SAFETY AND EMC INFORMATION

Please read this section before installing the controller

This controller is intended for industrial temperature and process control applications when it will meet the requirements of the European Directives on Safety and EMC. Use in other applications, or failure to observe the installation instructions of this handbook may impair the safety or EMC protection provided by the controller. It is the responsibility of the installer to ensure the safety and EMC of any particular installation.

Safety

This controller complies with the European Low Directive 73/23/EEC, amended by 93/68/EEC by the application of the safety standard EN 61010.

Electromagnetic compatibility

This controller conforms with the essential protection requirements of the EMC Directive 89/336/EEC, amended by 93/68/EEC by the application of a Technical Construction File. This unit satisfies the general requirements of an industrial environment as described by EN 50081-2 and EN 50082-2. For more information on product compliance refer to the Technical Construction File.

SERVICE AND REPAIR

This controller has no user serviceable parts. Contact your nearest Eurotherm Controls agent for repair.

Caution: Access to hazardous voltages

When this instrument is removed from the sleeve the open style sleeve will give limited access to the interior of the enclosure. The installation should not allow access to any hazardous voltages within the enclosure if the instrument is removed for repair.

Cleaning

Do not use water or water based products to clean labels or they will become illegible. Isopropyl alcohol may be used to clean labels. However a mild soap solution may be used to clean other exterior surfaces of the product.

Electrostatic discharge precautions

When the controller is removed from its sleeve, some of the exposed electronic components are vulnerable to damage by electrostatic discharge from someone handling the controller. To avoid this, before handling the unplugged controller discharge yourself to ground.

Technical Specification

Equipment ratings

Supply voltage:	85 to 264V a.c. ~ or optionally, by using an alternative power supply board; 17 to 40V a.c. ~ or 20 to 40V d.c. ⎓.
Supply frequency:	48 to 52Hz or 58 to 62Hz (50/60Hz)
Power consumption:	10 Watts.
Relay output, (isolated):	Max. 264Vac, (min. 30Vac or dc). Max, current: 2A resistive
Triac output, (isolated):	85 to 264Vac. Max. current: 1A resistive.
Leakage current:	<2mA through triac and relay suppression components
Over current protection:	External over current protection devices are required that match the wiring of the installation. A minimum of 0.5mm² or 16/0.2mm wire is recommended. Independent fuses are required for the instrument supply and each relay or triac output. Suitable fuses are T type, (EN 60127; time-lag) as follows: Instrument supply: 85 to 264V a.c. ~ 2A (T); 17 to 40V≂ 3.15A(T). Relay outputs: 2A (T). Triac outputs: 1A (T).
Low level I/O:	Input and output connections other than relay and triac are intended for low level signals at less then 42V.
Logic output, (isolated):	15V(min) at 20mA.
Logic i/p, (non-isolated):	Active <0.7V, non active >4V, or volt free contact operation.
DC output, (isolated):	0 to 20mA (600Ω max), or 0 to 10V (500Ω min).
DC input, (isolated):	0 to 20mA, or 0 to 10V,
Analogue comms dc i/p:	0 to 20mA, or -5 to 10V, isolated. An isolated potentiometer supply is available; 10V, 1mA.
Valve position pot. i/p:	Supply; 0.5V, 5mA, isolated, (818 only).
Digital Comms:	EIA-232, or EIA-422, both are isolated.

Environmental ratings

Panel sealing:	Instruments are intended to be panel mounted. The rating of panel sealing is IP54, EN 60529, when used with the supplied gasket.
Operating temperature:	0 to 55°C. Ensure the enclosure provides adequate ventilation.
Relative humidity:	5 to 95%, non-condensing.
Atmosphere:	The instrument is not suitable for use above 2000m or in explosive or corrosive atmospheres.

Electrical safety

EN 61010, Installation category II, pollution degree 2.

Installation category II:	Voltage transients on any mains power connected to the instrument must not exceed 2.5kV.
Pollution degree 2:	Conductive pollution must be excluded from the cabinet in which the instrument is mounted.
Isolation:	All inputs and outputs, (except the digital inputs) have a reinforced insulation which provides protection against electric shock. Digital inputs are electrically connected to the main process variable input, (thermocouple etc.).

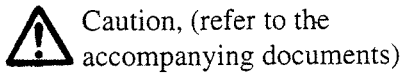
General

Input Range:	-8 to +60mV
Calibration error:	Better than 0.25% of span

INSTALLATION SAFETY REQUIREMENTS

Safety Symbols

Various symbols are used on the instrument, they have the following meaning:



A functional earth connection is provided to ground RFI filters but is not required for safety purposes.

Personnel

Installation must only be carried out by qualified personnel.

Enclosure of live parts

To prevent hands or metal tools touching parts that may be electrically live, the controller must be installed in an enclosure.

