

Power guard / monitor for 1- and 3-phase motors

Power metering ($U \times I \times \cos \varphi$)

Programmable start-up delay 0,5-25 sec.

Programmable reaction delay 0,5-99,9 sec.

3 digit display for programming and monitoring

2 separate 1-pole relay outputs, max. 5A / 250VAC

Produced in accordance with CE and EMC regulations



C-mac[®] module type FPD93 is used for power monitoring of 1-phase and symmetrical 3-phase loads, f.inst. motors. FPD93 can be connected directly to loads with nominal current consumption up to 6 A; If the current is bigger, a standard current transformer is used.

All functions, metering ranges etc. are programmable, which makes the unit very suitable for many different control and monitoring applications.

The unit is supplied with 2 separate relay outputs, which are programmed independent of each other, e.g. one relay releases at overload and the other at underload.

Technical data:

Supply voltage: 1 x 230/240 V + N +/- 10%
3 x 230/240 V +/- 10%
3 x 400/415 V +/- 10%
3 x 440 V +/- 10%

Supply frequency: 40-70 Hz

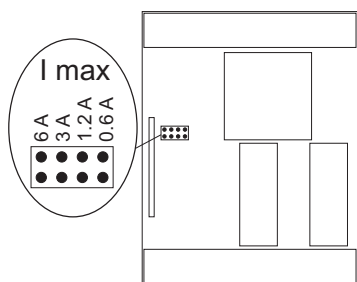
Power consumption: 2,5 VA

Operation temp.: -20°C to +60°C

Repeatability: <1%

Sampling time: 0,4 sec.

Metering ranges:



Open the unit, before the supply voltage is connected.

Max. metering current is selected at the terminals on the pcb, as shown on the drawing.

(default setting 6A)

Supply voltage	max.load at current range:			
	0,6 A	1,2 A	3 A	6 A
1 x 230 V	100 W	200 W	500 W	1000 W
3 x 230 V	180 W	360 W	900 W	1800 W
3 x 400 V	300 W	600 W	1500 W	3000 W
3 x 440 V	300 W	600 W	1500 W	3000 W

Metering principle: 1-phase $P = U \times I \times \cos \varphi$
3-phase $P = U \times I \times \cos \varphi \times \sqrt{3}$

Indications:

Red LED:

Red LED:

Red LED:

Display:

Flashes during programming

Relay 1 activated

Relay 2 activated

3 digits, indicates actual load in % during start-up and operation, also used at programming and check. If the metering range is exceeded, OFL is flashing in the display.

Adjustments:

Push-buttons

P , $\uparrow$ and $\downarrow$, used during programming and check.

Control inputs:

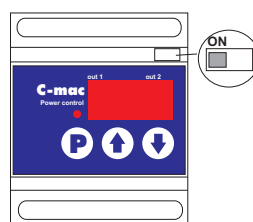
Start-up:

Pins 3-7. Aktivates the start-up time, see function selection.

Latch:

Pins 3-8. If the function is programmed, and a relay releases because of over- or under load, the relay remains released. The function is reset by disconnecting pins 3-8 or the supply voltage.

Programming lock:



Slide switch, placed above the front plate, used in connection with programming and adjustment of set points.

When the switch is OFF, it is possible to read but not change the programmed data; if you try to change data, the display shows ---

When the switch is ON, it is possible to change the selections.

Function selection:

1. Normal function. (over- and underload)

When the supply voltage is connected, the relay is released.

When pins 3-7 is connected (start), the relay activates, and remains activated in the programmed start-up time, after which the load monitoring starts.

If connection 3-7 opens, the relay releases.

2. Auto start (overload function only).

When the supply voltage is connected, the relay activates immediately, and the load monitoring starts.

When pins 3-7 is connected (start), the relay remains activated in the programmed start-up time, after which the load monitoring is resumed.

Programming of FPD93.

Remember: The programming lock must be set ON and the supply voltage must be connected.

Start and stop of the programming function:

Start: Press the buttons **P**, **↑** and **↓** simultaneously for min. 5 sec. The unit is in programming mode, when the LED above the **P** button is flashing. The display is now indicating **P 01**, which means it is in programming point no. 1. If you want to see the actual setting of the programming point, press **P**.

If you want to change the setting, press **P** together with the **↑** or **↓** button.

To get to the next programming point, press **↑**, and to the previous point, press **↓**.

The unit returns to operating mode if no buttons are activated in 15 seconds, and at the same time, the memory is updated automatically.

Note:

If the supply voltage is disconnected during programming, no update of the modified data will be made.

Programming points:

P 01 In this point you can adapt the metering range to the connected motor.

