INSTRUCTIONS MANUAL

PROTECTION AND CONTROL PANELS FOR THREE-PHASE SUBMERSIBLE PUMPS

Models	Code	Range (A)	Motor 3 x 400 V 50/60 Hz HP	kW
CBT-1	12301	1 ... 2.5	0.5 - 0.75 - 1	0.37-0.55-0.75
CBT-2	12302	2.5 ... 4.5	1.5 - 2	1.1 - 1.5
CBT-5	12305	4.5 ... 11	3 - 4 - 5 - 5.5	2.2-3-3.7-4
CBT-7	12307	11 ... 16	7.5	5.5
CBT-10	12310	16 ... 20	10	7.5

Main description

- Protections:
  1. Dry running by power factor (cos φ).
  2. Overload with thermal memory.
  3. Phase loss or phase unbalance.
  4. Incorrect phase sequence.
  5. Short-circuit.
- Manual/remote or automatic reset (every 15 minutes approximately).
- Indicates cause of tripping.
- Control point for pressure switch, buoy, programmer…

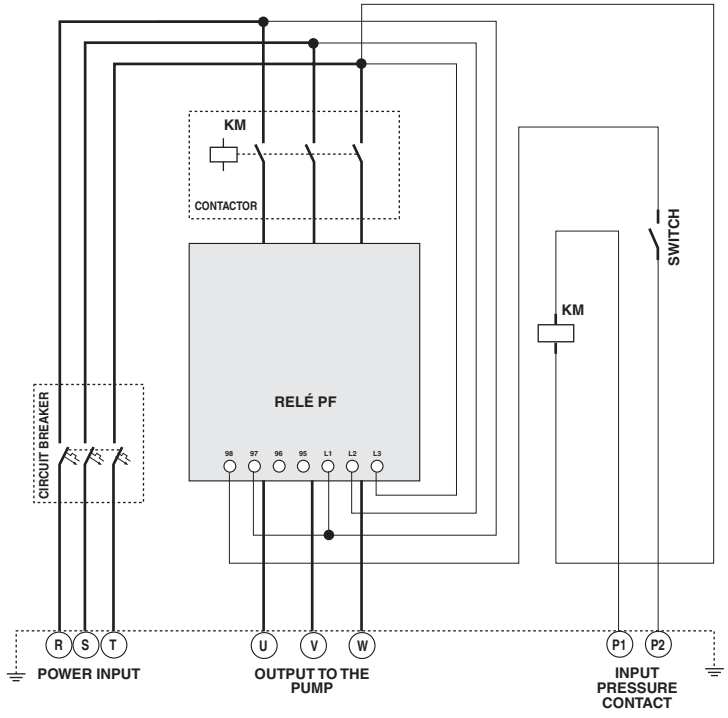
Connexion diagram

To prevent electrical shocks whilst installing or operating the relay, disconnect the power supply.

1. Check that the auxiliary voltage supply is correct.
2. Connect the wires of the motor to U, V and W. Check that the phases have been placed in the correct sequence.
3. If terminals P1 and P2 are not going to be used for a pressure switch, a buoy, a timer, etc., they must be bridged with a cable.
4. Connect the power input to the terminals of the circuit breaker. Check that the phases have been placed in the correct sequence.

Parts

- Plastic case with transparent lid, 230 x 250 x 150 mm.
- Circuit breaker 3P.
- Fanox PF electronic relay.
- Contactor.
- Stop/automatic switch.
- Connecting strip.
- Cable glands.



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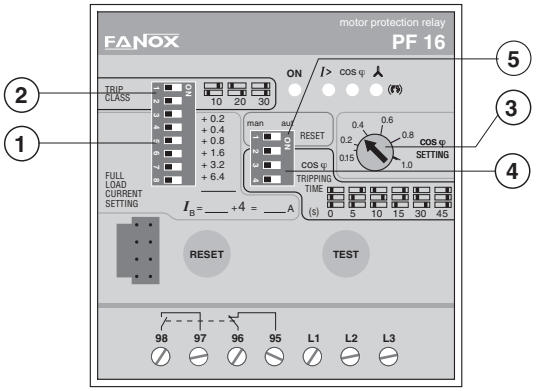
Settings

Depending on the characteristics of the motor and of the installation, some simple adjustments must be made to the PF relay.