Caution: Live sensors

The non-isolated digital inputs are electrically connected to the sensor input. If the temperature sensor is connected to an electrical element then the digital inputs will also be live. The controller is designed to operate under these conditions. However you must ensure that this will not damage other equipment connected to these inputs and that service personnel do not touch these connections while they are live. With a live sensor all cables, connectors and switches used for connecting the sensor and digital inputs must be mains rated.

Wiring

It is important to connect the controller in accordance with the data given in this handbook. Take particular care not to connect AC supplies to the low voltage sensor input or DC or logic inputs and output. Wiring installations must comply with all local wiring regulations.

Power isolation

The installation must include a power isolating switch or circuit breaker. This device should be in close proximity to the controller, within easy reach of the operator and marked as the disconnecting device for the instrument.

Earth leakage current

Due to RFI Filtering there is an earth leakage current of less than 1mA. This may affect the design of an installation of multiple controllers protected by Residual Current Device, (RCD) or Ground Fault Detector, (GFD) type circuit breakers.

Overcurrent protection

To protect the internal PCB tracking within the controller against excess currents, the AC power supply to the controller and power outputs must be wired through the fuse or circuit breaker specified in the technical specification.

Voltage rating

The maximum continuous voltage applied between any of the following terminals must not exceed 264V ac:

- power supply to relay, logic or sensor connections;
- relay output to logic or sensor connections;
- any connection to ground

The controller should not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 264V ac with respect to ground and the product would not be safe.

Voltage transients across the power supply connections, and between the power supply and ground, must not exceed 2.5kV. Where occasional voltage transients over 2.5kV are expected or measured, the power installation to both the instrument supply and load circuits should include a transient limiting device.

These units will typically include gas discharge tubes and metal oxide varistors that limit and control voltage transients on the supply line due to lightning strikes or inductive load switching. Devices are available in a range of energy ratings and should be selected to suit conditions at the installation.

Conductive pollution

Conductive pollution must be excluded from the cabinet in which the instrument is mounted. For example, carbon dust is a conducting pollution. To secure a suitable atmosphere in conditions of conductive pollution, fit an air filter to the air intake of the cabinet. Where condensation is likely, for example in low temperatures, include a thermostatically controlled heater in the cabinet.

Grounding of the temperature sensor shield

In some installations it is common practice to replace the temperature sensor while the controller is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.

Over-temperature protection

When designing any control system it is essential to consider what will happen if any part of the system should fail. In temperature control applications the primary danger is that the heating will remain constantly on. Apart from spoiling the product, this could damage any process machinery being controlled, or even cause a fire.

Reasons why the heating might remain constantly on include:

- the temperature sensor becoming detached from the process;
- the thermocouple or wiring becoming short circuit
- the controller failing with its heating output constantly on;

- an external valve or contactor sticking in the heating condition;
- the controller setpoint set too high.

Where damage or injury is possible, we recommend fitting a separate over-temperature protection unit, with an independent temperature sensor, which will isolated the heating circuit.

Please note that the alarm relays within the controller will not give protection under all failure conditions.

EMC INSTALLATION REQUIREMENTS

To ensure compliance with the European EMC directive certain installation precautions are necessary as follows:

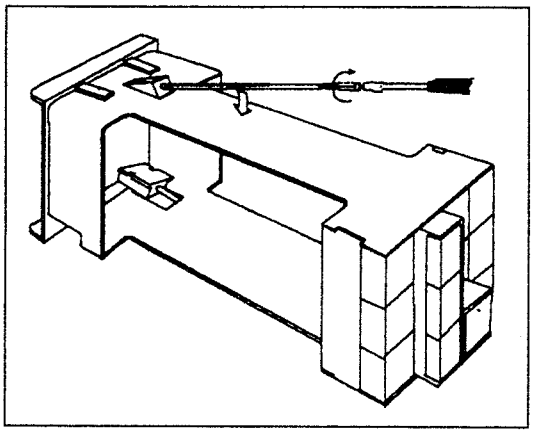
- For general guidance refer to Eurotherm Controls EMC Installation Guide HA025464.
- Input cables must be threaded through the feritte ring supplied with the product. Loop the cables so there are four complete turns through the ring. Use the ferrite ring for both the main PV input, (T/C. R/T or linear inputs) and remote inputs, (setpoint, trim etc.) Mount the ferrite ring as close as practical to the rear terminals, preferably inside the rear terminal cover. The Eurotherm part number of the ferrite ring is CO 025439.
- When using relay or triac outputs it may be necessary to fit a filter suitable for suppressing the emissions. The filter requirements will depend on the type of load. For typical applications we recommended Schaffner FN321or FN612.
- It may be that this product is to be included in equipment that is to be used in the environment defined in the light industrial or commercial environment of EN50081-1 and EN50082-1. In this case the unit should be mounted in a suitable metallic cabinet to enclose any electromagnetic emissions. All cables passing out side the cabinet including the mains leads should pass through suitable RF filtering such as Schaffner FN321 or FN612.

Routing of wires

To minimise the pick-up of electrical noise, the logic output wiring and the sensor input writing should be routed away from high-current power cables. Where it is impractical to do this, you should use shielded cables with the shield grounded at both ends.

