



PMAC 800

Motor Protection Relay

Integrated process and electrical control with protection for lowvoltage motor



Description

PMAC800 is used to control the contactor in the AC circuit (rated voltage up to 660V).

It integrates measurement, protection and control functions. It replaces the dispersive equipments in MCC and predigests control circuit of motor to improve reliability.

PMAC800 uses the design of module frame-work. It has the characteristics of small size, compact configuration, and extendibility. It is composed of main module, current measurement module (CT module), display module, extended digital module, extended analog module, and power supply module. The basic components are main module and CT module. The size of CT module is different in several current levels. Other modules can be selected according to the requirements.

PMAC800 include PMAC801 and PMAC802.

Application

- Lower voltage MCC
- Integrated process and electrical control

Advantage

- High reliability
- 10 years on site experience
- High cost performance
- 5mm DIN rail mounting
- Pluggable terminals, easy to install and maintain
- Optional display module
- Safety
- Excellent quality and multifunction
- Extended DI and DO module



Protection

Standard protection function



Standard Protection

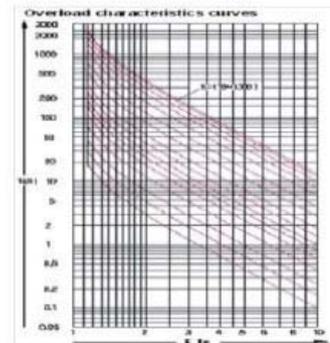
PMAC801 provide 9 standard protection and 8 option protection function.
PMAC802 provide 9 standard protection and 4 option protection function.

Overload

Overload protection prevents motor from running over rated current for long time and being damaged. The controller simulates heating characteristic of motor to protect it. The protection function can not be disabled. And it is just active during running state.

Overcurrent/Stalled rotor

Mechanical equipment such as pumps or fans can be quickly damaged if it get jammed resulting in locked rotor stall. Overload protection prevents the motor from being locked because of heavy overload or other reasons. The value can be set as half of motor's max locked current, and normal it is 1.5~2.5 times I_e . During the motor's running state, if $I_{av}=1$ time of the action value, overcurrent protection function will start to calculate the delay time, and act after the delay time is expired. If $I_{av} < 1$ time of the action value, protection won't active



Start overtime

During motor's starting process, When setting start time is expired and $I_{av} \geq 1.2$ times of I_e or $I_{av} \leq 0.1$ time of I_e , start overtime protection will act immediately.

Current Unbalance

PMAC800 can monitor the % unbalance in the motor phase currents. If one phase current unbalance of greater 15% existing for more than 0.5~5s. Alarm will active.

Ground Fault

The ground fault level is measure as % of the CT primary. Ground overcurrent can be detected either from the residual connection of the phase CTs or from zero sequence CT. Delay time is set to prevent unisance alarm from mementary surge. The alarm can be set below the trip level to get early warning of insulation breakdown

Phase Failure

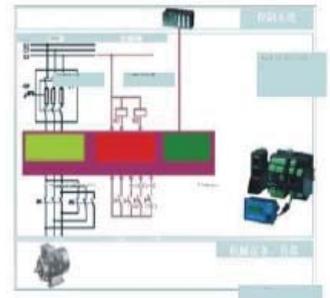
PMAC800 can monitor phase current, When one of phase current is zero. Alarm will active.

Short Circuit

It can protect when short circuit between phase and wire. It can be set as off or on.

Underload

Under current protection will act when current $< 60\% I_e$



External Fault protection

One of DI set as external fault input. When external fault happened, Controller will alarm or stop motor. After the fault is removed and DI is reset, motor can be restarted automatically.



Protection

option protection function



Option Protection

Overvoltage

Overvoltage may make insulation damaged. Because motors can usually work under 1.2 times of U_e , the action value can be set as 120% of U_e .

Undervoltage

During the motor 's running state, if any phase/phase voltage =1 time of the action value, the protection will start to calculate the delay time, and act after the delay time is expired.



