AC/DC DYNAMICS
TE05 PUMP PROTECTION RELAY

OVERVIEW

Congratulations for owning an AC/DC Dynamics TE02 Phase Angle / Pump Protection Relay! This relay provides full protection for your submersible borehole pump and motor. With high repeat accuracy, its features include:

* Low water (dry running) protection
* Blocked inlet/outlet protection
* High and Low voltage protection
* Motor Overload protection
* Locked rotor protection
* Single phase protection (380V model)
* Rapid Cycle protection
* Adjustable dry re-start timer
* Automatic calibration
* LED fault and relay status indication
* External reset facility

During normal operation, the "Relay On" LED will indicate when the pump is running or not. If a fault occurs, the relay de-energises and the LEDs indicate the cause of the fault. In most cases, the relay starts again after the fault has cleared or after a set time. On serious errors, the relay will not restart until the relay is manually reset.

The TE02 will give you many years of service and is guaranteed for 12 months against faulty workmanship and materials. In addition, a full repair service is available through any AC/DC Dynamics Branch.

INSTALLATION

The TE02 should be installed by a competent electrician in accordance with the relevant diagram. External start/stop circuits (eg pressure switch or liquid level relay) may only be used where shown. Deviation will cause failure to calibrate and/or nuisance trip. The externally mounted reset button is for manually resetting the TE02 when it has tripped on overload without disconnecting the power supply.

When connecting for pressure switch control, the pressure switch contacts should close on low pressure and open on high pressure.

When used with a star-delta starter, a N.O. contact on the star contactor must be connected across the reset terminals, 8 & 9. Similarly, with any other reduced voltage starting method, a contact must be connected across terminal 8 & 9 which closes during starting.

CTs (current transformers) must be used with all 220/230V single phase motors larger than 0.75kW and all 380/400V three phase motors larger than 4kW. For smaller motors no CT or shunt is required. Select the CT from the chart below.

	220/230V				380/400V									
Motor kW	Up to .75kW	1.1kW	1.5kW	2.2kW	Up to 4kW	5.5kw	7.5kW	11kW	15kW	18.5kW	22kW	30kW	37kw	45kW
CT code	N/A	PW105	PW155	PW205	N/A	PW155	PW205	PW305	PW405	MR1505	MR1505	MR1755	MR11005	MR11005

CALIBRATION

The unit is supplied uncalibrated. When first switched on, the TE02 will ask to be calibrated by all the LEDs coming on and the relay energising. If calibration has not been done within 5 minutes, the relay de-energises to protect the motor. To calibrate, the TE02 must be switched on and the pump allowed to reach its normal running condition. Press and hold the SET button on the front of the TE02 for longer than 5 seconds. The LEDs will now flash for about 15 seconds to show that the TE02 is calibrating. When the LEDs have stopped flashing, the TE02 is calibrated! To recalibrate at any time, simply repeat the calibration procedure.

To uncalibrate, switch power off to the TE02. Press and hold the SET button. Switch the power on. Wait until the LEDs flash (approx. 5 secs) and then release the SET button. The TE02 is now uncalibrated.

If when calibrating, the relay de-energises AFTER 5 SECONDS and the LEDs switch off, this is because the TE02 is unable to calibrate due to the input current being too low or high (check CT selection and connections). If the relay de-energised AFTER 15 SECONDS and LEDs switch off, this is because the voltage is too low or too high. When corrected, calibrate again.

Finally, the dry re-start timer must be set for the time it takes for the borehole water level to recover having run dry. This can be adjusted from 15 minutes to 5 hours.

OPERATION

1. Low water/blocked inlet/outlet protection.
The TE02 will detect the above conditions and switch off the pump within 2 seconds. The green "RELAY ON" LED will flash and remain doing so until the restart timing period has elapsed. The pump will restart and the green "RELAY ON" LED will stop flashing and remain on.

2. Low current protection.
Typically caused by an abnormally light load or faulty connection. If the current drops by more than 10% below the calibrated normal running current, the pump is stopped and the condition is treated the same as (1) above.

3. Motor overload protection.
In the event of locked rotor or current exceeding 20% of calibrated normal running current, the pump is switched off in one second and the red "OVERLOAD" LED comes on. This condition remains until it is manually reset by the external reset button or by disconnecting the power supply.

4. Low or High Voltage protection.
To protect the motor, if the supply voltage increases or decreases by more than 10% of nominal, the pump will be stopped and the /fs'| amber "OVER OR UNDER VOLTS" LED will come on. When the voltage has stabilized within safe limits, the amber LED switches off an the pump automaticly restarts.