Contents

INSTALLATION



The instrument plugs into a panel-mounting sleeve which requires a DIN-size 92mm by 92mm cut-out as illustrated. Remove the instrument from the sleeve by turning the screw, in the bottom right-hand corner, counter-clockwise. (If the screw is already at its maximum counter-clockwise position it should be possible to extract the instrument from the sleeve by turning the screw fully clockwise and then counter-clockwise). The instrument will start to withdraw from the sleeve and once the screw has been turned to its furthest extent the instrument can be withdrawn by hand. Remove the top and bottom mounting clamps from the sleeve by gently levering outwards and easing downwards inside the sleeve.*Insert the sleeve through the cut-out via the front of the panel. Fit the mounting clamps in the slots from inside the sleeve and from the rear of the mounting panel tighten with a screwdriver.

By hand, ease the instrument into the sleeve until the top and bottom edges of the bezel meet the sleeve moulding. Turn the screw in the bottom right-hand corner clockwise until tight. The instrument will be pulled completely into the sleeve, engaging the rear terminals and be fully secured.

Note: Do not attempt to dismantle the instrument without referring to the Maintenance Manual.

Instrument sealing

Supplied within the packing of the instrument, in a separate polythene bag, is a gasket to seal the instrument sleeve against the panel surface to IP54, (EN 60529).

If sealing of the instrument is not required this gasket need not be fitted and only the installation instructions above need be followed.

Fitting the gasket should be carried out as soon as the instrument is removed from the packing.

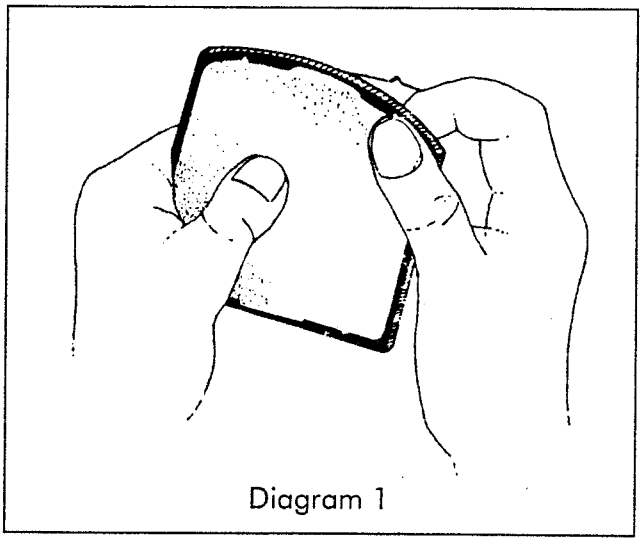


Diagram 1

Remove the instrument from its sleeve and place the sleeve, with the electrical connections uppermost, onto a flat surface. Remove the rear terminal cover and ensure that the mounting clamps are not fitted. Remove the gasket from its former (see diagram 1) noting that two sides of the gasket have a cut out profile.

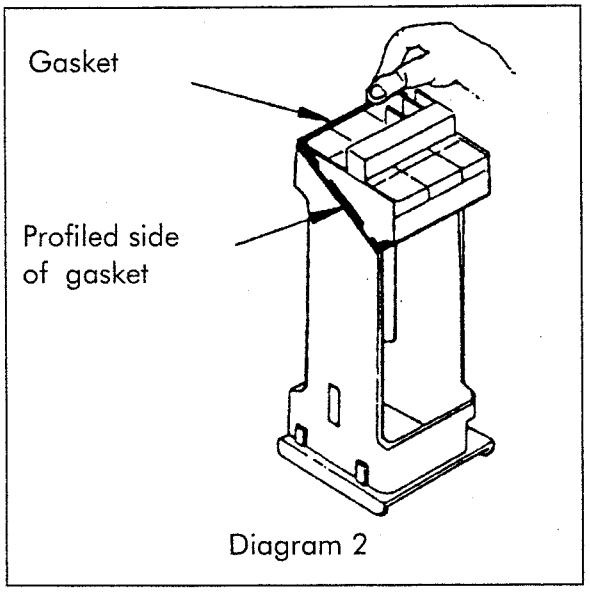
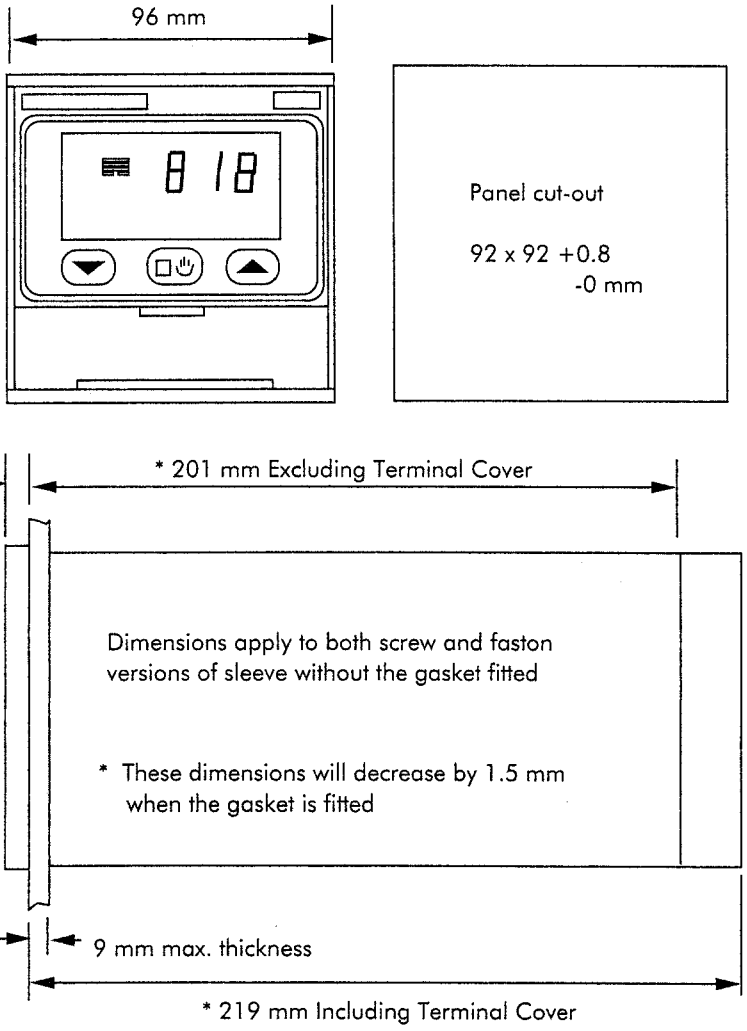