Protection

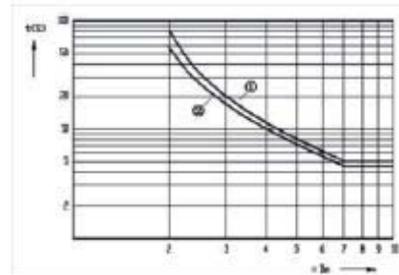
option protection function



Phase Sequence

Only for PMAC801

Wrong phase sequence can make motor run in wrong direction. The protection prevents motor from being started in wrong direction.



Temperature and Analog input

Only for PMAC801

An input from motor winding thermistors is available. The PMAC801 can accept both PTC and NTC sensors. A thermistor level can be selected for both alarm and trip.

Under Power

Only for PMAC801

Under power protection provides motors with better underload protection.

Leakage Current

Leakage current protection provides more precise check of earth current to prevent people from injury.

EEx e overload

EEx e overload protection is for explosion proof three phase induction motors. The trip time of the protection from the cold state motor must be less than the t_e time rated for the motor.

After leakage current protection is active, if $I_{\Delta} \geq 1$ time of the action value, the protection will start to calculate the delay time, and act after the delay time is expired, if $I_{\Delta} < 1$ time of the action value, the protection won't act.



Measuring



Measuring

Measuring parameter:

PMAC800 can measure and display below parameters:

- RMS current of each phase
- Three phase /phase voltage
- Zero phase sequence current
- Active power
- Reactive power
- Power factor
- Frequency
- Active energy
- Leakage current

Statistic

PMAC801 can statistic total running time, total stopped time, total stop operation times and total trip times.

PMAC802 only can statistic total running time.

Trip Record

8 trip events can be stored in non-volatile memory.

Communication

PMAC801 supports Modbus RTU485, Profibus-DP and 2 Modbus -RTU. PMAC802 supports Modbus-RTU and Profibus-DP.

Indicator LEDs

Display module has 5 LEDs "Start", "Run", "Alarm", "Trip" and "Communication"

Display and control keys

LCD module has control keys and display these parameters.



Control

Starting control

PMAC800 provides ten motor starting control modes via the control relay output.

Operating

Motor can be controlled through display module, remote DI or communication respectively.

Fault info output

PMAC801 provides a relay for fault information output. Its contact is open normally. When alarm or trip protection takes place, the contact will be closed. After the fault is eliminated, the contactor is opened again.

PMAC802 provides a relay DO3 for fault information output. Under protection mode, it can as open/close output of remote communication or close output of unload restarting.

Power diagnosis

PMAC801 provides a relay for power diagnosis output.

Emergent stop

PMAC801 provides an emergent stop operation input

PMAC802 provide a status as emergent stop operation input

Restart

In case of a voltage dip, PMAC800 will restart the motor in certain cases according to the length of the dip, after the voltage restores.

Reset

The controller should be reset to clear fault indication before restarting motor. Reset operation can be implemented via reset keypad of display module

Control keypads

Start A: Start motor in direction CW.

Start B: Start motor in direction CCW.

Stop: Stop motor.

Reset: In the stopping or stopped state, pressing the key 2s can eliminate fault information..

Display module

PMAC801D1 LCD module It has 5 LEDs, 8 keypads and 1debug port. Support start/stop control, data inquire, parameter setup.



PMAC802 includes LCD module and LED module. They are PMAC802D1 and PMAC802D2.



Extended Analog module

Only for PMAC801

EA1: 4-20mA analog current input, and 1 PTC/NTC (temperature protection)

EA2: 4-20mA analog current inputs

Leakage Current Transformer

Only for PMAC801



Extended Digital module

Only for PMAC801

The digital module is divided into 3 types according to the number of DI/DO.

ED1: 4DI, 4DO

ED2: 8DI, 2DO

ED3: 11DI



Power Supply Module

If a system has AC and DC power supply to the device at the same time or the restart function is needed, the power supply module can be selected.

