



# AC/DC DYNAMICS cc

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## TE02/TE03 PUMP PROTECTION RELAY

### OVERVIEW

Congratulations for owning an AC/DC Dynamics TE02/TE03 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/400V model)
- \* Adjustable dry re-start timer
- \* Automatic calibration
- \* LED fault and relay status indication
- \* External reset facility
- \* Float/Pressure Switch - TE03 only
- \* Rapid Cycle protection - TE03 only

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/TE03 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/TE03 should be installed by a competent electrician in accordance with the relevant diagram. External start/stop circuits (e.g. pressure switch or liquid level relay) may only be used where shown. Deviation will cause failure to calibrate and/or nuisance trip. An externally mounted reset button can be connected for manually resetting the TE02/TE03 when it has tripped on overload without disconnecting the power supply and is optional. If not required, leave terminals unconnected.

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 terminals 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.

**Motor kW  
CT code**

220/230V				380/400V									
Up to .75kW	1.1kW	1.5kW	2.2kW	Up to 4kW	5.5kW	7.5kW	11kW	15kW	18.5kW	22kW	30kW	37kW	45kW
N/A	PW 155	PW 205	PW 255	N/A	PW155	PW205	PW305	PW405	MR1505	MR1505	MR1755	MR11005	MR11005

### CALIBRATION

The unit is supplied calibrated to 0.37kW. When first switched on site calibration must be done. If calibration has not been done within 5 minutes, the relay de-energises to protect the motor. To calibrate, the TE02/TE03 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/TE03 for longer than 5 seconds. The LEDs will now flash for about 15 seconds to show that the TE02/TE03 is calibrating. When the LEDs have stopped flashing, the TE02/TE03 is calibrated! To recalibrate at any time, simply repeat the calibration procedure.

To uncalibrate, switch power off to the TE02/TE03. Press and hold the SET button. Switch the power on. Wait until the LEDs flash (approx. 5secs) and then release the SET button. The TE02/TE03 is now uncalibrated.

If when calibrating, the relay de-energises AFTER 5 SECONDS and the LEDs switch off, this is because the TE2/TE03 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 and blocked inlet/outlet protection.

The TE02/TE03 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 for 1 second, the pump is switched off 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 the calibrated voltage, the pump will be stopped and the amber "OVER OR UNDER VOLTS" LED will come on. When the voltage has stabilized within safe limits, the amber LED switches off and the pump automatically restarts.

#### 5. Rapid cycle protection.

Excessive starting damages a motor. The TE03 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 interrupting the supply to the TE03.

#### 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.

### L.E.D. INDICATION

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/TE03 uncalibrated
FLASH	FLASH	FLASH	TE02/TE03 calibrating
OFF	OFF	OFF	TE02/TE03 unable to calibrate

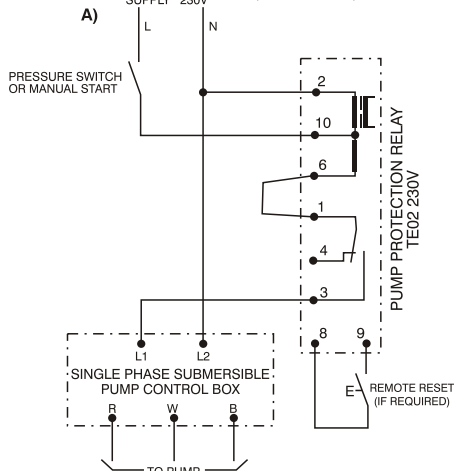
### TE02/TE03 PHASE ANGLE RELAY

Supply Voltage: Single phase: 230VAC  $\pm$ 20% Three phase: 400VAC  $\pm$ 20%  
 Power consumption: 2VA  
 Calibration: Automatic - activated by pushbutton  
 Dry trip level: Calibrated phase angle and current - 10%, 2 seconds delay  
 Voltage trip level: Calibrated voltage  $\pm$ 10%, 2 seconds delay  
 Current trip level: Calibrated current +20%, 1 second delay  
 Rapid Cycle: 3 starts per 15 minutes maximum (TE03 only)  
 Dry restart delay: Adjustable 15 minutes to 5 hours  
 Output relay: 10 amp SPDT @ 250VAC.