5. Rapid cycle protection.
Excessive starting damages a motor. The TE02 protects your pump by limiting the number of starts to 12 per hour. When the pump is started more than 3 times in a 15 minute period, the relay de-energises and the amber light flashes for 15 minutes. After this period, the pump can restart. During commissioning, this feature can be bypassed by interupting the supply to the TE02. Note that this feature does not function when there is a pressure switch or similar contact connected in the incoming line supply.

6. Single phasing and phase failure protection. (380/400V model only)
When any of the phases are disconnected, the relay de-energises and the pump stops. Either the green LED will flash or the red LED will stay on. This condition is reset once the fault has been cleared and supply reconnected.

GREEN	AMBER	RED	
ON	OFF	OFF	Normal pumping
FLASH	OFF	OFF	Dry - timing or phase failure/reversal
OFF	ON	OFF	Supply voltage low/high
OFF	FLASH	OFF	Rapid cycle
OFF	OFF	ON	Motor overload ~~or phase failure/reversal.~~
ON	ON	ON	TE02 uncalibrated
FLASH	FLASH	FLASH	TE02 calibrating
OFF	OFF	OFF	TE02 unable to calibrate

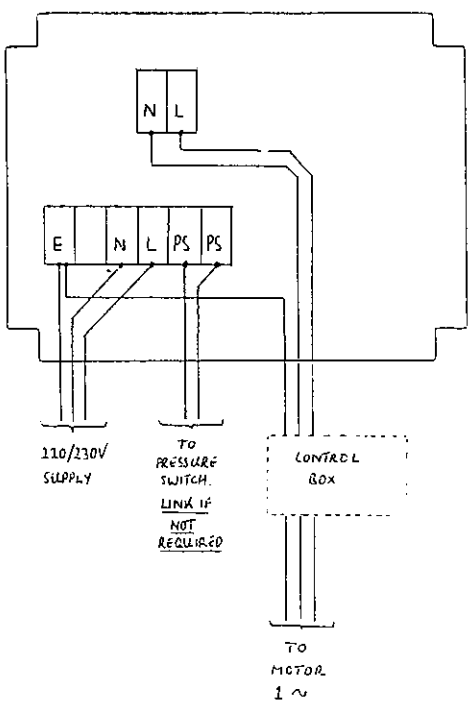
TE05 BOREHOLE PUMP STARTER SPECIFICATIONS

Supply Voltage :	Single phase: 230VAC +/- 20%	Three phase: 400VAC +/- 20%	
Power consumption:	3VA		
Calibration:	Automatic - activated by pushbutton		
Dry trip level:	Calibrated phase angle and current -10%, 2 seconds delay		
Voltage trip level	Calibrated voltage +/- 10%, 2 seconds delay		
Current trip level	Calibrated current + 20%, 1 second delay		
Rapid Cycle	3 starts per 15 minutes maximum		
Dry restart delay:	Adjustable 15minutes to 5 hours		
Output contact rating:	**TE05M**	0.75kW max 230V	10Amp SPDT @ 250VAC. Maximum switching voltage = 400VAC
	TE05M-1	1.1-2.2kW 230V	18Amp AC3 @ 500VAC, two pole connected in parallel per phase
	TE05Q	4kW 400V	9Amp AC3 @ 500VAC.

CONNECTION DRAWINGS

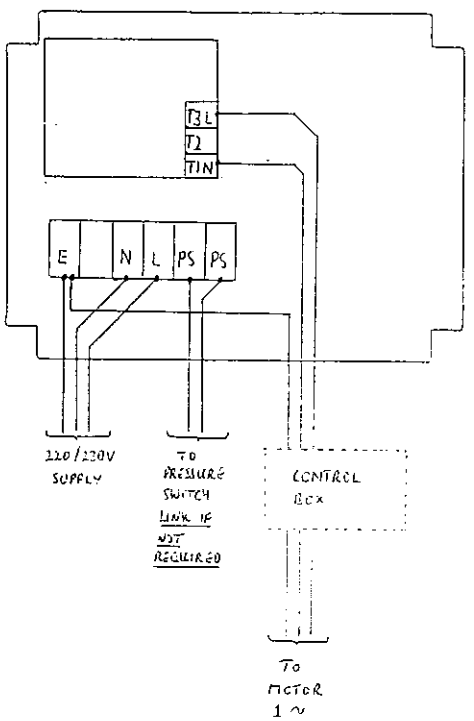
TE05M

For single phase motors up to 0.75kw 230V



TE05M-1

For single phase motors between 1.1 and 2.2kW 230V



TE05Q

For three phase motors up to 4kW max @ 400V

