

X10592 – PR3-E Series – Installation Instructions

12-27kW HVAC Range – 3-Phase Burst Fire Power Controller

Issue 16



1 Introduction

The PR3 range of thyristor stacks provides full seamless control of three phase resistive loads, using two thirds control technique. Signal control is by a dc signal or manual control via a 5kΩ potentiometer. These burst firing control stacks use fast pulse zero volts switching technology, to minimise flicker and eliminate RFI problems. They also incorporate an automatic resetting temperature trip, integral semiconductor fuses and heatsink. The three models in this build includes the 27kW model, which is forced-air cooled. All have easy access to signal & power terminals for simple installation.

2 Applications

Suitable for 3-wire, 3-phase floating-star or closed-delta configured resistive loads. This includes the Heating, Ventilating and Air Conditioning (HVAC) market for air curtain applications, but also for furnaces, ovens, dryers, and hot plates.

3 Functions

Alarm relay functions (3-way terminal – V/free alarm “NO_NC_C”)

The alarm circuit has voltage free relay contacts and are rated up to 2A @ 125V ac (RMS) load.

The internal supply to the relay is obtained from the transformer via two 20mm 1A fuses. These are connected to the L1 and L2 phases and therefore the relay and LED can only energise when there is an over-temperature condition, a sensor fault, or a L3 phase loss.

Over temperature protection

When a heatsink temperature of above 90°C is detected by the sensor, the alarms relay changes state, and the LED pulses rapidly. The power to the load will be disconnected and will not return until the temperature drops to 85°C.

Temperature sensor loss

LED status changes to ON/OFF (fast pulsing) if the sensor fails.

Phase loss with auxiliary supply

When any one of the three phase inputs are missing, the relay changes state and the LED flashes with ON/OFF bursts of 1.5 seconds. This is only functional with a remote supply (see below).

Fault condition

The default setting of DIL switch (SW1) is in the ON position, the alarm relay will be energised under a fault condition. Changing

SW1 to the off position will energise the alarm relay continuously until a fault condition occurs.

Remote supply

The unit will be factory set for an internal supply (SUPPLY Jumper J1 in the “INT” position). If there is a requirement for the alarm relay and LED to energise when a phase fault condition occurs, then there is provision for an external 24V ac or dc supply (SUPPLY Jumper J1 in the “EXT” position).

Note: If the remote supply is utilised, the main (L1, L2 & L3) supply must come on before this supply is switched on.



4 Connections

CAUTION:- DISCONNECT MAIN SUPPLY BEFORE COMMENCING ANY SERVICE WORK
MOUNT THE CONTROLLER WITH THE COOLING FINS IN A VERTICAL POSITION
ENSURE THERE IS ADEQUATE UNRESTRICTED AIR FLOW THROUGH THE FINS

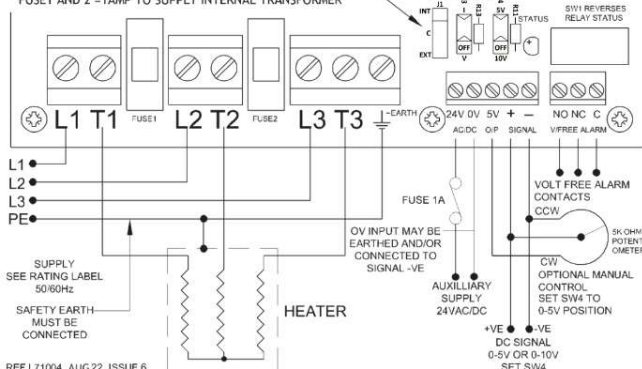
STATUS LED CONDITIONS

1. VARIABLE BRIGHTNESS, TRACKING CONTROL SIGNAL
2. CONTINUOUS SLOW PULSING 1.5 SECS. = PHASE LOSS
3. CONTINUOUS FAST PULSING = OVER TEMPERATURE
4. ON/OFF FAST PULSING = INTERNAL SENSOR FAILURE

SW3 IN 'INT' POSITION USES INTERNAL 24V TRANSFORMER
SWITCH TO 'EXT' POSITION FOR EXTERNAL 24V SUPPLY
FUSE1 AND 2 = 1AMP TO SUPPLY INTERNAL TRANSFORMER

RELAY STATUS

- SW1 ON = STANDARD SW1 OFF = REVERSE
- SW2 ON = FAST BURST SW2 OFF = SLOW
- SW3 - 1 V CURRENT OR VOLTAGE SIGNAL AND SET SW4 TO 0-5V
- V ON = 0-5V OR 0-10V DC SIGNAL



CONTROL OPTIONS GUIDE

Burst fire control options (SW2)

There are two methods which can be selected to suit specific applications.

With the **SW2** DIL switch in the “ON” position it gives fast burst control which is the ‘inhibited flicker’ mode.

With the **SW2** DIL switch in the “OFF” position it gives slow burst control, which is basic burst firing mode.

Control input options (SW4 & SW3)

These are connected via the terminals 5V o/p and “+” and “-” signal. Ensure correct polarity, as shown in CONNECTIONS section. [SW4] For input voltage signals of 0-5V or 0-10V dc, use the “+” and “-” SIGNAL terminals.