PL-1 : 220VDC and 220VAC, 3-6s

PL-2: 380VAC

PL-3: 220VAC, 9s



CT Module

The CT module will be provided according to the rated current



PMAC800 series function configuration

● = standard ○ = optional

Protection	PMAC802	PMAC801
Start overtime	●	●
Overload	●	●
Overcurrent	●	●
Phase failure	●	●
Current unbalance	●	●
Short circuit	●	●
Earth fault	●	●
Underload	●	●
External fault	●	●
Leakage current	○	○
Temperature (PTC/NTC)		○
Overvoltage	○	○
Undervoltage	○	○
Under power		○
Phase sequence error		○
EEEx e overload(tE)	○	○
Analog input		○

Motor Starting Control Mode	PMAC802	PMAC801
Protection mode	●	●
Direct starter	●	●
Reversing direct starter (Rev_DS)		●
Star/delta starter with 2 relays (S/D Starter)		●
Loop-open star/delta starter with 3 relays (S/D_3R_Open)		●
Loop-close star/delta starter with 3 relays (S/D_3R_Close)		●
Autotransformer starter with 2 relays (Autotf starter)		●
Loop-open autotransformer starter with 3 relays (Autotf_3R_Open)		●
Loop-close autotransformer starter with 3 relays (Autotf_3R_Close)		●
Breaker direct starter		●

DI	PMAC802	PMAC801
DIs in main module	5	9
Extended digital module can provide 11 DIs at the most.		○

DO	PMAC802	PMAC801
DOs in main module	3	5
Extended digital module can provide 4 DOs at the most.		○

Measurements	PMAC802	PMAC801
Three phases current	●	●
Zero phase sequence current	●	●
Current unbalance rate	●	●
Three phase/phase voltage	○	○
Active power, Reactive power	○	○
Power factor	○	○
Frequency	○	○
Active energy	○	○
Leakage current	○	○

Communication	PMAC802	PMAC801
MODBUS-RTU	○	○
The other MODBUS-RTU		○
PROFIBUS-DP	○	○

Analog Output	PMAC802	PMAC801
420mA analog output: Analog parameter can be programmed	○	○

Analog Input	PMAC802	PMAC801
Extended analog module can provide 2 route of 4~20mA analog input at the most		○

Trip Events	PMAC802	PMAC801
8 trip events including the trip reasons and the trip time can be stored.	●	●

Statistic Information	PMAC802	PMAC801
Total running time	●	●
Total stopped time		●
Total stop operation times		●
Total trip times		●

Restart Function	PMAC802	PMAC801
In case of a voltage dip, motor can be restart after the restoration in certain cases.	○	○



Accessorial Modules

Display Module	PMAC801D1	Display panel for local control.
	EDM1	4DI, 4DO
Extended Digital Module	EDM2	8DI, 2DO
	EDM3	11DI
	EA1	One 4~20mA analog input, one PTC/NTC input (temperature protection)
Extended Analog Module	EA2	Two 4~20mA analog input
	PL1	When the system voltage is interrupted, it provides power to PMAC801 to work for 3~6s. It is proper for 220VAC or 220VDC input.
Power Supply Module	PL2	It is proper for 380VAC input.
	PL3	When the system voltage is interrupted, it provides power to PMAC801 to work for 9s. It is proper for 220VAC input.
	LCT100	The inside diameter is 50mm. It is proper for motor with rated current 10~100A.
Leakage CT	LCT250	The inside diameter is 75mm. It is proper for motor with rated current 100~250A.
	LCT400	The inside diameter is 100mm. It is proper for motor with rated current 250~400A.
	LCT630	Foursquare CT. It is proper for motor with rated current >400A.



PMAC802--①--②--③--④--⑤ (main module)

①: Rated Current				③: Other Protection Function	
2	2A	250	250A	C	Leakage Current Protection
6.3	6.3A	500	500A	X	EEe Overload Protection
25	25A	820	820A	V	Voltage Protection
100	100A			④: Accessorial Function	
②: Communication Protocol				A	One 4~20mA Analog Output
M	MODBUS-RTU			R	Restart Function
P	PROFIBUS-DP			⑤: Control Relay Type	
				Z	220VDC/3A

Notes:

- The basic protection function include start overtime protection, overload protection, overcurrent protection, phase failure protection, current unbalance protection, earth fault protection, short circuit protection, underload protection, external error input protection, Trip Events, Statistics
- The functions dedicated with italics can be selected together.
- Voltage protection function includes overvoltage, undervoltage, underpower, phase sequence error protection.
- If voltage protection function or restart function are selected, voltage measurement function will be active automatically
Include: voltage, power, power factor, frequency, energy.
- If the control circuit is DC system, the "Z" item can be selected.