Diagram 2

Place the gasket onto the rear of the sleeve with the two profiled sides aligned with the sides of the sleeve that carries the mounting clamps. Drop one of the unprofiled edges over the side of the sleeve until it enters the cut out in the sleeve (see diagram 2). The opposite edge can now be eased over the rear terminals. Ease the whole gasket down the sleeve into its position at the rear of the bezel.

The sleeve can now be mounted into the panel cut-out and assembly continued as described in the installation instructions above. When fully compressed this gasket increases the projection of the bezel in front of the panel by 1.5mm.

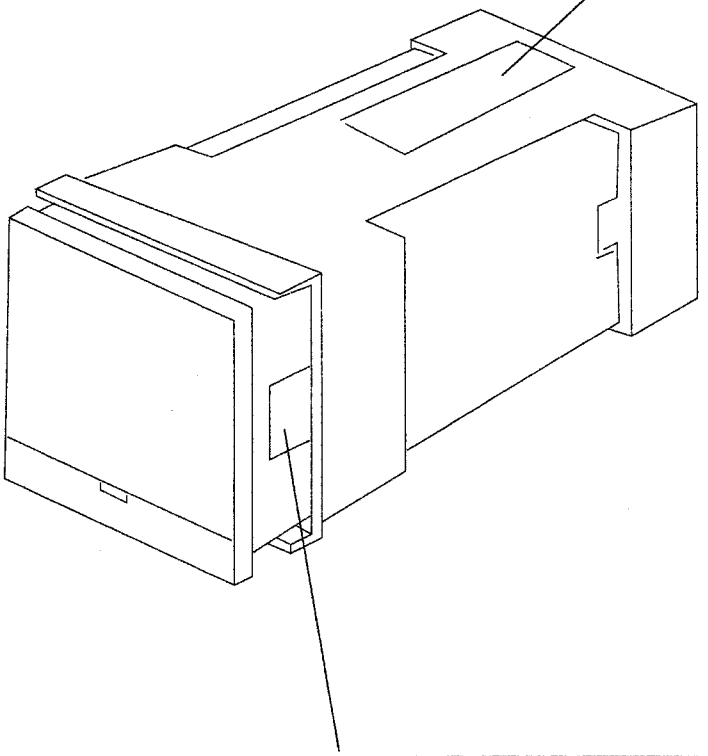
DIMENSIONAL DETAILS



The instrument is supplied with a terminal cover which provides electrical safety.
The use of shrouded receptacles on the faston version of the sleeve is recommended.

CONNECTIONS AND WIRING

Electrical connections are made via multi-way terminal blocks on the rear of the instrument. All connections are low current and a 16/0.20mm wire size is adequate. Labels on the instrument and sleeve indicate the specific connections for the instrument. The instrument supply should be fused externally, in accordance with local wiring regulations.



EUROTHERM CONTROLS
Worthing, England :01903 268500

Model No:
818S/4MA20/R0MA20/NONE/NONE/NONE/NONE/
NONE/FN/00/0/350/BAR/AT/ST/E/N/S/N////
Serial No: D09740-001-001-06-96

Made in UK

01. 85 - 264V	19.Dig In 1
02. Filter Earth	20. Dig In 2
03. Neutral	21. Dig Com
04.	
05. DC O/P1+	
06. DC O/P1-	
07. R.F.I. Earth	25. DC I/P+
08.	26. DC I/P
09.	27.

