor (Valid in bidirectional 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











11. Operating Description

11.2 Functional Description ♦ Display list: Control interface, Query interface, Set interface.

♦ After the electrical operation on the display module, the default display is control interface, under the • By operating the buttons, the display interface can be switched from the control interface to the guery

/ setup root interface, under the interface, user operation buttons can query all measurement

11.3 Button PUMG650 front panel has 5 buttons, from left to right.
 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"

There is 1 channel leakage transformer input, 1 channel 485 input, transmission function and

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
1.5	87.1	174.3	261.4	348.6	435.7	522.9
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.

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

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.

eiateu paraillet	613			
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 cotting value	0.160-	E Oo	

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
Ground Fault/Leakage Protection	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
	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	0.1~60s	5.0s	

12.2 Overload protection A motor overload 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.

Tfr

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

In the process of starting the motor, if the set start time to the rear, the current of any phase

When leq > 1.05 * le, the heat accumulation, thermal protection equation is:

When leq <1.05 * le, the heat dissipation protection equation is
$$t = \frac{\text{Tsr}}{(L_x)^2}$$

among them, $I_{eq} = \sqrt{k_1 I_1^2 + k_2 I_2^2}$, 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.

	Related paramete	ers			
	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	

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	0.1~99.99s	10.0s	

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.

tolated parameters						
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 value	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.

Function	Parameter name	Setting range	Default value	Define
	Protection action	Alarm, trip, disable	Disable	
	Action setting value	Ground 50%le~95%le	70%le	
Undervoltage	Time setting value	0.1~25.5s	2.0s	

12.11 Underpower protection

Related parameters

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

Function	Parameter name	Setting range	Default value	Define	
	Protection action	Alarm, trip, disable	Disable		
Underpower protection	Action setting value	Ground 20%le~95%le	40%le		
	Time setting value	0.1~99.99s	10.0s		
40.40TF Double - 41 (A.d 44 - 1					

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

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.

Default value

Function Parameter name Setting range

	Protection action	disable	Disable		
TE protection	Action setting value	1.0s~15.0s	4.8s	Allowed to run at 7 times the rated current	
TE time protect	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

eiai	ed parameters				
	Function	Parameter name	Setting range	Default value	Define
Ī	Contact breaker protection	Protection action	Alarm, trip, disable	Disable	
		Action setting value	600%~1000%le	800%le	

12.14 Undervoltage Auto-restart

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

 $Immediately\ restart:\ when\ the\ motor\ undervoltage\ protection\ parking\ or\ lost\ voltage\ sags\ interval\ in\ 0.5$ 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 sags 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

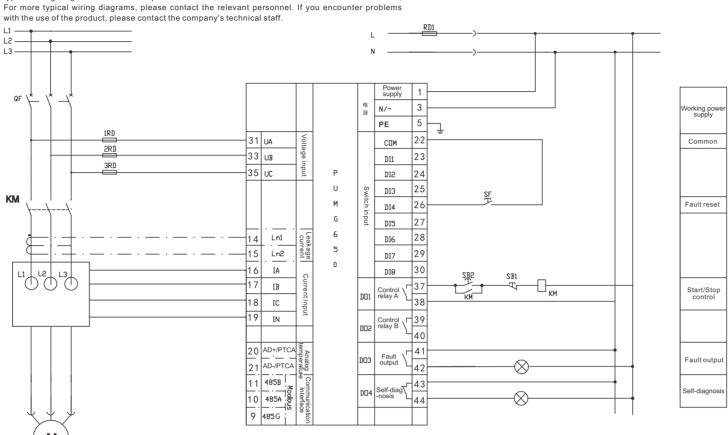
12.15 Power Factor Protection

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).

R	elated parameters	S			
[Function	Parameter name	Setting range	Default value	Define
	Power factor	Protection action	Alarm, trip, disable	Disable	
١		Action setting	0.1~1	0.1	
١		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,



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 DO1contacts are closed immediately, operation start button SB2 then motor start, the protection trip occurs, relay DO1 is disconnected, the contactor KM's coil is de-energized, the contactor KM is released, the motor stops.

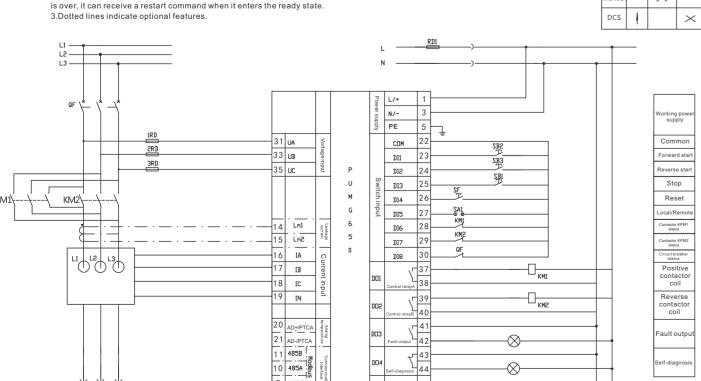
2. When the motor has a protection alarm or protection trip, press the reset button to clear the fault indication. The relay DO1 will automatically close and enter the ready state, allowing the motor to start again.
3. Dotted lines indicate optional features.

Protective mode wiring diagram

QF PE Common COM 33 UB Start 35 UC DIS Stop DI3 KM DI4 DI5 Ln1 DI6 5 Ln2 29 D17 IA DI8 IB IC 39 40 20 AD+/PTCA Fault outpu \otimes 1 485B 43 ح 1 0 485A

Wiring diagram of direct start mode 1. In the direct start mode, after the controller receives the start command in the ready state, the internal relay DO1 is closed, the contactor KM coil is electrically closed, and the motor is started. When the controller receives the opening command or a protection trip occurs, the relay DO1 is disconnected, the KM coil is de-energized, and the motor is stopped. $2. When the motor has a protection alarm or protection trip, press the reset button to clear the fault indication \,, \,\, When the parking process$

Selectable switch 1-2 3-4



M 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

М

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		
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

stated parameters				
Function	Parameter name	Setting range	Default value	Define
Phase sequence	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.

Related parameters

Function	Parameter name	Setting range	Default value	Define
Temperature	Protection action	Alarm, trip, disable		
protection	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.

computer. *Before the normal operation, you also need to set the protection function to be used for

♦ Confirm the operating authority. ◆Confirm the device address and communication baud rate are consistent with the host

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

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 vol is added to the device L / + and N terminals
	Voltage measurement is incorrect	Check whether the measured volta matches the device rating
The measured value is	current measurement is incorrect	Check that the measured curren matches the device rating paramet Check that the CT ratio setting is co
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 correct
◆Relay error action	The relay operating mode is not correct	Check that the current relay is in t 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 the definition
tile device	The communication link is disturbed	Check that the communication shie well grounded
◆The PC cannot start / stop the motor	Permission is wrong	Check that the control permissions 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 sales service department
Ground fault does not work	Ground protection is not turned on	Turn on the ground protection swi
	Poor cable contact	Check sensor cable

15. Contact

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