Signalling

ON : relay in service
***I*>** : Tripping due to overload
cos φ : Tripping due to underload
⅄ : Tripping due to phase loss or unbalance
(( )) : Tripping due to incorrect phase sequence

(1) Current setting I_B "Full load current"

This adjustment is to be made according to the nominal current of the motor $\mathbf{I}_N$ indicated in its characteristics plate (see panel)

In order to calculate the I_B to be adjusted in panels CBT-1 and CBT-2, the $\mathbf{I}_N$ has to be multiplied by 4 and 2 respectively.
In the rest of the cases, the I_B to be adjusted must be the same as the $\mathbf{I}_N$ of the motor.

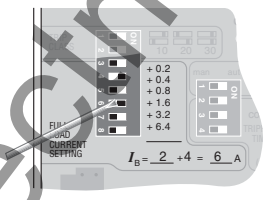
Ref.	I_B to be adjusted	Relay
CBT-1	$\mathbf{I}_N$ x 4	PF 16
CBT-2	$\mathbf{I}_N$ x 2	PF 16
CBT-5	$\mathbf{I}_N$	PF 16
CBT-7	$\mathbf{I}_N$	PF 16
CBT-10	$\mathbf{I}_N$	PF 47

- With all the micro-switches to the left (OFF), the set current is the basic current of the relay (4A for the PF 16 and 16A for the PF 47)
- When we place a micro-switch to the right (ON), we add its value to the basic current. To obtain the necessary I_B, these values must be combined.

Examples:

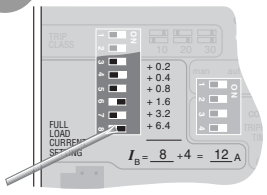
CBT-2 Panel.

Supposing that the nominal current of the motor, indicated on its characteristics plate is 3 A.
The current to be set will be:
$I_B = \mathbf{I}_N$ x 2 = 3 x 2 = 6 A
6 A = 0,4 + 1,6 + 4



CBT-7 Panel

$\mathbf{I}_N$ = 12A
$I_B = \mathbf{I}_N$ = 12A
12A = 1,6 + 6,4 + 4

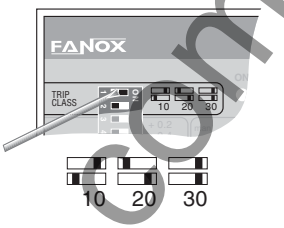


(2) Trip class setting "Trip class"

The different trip classes allow to adapt the overload protection to the different applications of motors.

For submersible pumps, adjust to class 10 (recommended value).

Place the first micro-switch to the right (ON) and the second to the left (OFF).

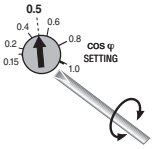


(3) Underload setting "cos φ setting"

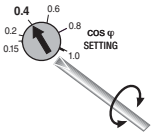
The adjustment of the underload trip level by cos φ is made trough a potentiometer graduated form 0.15 to 1.0.

3.1 Quick adjustment:

a) If the pump is adequately dimensioned, the recommended value for the adjustment of the cos φ is 0.5. This applies in the majority of cases.
Adjust the potentiometer "cos φ setting" to 0,5



b) If the power of the motor is excessively dimensioned and during its functioning, unwanted trips should occur, the cosφ adjusted factor should be reduced to 0.4.



3.2 Step-by-step adjustment:

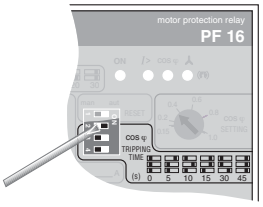
If the above mentioned cos φ values are unknown, the underload trip setting can be made in the following way:

1. Set the underload trip delay to zero by moving the three dipswitches to the left (trip delay).
2. Using the potentiometer (cos φ setting), set the cos φ value to the minimum 0,15.
3. Start up the motor and run it with the minimum estimated load.
4. Slowly turn the cos φ potentiometer clockwise until the relay trips and the cos φ LED lights up.
5. Turn the cos φ potentiometer anticlockwise until the cos φ is set at approximately 30% less than the previous value (point 4).
6. Set the underload trip delay using the 3 corresponding dip switches.

(4) Cos φ trip delay setting "cos φ tripping time"

Recommended time 5 seconds.

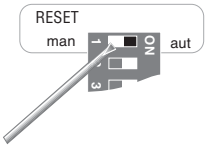
Place the first micro-switch to the right (ON) and the second and third to the left (OFF).



(5) Reset mode setting "Reset"

To choose this mode, place the gliding micro-switch in "auto" position, to the right.

After any kind of trip, the reset will occur automatically after 20 minutes, uninterruptedly.



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