18. Safety Earth

EUROTHERM CONTROLS [5.23] Net
Worthing, England :01903 268500

Model No: 818S/4MA20/R0MA20/NONE/NONE/NONE/NONE/NONE
FN/00/0/350/BAR/AT/ST/E/N/S/N////

Serial No: D09740-001-001-06-96

Tag Text:

Software: 420

Made in UK

An explanation of the construction of the coding system used on the label on the side of the instrument and the sleeve is given on the next pages.

ORDERING INFORMATION 815

Basic Product	Code
Basic Controller	815S
Programmer Controller	815P

Input	Code
Thermocouple	TC
Resistance thermometer	RTD
0-20mA	0mA20
4-20mA	4mA20
0-5V	0V5
1-5V	1V5
0-10V	0V10

Output 1 and Output 2	Code
Action	**Output2/Input 2 Prefix**
Control on output 2 (1)	C
Retransmission of:	
Process variable	M (2)
Setpoint	S (2)
Remote Input of:	
Setpoint	X (2)
Trim	T (2)
S/P with local trim	L (2)

	Output 1		Output 2 /Input 2
No output	NONE		NONE
Relay linear	RLY		RLY
Relay non linear	–		RLYN
Relay ON/OFF	RLYF	(3)	RLYF
Logic linear	LGC		LGC
Logic non linear	–		LGCN
Logic ON/OFF	LGCF	(3)	LGCF
Triac linear	TRI		TRI
Triac non linear	–		TRIN
Triac ON/OFF`	TRIF	(3)	TRIF
Isolated 0-5V	0V5		0V5
Isolated 0-10V	0V10		0V10
Isolated 1-5V	1V5		1V5
Isolated 2-10V	2V10		2V10
Isolated 0-10mA	0mA10		0mA10
Isolated 0-20mA	0mA20		0mA20
Isolated 4-20mA	4mA20		4mA20

Notes:

(1) Control action on output 2 is opposite to output 1.

(2) With output 2 prefix M, S, X, T or L only dc outputs or inputs apply.

(3) ON/OFF on output 1 restricts output 2 to ON/OFF unless prefix M, S, X, T or L.

Alarms 1 and 2	1st & 2nd Code
None	NONE
Deviation band	DB
Deviation high	DH
Deviation low	DL
Full scale high	FH
Full Scale low	FL
Assigned to programmer	PROG
Relay State in Alarm	**3rd Digit Code**
Energised	E
De-energised	D

Digital Communications	Code
None	NONE
Digital RS232	232
Digital RS485	485
Baud Rate	
Baud 9600	96
Baud 4800	48
Baud 3600	36
Baud 2400	24
Baud 1200	12
Baud 600	06
Baud 300	03

Options	Code
Faston terminal	F
Screw terminal	S
Faston 24V ac/dc	F24
Screw 24V ac/dc	S24

Curve

Select from the range list shown below

	Recommended Ranges	Code
Linear	-1999 to 8000	00
Iron Constantan J	0C to 600C	01
Fe/Konst (DIN) L	0C to 600C	02
Ni Cr/Ni AL K	-250C to 1200C	03
Ci/Con T	-250C to 400C	04
Pt13% Rh/Pt R	0C to 1600C	05
Pt10% Rh/Pt S	0C to 1600C	06
Nicrosil/Nisil N	0C to 1300C	45
Rt 100 ohms at 0°C	-200C to 600C	70

Note: For linear inputs sensitivity must not be less than 5μ V/Digit

Display Max

These should be selected from the recommended minimum and maximum ranges shown in Curve. Include decimal point position. This is especially important on linear range

Examples: Linear 0.0 to 100.0

Units	Code
None	NONE
Degrees Celsius	C
Degrees Fahrenheit	F
Degrees Kelvin	K
Millivolts	mV
Volts	V
Milliamps	mA
Percentage	%

(Or specify up to 5 characters)

Digital Inputs

	Dig I/P1 Code	Dig I/P2 Code
None	–	–
Auto manual	AM	–
Self tune	ST	–
Keylock	KL	–
Parameter security	PS	–
Ramp	RP	–
Local remote	LR	–
Skip segment	SS	SS
Run/hold	RH	–
Hold/run	HR	–
Reset	–	RS

Software Options

Function	Code
Manual key enabled	E
Manual key disabled	D
Cold Junction	**Code**
Non T/C input	N
Internal compensation	IN
External 0°C ref	0
External 45°C ref	45
External 50°C ref	50
Function	**Code**
Integral and derivative in secs	S
Integral and derivative in mins	M
Function	**Code**
Power feedback	P
No power feedback	(1) N

Note:

(1) Not available on dc outputs therefore enter N.

