36kW and 54kW HVAC RANGE
3-PHASE BURST FIRE POWER CONTROLLER
INSTALLATION INSTRUCTIONS

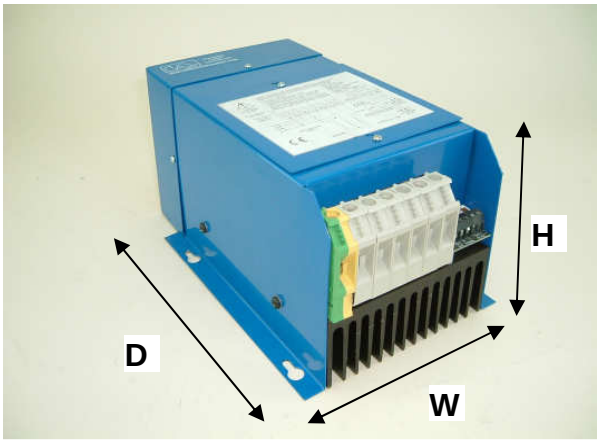
PR3-E SERIES

X10593

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. 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 two models in this build includes the 54kW model, which is forced-air cooled. All have easy access to signal & power terminals for simple installation.

Sample Photo is 54kW, complete with fan cowl.



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.

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. Connection is via the PCB terminal.
For alarm relay status options see SPECIFICATIONS.
Note: The internal supply to the relay is obtained from the transformer via two 20mm 1A fuses. These are connected to the Black (L2) and Grey (L3) phases and therefore the relay and LED can only energise when there is an over-temperature condition, a sensor fault, or a phase loss on L1 phase. See Remote Supply Option section.

RoHS Compliant

Over temperature protection

When a heatsink temperature of above 90ºC is detected by the sensor, the alarms relay changes state and the status LED indicator flashes continuous rapid pulsing. The power to the load will be disconnected and will not return until the temperature drops to 85ºC. The 54kW unit is also fitted with a cooling fan that switches ON when the heatsink reaches approximately 55ºC.

Temperature sensor loss

The Status LED indicator changes to continuous equal ON/OFF 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 (SW4 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 (SW4 in the "EXT" position).
NOTE – If the remote supply is utilised, the main (L1, L2 and L3) supply must come on before this supply is switched on.

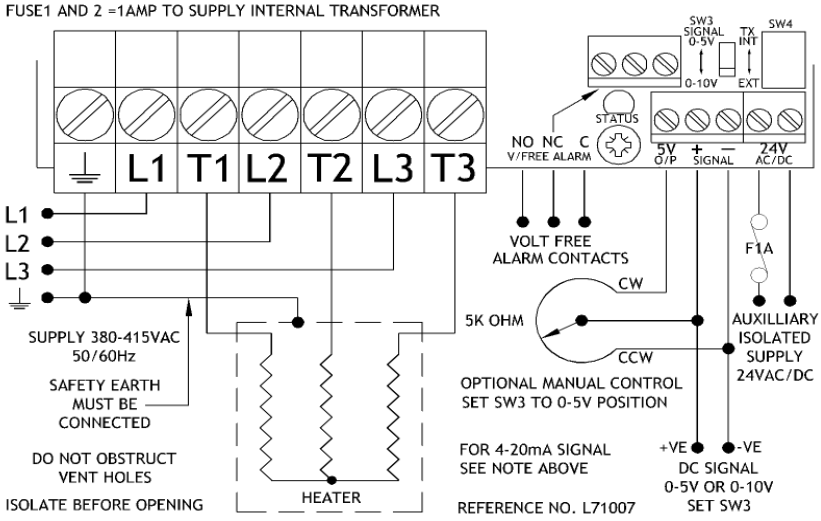
CONNECTIONS

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

SW4 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
SW - I V CURRENT OR VOLTAGE SIGNAL
I ON = 4-20mA FIT 270R ACROSS SIG + /-
AND SET SW3 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 (SW3 & SW"I/V")

These are connected via the terminals 5V o/p and **"+"** and **"-"** signal. Ensure correct polarity, as shown in CONNECTIONS section.
[SW3] For input voltage signals of 0-5V or 0-10V dc, use the **"+"** and **"–" SIGNAL** terminals**.**
[SW3] For manual control using a 5kΩ, 1W potentiometer, use all 3 terminals **5V-O/P**, and **"+"** and **"–" SIGNAL** terminals.
[SW "I/V"] For input current signal of 4-20mA, set DIL switch **SW-I/V** to "ON", fit a 270Ω, 0.25W resistor across the **"+"** and **"-" SIGNAL** terminals and set **SW3** to 0-5V.