Accessorial Modules

Display Module	PMAC802D1	LCD Display panel
	PMAC802D2	LED Display panel
Power Supply Module	PL1	When the system voltage is interrupted, it provides power to PMAC801 to work for 3~6s. It is proper for 220VAC or 220VDC input.
	PL2	It is proper for 380VAC input.
	PL3	When the system voltage is interrupted, it provides power to PMAC801 to work for 9s. It is proper for 220VAC input.



PMAC801--①--②--③--④--⑤
(main module)

①: Rated Current				③: Other Protection Function	
2	2A	250	250A	C	Leakage Current Protection
6.3	6.3A	500	500A	X	EEx e Overload Protection
25	25A	820	820A	V	Voltage Protection
100	100A			④: Accessorial Function	
②: Communication Protocol				A	One 4-20mA Analog Output
M	MODBUS-RTU			R	Restart Function
P	PROFIBUS-DP			⑤: Control Relay Type	
F	DUAL MODBUS-RTU			Z	220VDC/3A

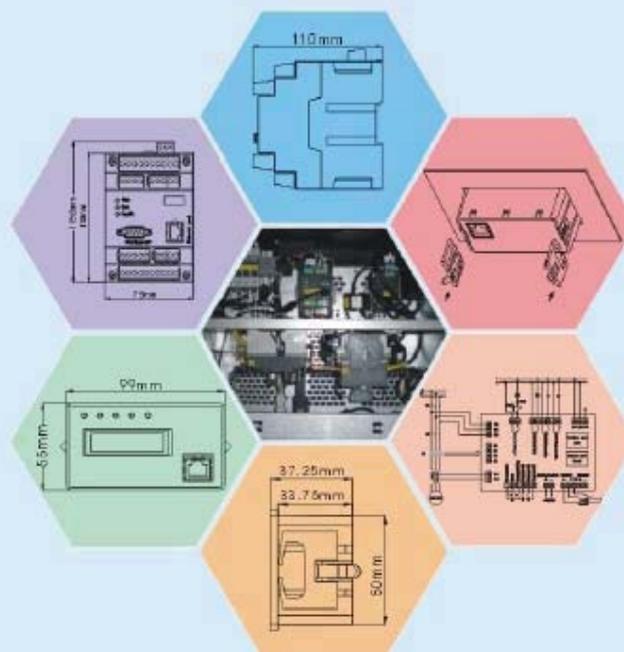
Notes:

1. The basic protection function include start overtime protection, overload protection, overcurrent protection, phase failure protection, current unbalance protection, earth fault protection, short circuit protection, underload protection, external error input protection. Trip Events, Statistics
2. The functions dedicated with italics can be selected together.
3. The leakage current protection needs an additional leakage CT.
4. Voltage protection function includes overvoltage, undervoltage, underpower, phase sequence error protection.
5. If voltage protection function or restart function are selected, voltage measurement function will be active automatically Include: vlotage, power, power factor, frequency, energy.
6. If temperature protection function or analog input protection function is needed, the extended analog module EA1 should be selected.
7. If the control circuit is DC system, the "Z" item can be selected.

 **Install**



Dimension





Application Project



China project

- Sinopec: Sichuan-to-east Gas Transmission
- Fujian Large-scale Oil Refining Project
- Daqing Pechem: 120 T/year Saltern Coking
- Takang Oilfield of Tianjin
- China Petroleum Pipeline Project
- Anxi Hydropower Plant
- Inner Mongolia Yitai Coal Oil Project
- China Aluminum Co.Ltd 700 thousands ton Alumina Project
- Yunfu Power Plant of Guangdong Electric
- Xinjiang Manasi Power Plant, Phase III
- ShandongBinzhouWeiqiaoThermoelectricCo.,Ltd. Zouping3rd ThermoelectricPlant:8 ×135KWProject
- Jilintai Hydropower Station II
- Expansion Project of Qinshan Nuclear Power Station Phase II
- Inner Mongolia Yuanbaoshan Power Plant:2 × 600MW project
- Xinjiang Karasuk Hydropower Station



Other project

- Parkistan: D.G.Khan Cement Co.,Ltd
- India: Hindustan zinc limited
- South Africa: high-carbon ferrochrome
- toll-treatment plant Project of Aerva.