Ramp Scale	Code
SP Units per minute	MN
SP Units per hour	HR

Dwell Scale	Code
Dwell in minutes	MN
Dwell in hours	HR

Holdback	Code
No holdback	N
Band deviation holdback	H

Hardware

Basic Product	Input	Output 1	Output 2	Alarm 1	Alarm 2	Digtal Comms	Comms Baud Rate	Options

Configuration

Curve	Display Minimum	Display Maximum	Units	Digital Input 1	Digital Input 2	Software Options	Ramp Scale	Dwell Scale

Holdback

ORDERING INFORMATION 818

Basic Product	Code£
Controller	818S
1 stored program	818P
4 stored programs	818P4
15 stored programs	818P15634

Inputs	Code £
Thermocouple	TC
Resistance thermometer	RTD
0-20mA	0mA20
4-20mA	4mA20
0-5V	0V5
0-10V	0V10
1-5V	1V5
2-10V	2V10
-8mV +8mV	8mV8
Pyrometer	PYR

Outputs	Output 1 Prefix	Output 2 Prefix
Reversing acting control	(1) R	
Direct acting control	(1) D	
Control on output 2 (Opposite action to output1)	C	
(2) Retransmission of process variable		(4) M
Setpoint		(4) S
Error		(4) E
Power		(4) W

	Output 1	Output 2 (Input 2)
No output	NONE	NONE
Relay linear	RLY	RLY
Relay non linear	–	RLYN
Relay ON/OFF	(3) RLYF	RLYF
Logic linear	LGC	LGC
Logic non linear	–	LGCN
Logic ON/OFF	(3) LGCF	LGCF
Triac Linear	TRI	TRI
Triac non linear	–	TRIN
Triac ON/OFF	(3) TRIF	TRIF
Isolated 0-5V	0V5	0V5
Isolated 0-10V	0V10	0V10
Isolated 1-5V	1V5	1V5
Isolated 2-10V	2V10	2V10
Isolated 0-10mA	0mA10	0mA10
Isolated 0-20mA	0mA20	0mA20
Isolated 4-20mA	4mA20	4mA20
Relay controlled by program		PROG
(5) **Motor Valve Controller**		
Relay Output		VPR
Triac output		VPT
Option board		
With feedback pot		(6) FB
Without feedback pot	NONE	

	None
NONE	Deviation band
DB	Deviation high
DH	Deviation low
DL	
Full scale high	FH
Full scale low	FL
Assigned to programme	PROG

Relay State in Alarm	**3rd Digit Code**
Energised	E
De-energised	D

Retrans/Remote I/P	**Signal Code**
0-20mA	(8) 0mA20
4-20mA	(8) 4mA20
0-5V	0V5
0-10V	0V10
1-5V	1V5
2-10V	2V10

Retrans/Remote I/P	**Signal Code**
(7) Alarm 1 as Retransmission	
Process variable	M+(Signal code)
Setpoint	S+(Signal code)
Error	E+(Signal code)
Power	W+(Signal code)
(7) **Alarm 2 as Remote input**	
Remote setpoint	X+(Signal code)
Remote trim	T+(Signal code)
Remote S/P with local trim	L+(Signal code)
Max. output power	W+(Signal code)

Digital Communications	
None	NONE
Digital RS232	232
Digital 485	485
JBUS®RS232	J32
JBUS®RS485	J85
MODBUS®RS232	M32
MODBUS®RS485	M85
Baud Rate	
Baud 9600	96
Baud 4800	48
Baud 3600	36
Baud 2400	24
Baud 1200	12
Baud 600	06
Baud 300	03

Analogue Communications	
Retransmission Comm 2	**Code**
Process variable	M+(Signal code)
Setpoint	S+(Signal code)
Error	E+(Signal code)
Power	W+(Signal code)
Remote Input Comm 1	
Remote setpoint	X+(Signal code)
Remote trim	T+(Signal code)
Remote S/P with local trim	L+(Signal code)
Max. output power	W+(Signal code)

Retrans/Remote Input	**Signal Code**
None	NONE
0-20mA	(8) 0mA20
4-20mA	(8) 4mA20
0-5V	0V5
0-10V	0V10
1-5V	1V5
2-10V	2V10
-5 to +5V (Retransmission only)	5V5

Options	Code
Faston terminal	FN
Screw terminal	SN
Faston 24V ac/dc	FN24
Screw 24V ac/dc	SN24

Notes:

(1) For normal temperature control select Reverse Acting control, Output 2 action opposite to Output 1.

(2) The retransmission option is not available with Analogue Comms. or when retransmission speci fied in Alarm 1.

(3) ON/OFF on O/P1 restricts O/P2 to ON/OFF unless prefix MSEW

(4) With Output 2 prefix M, S, E, W only dc outputs apply.

(5) With MVC no Output 2 prefix is required.

(6) On Motor Valve Controller version using a Feedb'k Pot. (FB in Output 2) Alarm 2 must be 'NONE'.

