Three-Phase 12 & 18kW Heater Controllers

Features

- 0-10Vdc Control input
- Over temperature protection with auto reset
- No additional heatsinks required
- No external RFI filters required

Specification

Input signal	0-10Vdc
External supply (control)	24Vac/dc ±10% @40mA
Supply (load)	3-Phase 24 to 440Vac RMS 50Hz/60Hz
Power/current ratings:	
RE-PR3-DIN-12	12kW (16.7A per phase) @ 415Vac
RE-PR3-DIN-18	18kW (25A per phase) @ 415Vac
Fusing (recommended):	
RE-PR3-DIN-12	20A High speed semiconductor fuses or equivalent Z curve MCB's
RE-PR3-DIN-18	30A High speed semiconductor fuses or equivalent Z curve MCB's
Terminal connections:	
Control	Rising cage for 2.5mm² cable max.
Power	Rising cage for 6mm² cable max.
Terminal torque setting	0.8Nm (only required for power terminals)
Over temperature:	
Trip temp.	@ 90°C ±5°C
Reset temp.	@ 85°C ±5°C
Fault condition	24Vac/dc (as power supply)
LED indication	T1 & T3 LED's pulse when output is ON
Ambient temperature	0-40°C max.
Dimensions (W, H, D):	
RE-PR3-DIN-12	217 x 87 x 90mm
RE-PR3-DIN-18	217 x 87 x 110mm
Conformity	CE Marked
Country of origin	UK

Product Codes

RE-PR3-DIN-12

Din rail mount, 3-phase 12kW electric heater controller

RE-PR3-DIN-18

Din rail mount, 3 phase 18kW electric heater controller

SAFETY REQUIREMENTS & ADVICE SHEET

Introduction

The objective of this leaflet is to provide information to ensure that the safety of the person(s) installing or maintaining the equipment is not compromised and its location and method of installation does not endanger others, either during or after installation.

Customers should be aware of the Health and Safety at Work Act 1974 (HSW 1974) and the EC "Provision and Use of Work Equipment Regulations 1992" (PUWER). Both are available from the Health and Safety Executive (HSE) publications, within the UK.

Installation

CE Directives

These are European regulations which apply to our industry. They affect the equipment emissions and immunity to Radio Frequency Interference (RFI) and various elements of safety for electrical equipment.

The European Community 'CE' Directives that mainly concern Sontay Ltd are, the Low Voltage Directive (LVD) and the Electromagnetic Compliance Directive (EMC).

A Declaration of Conformity may be supplied with the product or supplied on request.

Torque Settings

Good working practises must be adhered to ensuring appropriate electrical and mechanical installation. This would include the mechanical fixing of potentiometer bushes and electrical set screw and/or pillar connections. These Electrical Connections and Mechanical Fastenings must not be over tightened. We would recommend a typical torque setting of 1 to 5Nm. For specific product information, see appropriate product data sheet, where applicable.

Cooling Requirements

The use of an additional heatsink (this could be a conductive panel) suitably attached or mounted with the unit, will help to dissipate heat away from the device(s). An alternative or additional method would be forced air-cooling (using a fan), to assist the natural convection of airflow over an existing heatsink within the unit. The product fins should be mounted in line with the forced and/or natural airflow.

The equipment's environment and its initial ambient temperature also need to be considered, as this could have an adverse effect on the overall operating conditions.

Fusing

We recommend that semiconductor, fast acting to BS88 IEC 269, type fuses or circuit breakers (Semiconductor - MCB) should be used for unit and/or device protection. The appropriate maximum load current should be known to select the required SCR fuse or Z curve MCB, but must not exceed the equipment rating. The $I^2 t$ ($A^2 s$) rating of the selected fuse must be less than that of the equipment so as to protect the equipment's discrete device. Further appropriate fusing may be required for protection of the unit supply using standard fuse links and holders. Failure to address these requirements and the use of incorrectly selected fuses may cause the equipment to fail.

Earthing

The protective conductor terminal of the equipment must be utilised at all times and bonded to a 'good' Earth (ground). The earth bonding (strapping) leads of any combined equipment should be as short as possible and be substantial, i.e. at least rated higher than the equipment's load. For further information, refer to BS7671. Following these simple guidelines will ensure optimum use of any appropriate filter circuits which may be required.