[SW4] For manual control using a 5kΩ, 1W potentiometer, use all 3 terminals 5V-O/P, and “+” and “-” SIGNAL terminals.

[SW3 “I/V”] For input current signal of 4-20mA, set SW3 to I “ON”.



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(See CONNECTIONS and SPECIFICATIONS sections)

5 Installation

Cooling requirements

This robust stack assembly has an operational temperature of 65°C when naturally cooled and has a built-in 90°C over-temperature trip on the heatsink as a safety feature. The unit should be mounted vertically, with heatsink fins top to bottom, and with sufficient surrounding air space to maximise natural convection cooling. If the unit is mounted in an enclosure or cabinet, adequate ventilation and/or forced air-cooling should be fitted. The 27kW unit has a built-in fan that switches on when the heatsink gets hot (see SPECIFICATIONS).

Load considerations

The PR3 series of power controllers are designed for 3-wire, 3-phase floating-star or closed delta configured resistive loads. The PR3 series are 2-leg thyristor controllers and therefore unsuitable for 4-wire, 3-phase with star point to neutral configured loads. For further information on configured loads, see the 'Application circuits' section of our supporting datasheet – APC (ref. X10322).

Unusual heating loads such as Molybdenum, Platinum or Tungsten have a typical, 10:1, hot to cold, resistance ratio and therefore, when cold, draw larger currents than normal.

Connections

This unit has simple clamp type connectors for all auxiliary-wiring requirements.

Note: It is factory set for an internal power supply. For alternative volts 'free alarm' supply details see *Functions* section. Please contact our technical support for further details.

6 Specifications

| | | |
|------------------------------------|--|---|
| Power / Current Ratings | 12kW (17A); 18kW (25A); 27kW (38A) @ 415V RMS nominal | |
| Input Voltage | 400V RMS \pm 10% | |
| Frequency | 50/60Hz | |
| Control Input Options | Signal: (using SW4): 0 to 10V DC (Set as standard) / 0 to 5V OR Manual: using 5k Ω Potentiometer 4-20mA signal: set SW3 to I (ON), For 0 to 5V DC set SW4 to 0-5V | |
| Alarms Relay Circuit Rating | 2A @ 125V AC Max. | |
| Fan "switch-on" Temp | Typically, 55°C (27kW Model only) | |
| Status Indicator | (Tracking control signal) LED Indicator Changes Intensity | |
| Over-temperature | Trip in temperature @ 90°C \pm 1°C (LED indicator 'flashes' continuous fast pulsing) | |
| Phase Loss Detection | LED indicator 'flashes' continuous slow pulsing | |
| Sensor Loss Detection | LED indicator 'flashes' on/off fast pulsing | |
| Cable Terminations | Phase Power & Earth | 10mm ² Rising Clamp Terminal Block |
| | Remote Supply Auxiliary Alarm (relay) | 2.5mm ² Rising Clamp Terminal Block |
| | Control Signal | 2.5mm ² Rising Clamp Terminal Block |
| Terminal Torque Specs | 1.2Nm (10mm ²) Power Terminals Only | |
| Fusing | 12 to 18kW | 20A, 30A, High-Speed Semiconductor type, ferrule fuse (10mm ϕ x 38mm long) |
| | 27kW only | 40A High-Speed Semiconductor type, ferrule fuse (14mm ϕ x 51mm long) |
| Max. Ambient Temperature | 40°C | |
| Dimensions | 150mm (D) x 240mm (W) x 100mm (H) | |
| Fixing Centres | 4 x 5.5 ϕ holes on centres 220mm (W) x 130mm (D) | |
| Weight | 2.6kg (All models) | |

Note: SAFETY WARNING – Isolate supply before removing cover; Metal parts, in particular the heatsink, may get very hot when the unit is fully operational; DO NOT COVER enclosure ventilation slots.

It is essential that a load break switch and a contact breaker is installed in the load supply. The supply to the contactor coil should be interrupted by an over-temperature thermostat located in the heater battery and also upon detection of airflow loss.

7 Recommendations

Additional supporting documents, which may be appropriate for your application, are available on request (see X10593).

8 Fusing

It is recommended that fast acting semiconductor type fuses (as supplied) be used for protection. See SRA Data sheet X10255 for further information. Other external supplies should be fused accordingly.

9 CE Marking

This family carries a "CE" marking. These burst fire controllers do not normally require a remote filter. For more information contact our sales desk. A Declaration of Conformity is available on request.

10 Order Code

When ordering directly, please use the following stock codes:

| Manufacturer Stock Code | Product Description | Rating |
|-------------------------|---|---|
| A437407-HV | PR3-E-12kW | 3-phase, 12kw, 17A @ 415V, 2/3rds control |
| A437408-HV | PR3-E-18kW | 3-phase, 18kw, 25A @ 415V, 2/3rds control |
| A437409-HV | PR3-E-27kW | 3-phase, 27kw, 38A @ 415V, 2/3rds control |
| T30201 | Auxiliary transformer for Failsafe Alarm | 0/240/415 10-0-10V 2VA |
| A403011 | 5k Ω , 1W Potentiometer with 0.5m long leads for manual control option | |
| Available on request | Spare fuses: 20A, 30A or 40A HS SCR-type | |



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