(7) Only one retransmission output and one remote input is allowed within the controller. Alarm Channels can be used for analogue inputs/outputs if not required for alarms.

(8) Additional price for Remote Inputs only.

Curve (Select from the range list below)

Lin Type	Recommended Range	Code
Iron Constantan J	0C to 600C	01
Fe/Const (DIN) L	0C to 600C	02
Ni Cr/Ni AL K	-250C to 1200C	03
Ci/Con T	-250C to 400C	04
Pt13% Rh/Pt R	0C to 1600C	05
Pt10% Rh/Pt S	0C to 1600C	06
Pt30% Rh/Pt6% Rh B	400C to 1820C	08
W/W26%/Re	0C to 2000C	09
W5%Re/W26%	10C to 2300C	11
Ni Cr/Con E	0C to 780C	12
Pt10%Rh/Pt40%Rh	200C to 1800C	23
W5%Re/W26%Re C	0C to 2300C	24
Pt20%Rh/Pt40%Rh	0C to 1600C	25
Platinell 11	0C to 1200C	28
W/W26%Re	0C to 2010C	29
Ni/Ni18%Molybednum	0C to 1100C	33
W3%Re/25%Re D	0C to 2400C	35
W/Re5%W/Re26%	0C to 2000C	38
Nicrosil/Nisil N	0C to 1300C	45
Pt100 ohm at 0°C	-200C to 800C	70
Pyrometer (Q004 Land)	800C to 1550C	48
Pyrometer (Q003 Land)	700C to 1400C	51
Pyrometer RO 26	100C to 500C	54
Pyrometer IVDI	1000C to 2500C	61
Pyrometer DTI	1200C to 2500C	62
Pyrometer RO 23	800C to 1700C	64
Pyrometer FP/GP 10	500C to 900C	82
Pyrometer FP/GP 11	700C to 1300C	83
Pyrometer FP/GP 12	1000C to 1850C	84
Pyrometer FP/GP 20	300C to 750C	85
Pyrometer FP/GP 21	500C to 1100C	86
Linear	-9999 to 19999	00*
Square Root	-9999 to 19999	92*

*For linear inputs sensitivity must not be less than 5μ Vs/digit

Display Min/Display Max

These should be selected from the recommended minimum and maximum range. Shown in Range List Include decimal point position – This is especially important on linear range.
Example: Linear 0.0 to 100.0

Units	Code
None	NONE
Degrees Celsius	C
Degrees Fahrenheit	F
Degrees Kelvin	K
Millivolts	MV
Volts	V
Milliamps	MA
Percentage	%

(Or specify up to 5 characters)

Digital Inputs	Code Dig I/P1	Code Dig I/P2
None	NO	NO
Auto manual	AM	AM
Local remote	LR	LR
Adaptive tune	AT	–
Keylock	KL	–
DIG I/P1 up key (1)	UK	–
DIP I/P 2 down key (1)	–	DK
Parameter security	PS	–
Self tune	–	ST
SP 2/SP 1 (2)	S2	S2
PID 2/PID 1 (3)	–	P2
Ramp	–	RP
Step program number	–	SP
Run/reset	RR	–
Run/hold	–	RH
Hold/run	–	HR
Skip segment	SS	SS

Notes: (1) These must be selected together.
If selected no other input is possible.
(2) Not available with remote trim
(3) Not available with programmer

Software Options	Code
Manual key enabled	E
Manual key disabled	D
Cold junction	
Non T/C input	N
Internal compensation	IN
External 0°C ref	0
External 45°C ref	45
External 50°C ref	50
Function	
Integral and derivative in secs	S
Integral and derivative in mins	M
Integral and derivative in secs with dual PID	SS
Integral and derivative in Mins with dual PID	MM
Function	
Power feedback	P
No power feedback	N*

*Not available on dc or VP outputs therefore enter N.

Ramp Scale	Code		Code
SP Units per minute	MN	SP Units per hour	HR
Dwell Scale	**Code**		**Code**
Dwell in minutes	MN	Dwell in hours	HR
Holdback	**Code**		**Code**
No holdback	N	Band deviation holdbk	H

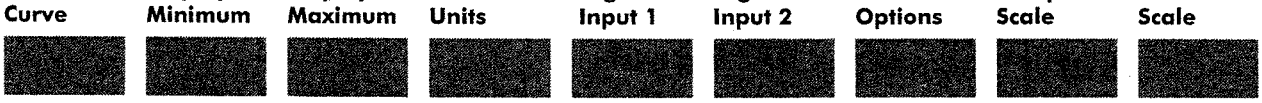
Hardware

Basic

Product | **Input** | **Output 1** | **Output 2** | **Alarm 1** | **Alarm 2** | **Comms 1** | **Cpmms 2** | **Options**