Insulation (over-voltage category) and Protection from electric shock Classification of Equipment

All equipment, unless otherwise stated, is rated to CLASS II Insulation (Over-voltage category) and CLASS I (Protection category).

Maintenance

Before any servicing is carried out, reference should be made to appropriate installation instructions, drawings and labelling which may come with the equipment. Personnel should switch off the unit supply before accessing or removing any safety cover and be aware of hazardous live parts.

Technical Overview

The RE-PR3-DIN series are a range of thyristor stacks which provides full seamless control of 415V supply loads, using the two-thirds control technique, to provide adjustable control output in proportion to the demand control signal.
These burst fire control assemblies use zero volt switching technology, to minimise RFI problems. They also incorporate a temperature trip, automatic reset, alarm output, LED 'output on' indication and heatsink.
Applications include electric heater batteries and dust heaters.

Location & Ventilation

The unit is designed to be installed on DIN rail in an electrical control panel, and should be installed with the heatsink cooling fins in a vertical plane. Allow a minimum of 100mm between units on the vertical axis.
The maximum ambient of 40°C should not be exceeded. Where necessary control panels & enclosures should be ventilated with a fan.

Over Temperature Monitoring

The RE-PR3-DIN series are fitted with a thermal protection device to protect against over temperature. The unit will automatically switch off the load in the event of the heatsink temperature exceeding safe limits (90°C ±5°C). Once the temperature has fallen to a safe level (85°C ±5°C) the load will be switched on again if the supply is still present.
Under normal operating conditions the heatsink will not reach 90°C but this might occur, for example when the ambient temperature exceeds 40°C.

Caution: During the course of normal operation metal parts, in particular the heatsink, may get very hot.

Control Supply

The control pcb is fully isolated from the load supply and requires a 24Vac/dc supply to operate the electronics. The control supply common is internally linked to the input signal common.

Load Supply

The RE-PR3-DIN series are designed for resistive type loads in 'star' or 'delta' configurations. 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.

Maximum Heating Load

The total installed kW rating of the heating load must not exceed the maximum kW duty rating, see specification on page 1.

Fuse Back-Up Protection

Fuses or MCB's (circuit breakers) are required to provide back up protection. To select the required fuses or Z curve MCB's (circuit breakers), the load current should be known, but not exceed the electric heater battery rating.

Alarm Output

24Vac/dc (as power supply) is normally present at the alarm terminal. In the event of over temperature, a sensor fault, or loss of power supply, the output of the unit will fail to OFF with no output.

Manual Override

The unit can be placed in manual mode by setting the pcb jumper A/M to the M position. The RE is factory supplied with the jumper in the A position. In the M position the RE will give a fixed load output of 100%.

Three-Phase Connections

Three phase units can be installed with the heating load in either star or delta configuration. It is **essential** that in the star mode the star point **is not** connected to neutral. Terminals L2 & T2 are internally linked. If local regulations permit, the L2 supply can be connected directly to the heater element (bypassing the RE unit).

Load considerations

The RE-PR3-DIN series of power controllers are designed for resistive type loads only. Capacitive, or unusual heating loads such as Molybdenum, Platinum or Tungsten, (which can have a 10:1 hot to cold resistance ratio) are not suitable.

Cycle Time

The cycle time is factory preset at 1 second. At this setting and with the 0-10Vdc control signal at 5Vdc the RE will be pulsed for 50% of the cycle time, i.e. 0.5 seconds. The cycle time can be adjusted to between 1 and 255 seconds to suit the application and/or any supply authority requirements.

Adjusting The Cycle Time

Adjustment is not normally required. See above for functional description.

Apply the 24Vac/dc control supply.

The cycle time can be adjusted to any of the periods given in the table below.

Using a multimeter measure the dc voltage across the pins on test jumper HD4. The cycle time is factory set at 1 second which equates to a measured voltage of 0Vdc.
Adjust potentiometer VR2 until the desired dc voltage is measured.

Cycle Time Adjustment Table: (Nominal voltages ±0.1Vdc)

DC Volts	Seconds	DC Volts	Seconds
0	1	1.8	90
0.2	10	2	100
0.4	20	2.3	120
0.6	30	2.7	140
0.8	40	3.1	160
1	50	3.5	180
1.2	60	3.9	200
1.4	70	4.3	220
1.6	80	5	255

Signal Rescaling

The RE is factory supplied to give 100% load output at 10Vdc input. For optimum control the signal input circuitry can be rescaled to reduce the RE maximum power output (see below). This feature can be utilised where only a proportion of the installed heating load is needed
(NB - The total installed kW rating of the heating load must not exceed the maximum RE kW duty rating).