Note: *For 4-20mA signal*, a 270Ω resistor is supplied. *Factory-set 'default' setting is 0-10V.*

(See CONNECTIONS and SPECIFICATIONS sections)

INSTALLATION

Cooling requirements

This robust stack assembly has an operational temperature of 65℃ when naturally cooled and has a built in 90℃ 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 54kW model has a fan which is normally off, but automatically turns on at high heatsink temperatures (see SPECIFICATIONS – Fan switch-on temperatures).

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 'voltage free' alarm supply details see *Functions* section. Please contact our Technical support for further details.

Fusing & over temperature

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

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.

SPECIFICATIONS

Power/(current ratings):	36kW (50A); 54kW (75A) @ a typical supply of 415V RMS
Input voltage:	400V RMS +/- 10%
Frequency:	50/60Hz
Control input options:	**Signal (using SW3):** 0 to 10V dc (set as standard) / 0 to 5V; **OR Manual:** using 5kΩ potentiometer. **For 4-20mA signal:** set **SW -I/V** to "ON", fit 270R (0.25W) across SIG.+/- and set **SW3** to 0-5V.
Burst fire control options:	**Slow Burst:** 1 second proportional time base **Fast Burst:** variable and un-proportional time base.
Alarm relay functions:	The voltage free alarm circuit is rated for 125V ac @ 2A.
Alarm relay status options:	SW1 = "OFF" - Relay is continuously energised (normally closed); trips in fault condition. SW1 = "ON" - Relay is de-energised (normally open); closes in fault condition.
Status indicator:	(Tracking control signal) **status** LED indicator changes **intensity**
Cooling fan:	24V AC *(NOTE: Fan fitted on 54kW model only);* **Fan 'switch-on' Temp. sensor:** typically 55 ºC
Over Temperature:	Trip in temperature @ 90ºC, +/- 1ºC (**Status** LED indicator '**flashes**' with ON/OFF rapid pulsing) Trip out temperature @ 85ºC, +/- 1ºC
Phase loss detection:	**Status** LED indicator '**flashes**' ON/OFF continuously in slow 1.5 second intervals.
Sensor loss detection:	**Status** LED indicator '**flashes**' ON/OFF continuously in equal intervals.
Cable terminations:	Phase power 10mm² (36kW) or 16mm² (54kW) rising clamp terminal block Earth 10mm² (36kW) or 16mm² (54kW) rising clamp terminal block Remote supply Auxiliary alarm (relay) 2.5mm² rising clamp terminal block Control signal 2.5mm² rising clamp terminal block
Terminal torque settings:	2Nm (10mm² - 36kW), 2.5Nm (16mm² - 54kW) Power terminals only.
Fusing 36kW:	63ET **(**63A) High-Speed Semiconductor type fuse, or equivalent.
54kW:	100ET (100A) High-Speed Semiconductor type fuse, or equivalent.
Working temperature:	65°C (maximum operational)
Dimensions:	200mm (D) x 155mm (W) x 120mm (H) 36kW 250mm (D) x 155mm (W) x 120mm (H) 54kW
Fixing centres:	4 x 4.5mm-clear keyhole slots on fixing centres 140mm (W) x 140mm (D)
Weight:	(36kW) 2.6kg (54kW) 3.5kg

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.

RECOMMENDATIONS

Additional supporting documents, which may be appropriate for your application, are available on request. These include X10255: SRA – Safety Advise; X10213: ITA – Interaction (Causes & remedies for Burst fire & Phase Angle control), P01.1 – UAL Conditions of Sale.

NOTE: It is recommended that installation and maintenance of this equipment should be done with reference to the current edition of the I.E.T. (formally I.E.E.) regulations (BS7671) by suitably qualified/trained personnel. The regulations contain important requirements regarding installation and safety of electrical equipment. Specific installers should refer to local and national regulations.

ORDER DETAILS

When ordering directly, please use the following stock codes:-

Manufacturer stock code	Product Description	Rating
A437432-HV	PR3-E-36kW	3-phase, 36kW, 50A@415V, 2/3rds control
A437442-HV	PR3-E-54kW	3-phase, 54kW, 75A@415V, 2/3rds control
T30201	Auxiliary transformer for Failsafe Alarm	0/240/415 10-0-10V 2VA
A403011	5kΩ, 1W Potentiometer with 0.5m long leads for manual control option	
Available on request	Spare HS fuses: 63ET (63A) or 100ET (100A) SCR-type	

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