If first you have a motor at 3 x 400 V, 2100W (supplied power), select the 6 A range (3000 W). 2100 W equals 70% of 3000 W, and the display is adjusted to 70%.

Now 0-2100 W equals 0-100% in the new metering range. You can adjust the metering range between 30 and 99,9% of the max. range for the selected current input, (default setting 99,9%).

P 02 Selection of start-up time, i.e. the time from the start input is activated and the relays activates until the power monitoring starts. The start-up time is the same for both relay outputs and it can be set between 0,5 and 25 seconds (default setting 1 second).

P 11 Relay function, relay 1.

F D: relay releases at overload (normal)

F U: relay releases at underload (normal)

F R: autostart, relay releases at overload.

(default setting F O).

P 12 Hysteresis, relay 1.

The hysteresis is negative at overload (FO and FA), and positive at underload (FU). Range: 0,5 to 25%, (default setting 5%).

P 13 Time delay, release, relay 1.

The relay releases, when the load has been over/under the setpoint in the adjusted time. Range 0,5 to 99,9 sec., (default setting 1 sec.).

P 14 Hold function (latch), relay 1.

L A -: The hold function is not active, the relay reactivates on the hysteresis.

L R: Hold function active, pins 3-8 must be connected.

If the relay releases, it will remain released, no matter how the load changes. In order to reactivate the relay, connection 3-8 or the supply voltage must be disconnected. (default setting L A -).

P 21 Relay function, relay 2, function as P11.

P 22 Hysteresis, relay 2, function as P12

P 23 Time delay, release, relay 2, function as P13

P 24 Hold function (latch), relay 2, function as P14

Setpoint adjustment.

Remember: The program lock must be ON and the supply voltage must be connected.

Press **P** for 1 sec., the adjusted setpoint for relay 1 is shown on the display, and at the same time, the OUT1 LED is flashing.

If you press **P** again, the setpoint for relay 2 is shown, and the OUT2 LED is flashing.

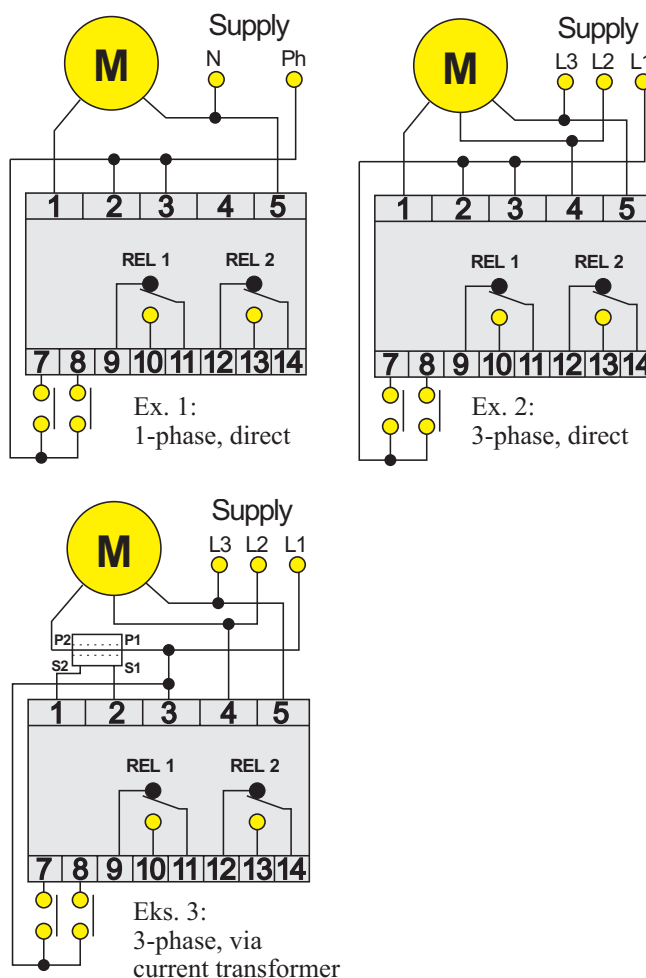
The adjusted setpoint is changed by pressing **P**, **↑** or **↓** simultaneously. (Please check the OUT LED for the wanted relay is flashing).

The unit return to operation mode and indicates the actual load, if none of the buttons has been activated for 5 seconds, and at the same time, the memory is updated automatically.

Note: If the setpoint is set at 00.0, the relay is always released.

After programming remember to set the programming lock OFF again.

Connection examples:



Ordering guide:

Supply	Type nr.
1 x 230/240 V	FPD93-1-230
3 x 230/240 V	FPD93-3-230
3 x 400/415 V	FPD93-3-400
3 x 440 V	FPD93-3-440

Mechanical dimensions: 90 x 70 x 57 mm
for mounting on standard DIN-rail