Adjustment is not normally required.

Apply the 24Vac/dc control supply.

Signal Rescaling (continued)

Potentiometer VR1 sets the maximum power output. This can be measured using a multimeter across the test pins on jumper HD3. At 100% output the measured voltage across HD3 is 4Vdc
If required, the output can be changed to reduce the maximum output. The voltage at HD3 should be set at a proportion of 4Vdc for a 10Vdc input, i.e. for a 75% output the voltage at HD3 would be 75% of 4Vdc = 3Vdc for a 10Vdc input.

Installation

1. The RE-PR3-DIN should only be installed by a competent, suitably trained technician, experienced in installation with hazardous voltages. (>50Vac & <1000Vac or >75Vdc & 1500Vdc)

2. Ensure that all power is disconnected before carrying out any work on the RE-PR3-DIN.

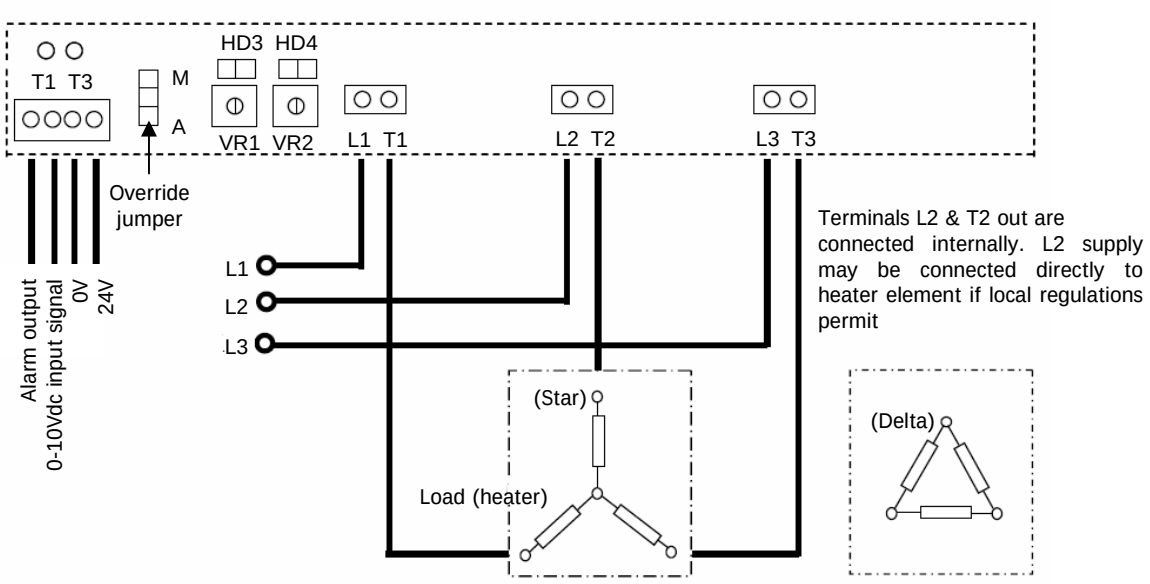
3. Maximum cable size is 2.5mm² (6mm² for power), care must be taken not to over tighten terminals.

4. When mounting the RE-PR3-DIN care should be taken not to stress the PCB when fitting to the DIN rail. If it is necessary remove the module from the DIN rail, be sure to use a flat bladed screwdriver to release the DIN clips.

5. The RE-PR3-DIN is designed to operate from a 24Vac/dc supply (so that power can be drawn from a 24Vac transformer used for other purposes if a 24Vdc supply is not available). In either case one side of the supply is common to the signal ground from the BEMS controller.

Caution: When monitoring 230Vac inputs, dangerous voltages are present on the terminal blocks and on the printed circuit board. Care MUST be exercised to avoid coming into contact with live components.

Connections



Terminals L2 & T2 out are connected internally. L2 supply may be connected directly to heater element if local regulations permit

Alternative load (heater) configuration

WARNING! Do not connect neutral to star point of heater.