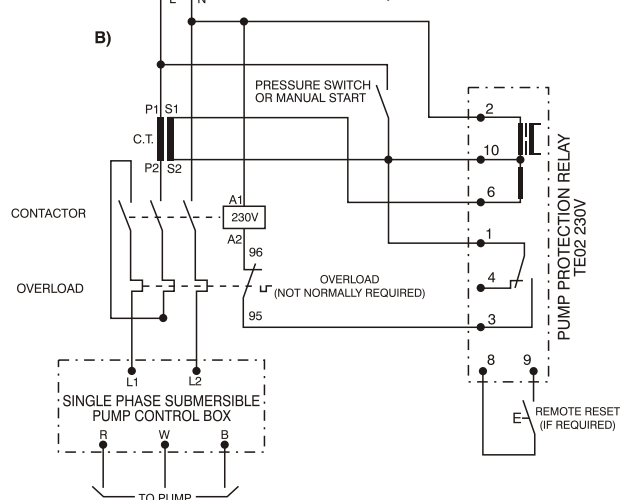
# DRAWINGS

## TE02 230V – FOR SINGLE PHASE PUMPS

**A) DOL CONNECTION DIAGRAM FROM 0,25kW TO 0,75kW**

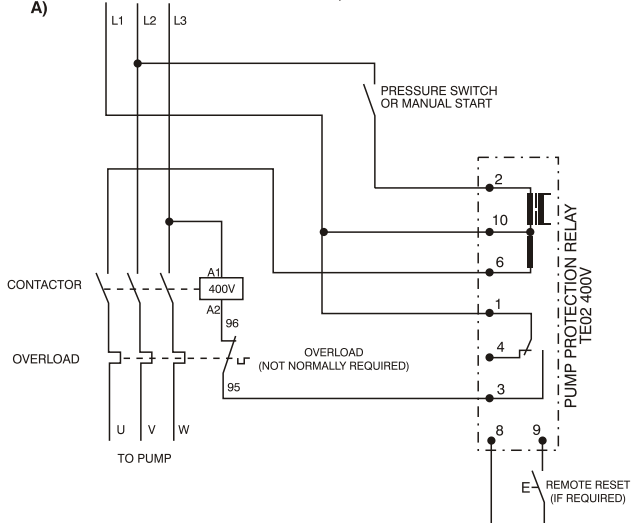


**B) DOL CONNECTION DIAGRAM WITH CONTACTOR & OVERLOAD FOR 1,1kW & ABOVE**

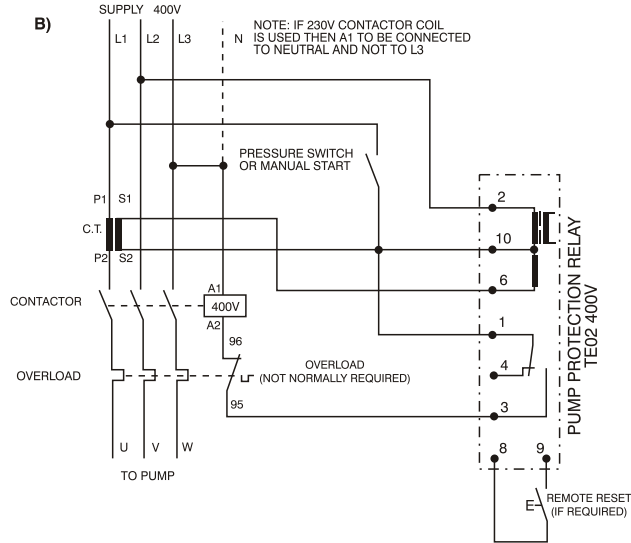


## TE02 400V – FOR THREE PHASE PUMPS

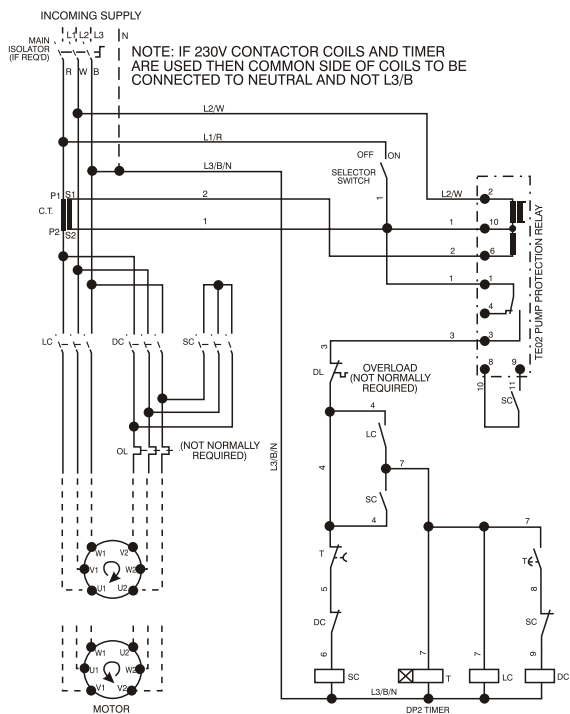
**A) DOL CONNECTION DIAGRAM FROM 0,37kW TO 4kW**



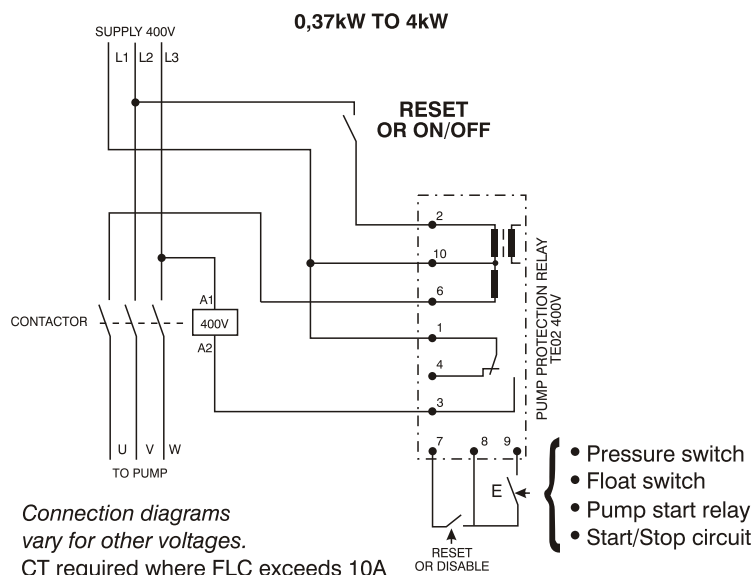
**B) DOL CONNECTION DIAGRAM FOR ABOVE 4kW**



## STAR-DELTA CONNECTION DIAGRAM



## TE03 CONNECTION DIAGRAM 400V



**NOTES:** 1) 230V refers to either 220 or 230v, 2) 400V refers to either 380 or 400V, 3) 525V TE02 available