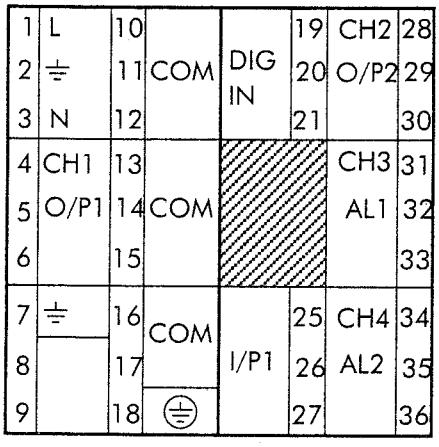
Configuration

Curve | **Display Minimum** | **Display Maximum** | **Units** | **Digital Input 1** | **Digital Input 2** | **Software Options** | **Ramp Scale** | **Dwell Scale**

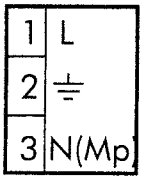


Holdback

REAR TERMINAL CONNECTIONS



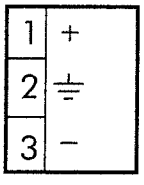
815
818



Supply

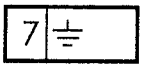
Power supply 85V to 264V. The LINE is connected to terminal 1 and the Neutral to terminal 3.

815
818



For instruments with the optional 24 volt a.c. or d.c. supply, connect the 24 volt supply to terminals 1 and 3. If this supply is d.c. the positive must be connected to terminal 1.

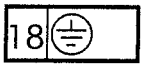
815
818



Suppression earth

Terminal 7 is connected to the radio frequency interference (RFI) network.
When despatched from the factory, terminal 7,18 and 2 are connected together. If a single earth connection is made connedt to terminal 18. Alternatively it is acceptable to connect a safety earth to terminal 18 and separate functional mains earth to terminals 2 and 7.

815
818

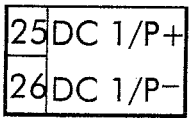


Safety earth

This terminal is the safety earth for the instrument and is connected to the instrument side covers.

SENSOR INPUTS

815
818

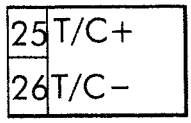


DC Signals

Inputs are connected to the terminals 25 and 26.
Maximum input acceptable is 60mV dc for voltage inputs.
mA inputs (recognised by the input 1 code of the instrument containing mA, see pages 5 and 7) will be

supplied with a 2.5Ω resistor packaged with the mounting clamps. This resistor must be connected across terminals 25 and 26 (polarity is not important) together with the external wiring, so that the resistor terminates the incoming control signal. For high voltage and pyrometer inputs a potentiometer chain is enclosed into a block placed onto the rear terminals. The terminals on this block are also numbered 25 and 26.

815
818

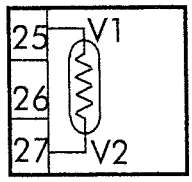


Thermocouple

Thermocouple connections are made to terminals 25 and 26.

When the instrument has been configured for internal cold junction compensation (CJC), compensating cable of the correct type for the thermocouple used or the thermocouple itself must be wired to these terminals. Copper wire must NOT be used. If an external CJC is to be used then copper wires must be used to wire between the rear terminals of the instrument and the cold junction oven/ice reference. The correct compensating cable or thermocouple wires must be connected from this cold junction oven/ice reference, to the thermocouple.

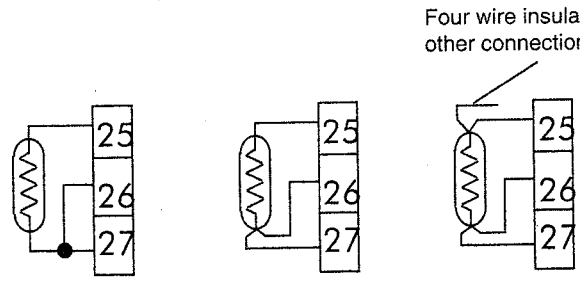
815
818



Resistance thermometer

Platinum resistance three-wire thermometers are connected to terminals 25, 26 and 27.

Resistance thermometers with other connections can also be used. Below is shown all possible connections.



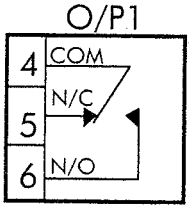
* Note: Only when three conductors between the bulb and the rear terminals have identical resistances will the lead resistance error be minimised.

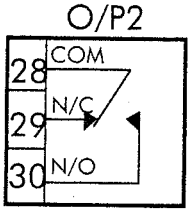
OUTPUTS

NOTE: Terminals 4 and/or 28 only must be taken to the live supply. Then inadvertantly plugging a d.c., retransmission, d.c. output, d.c. input or logic output instrument into that sleeve will not damage the instrument.

Relay

815
818

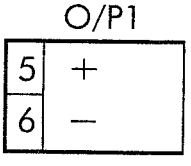


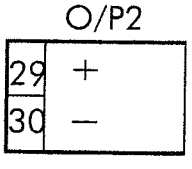


Relay outputs are connected to terminals 4, 5 and 6 for output 1 and 28, 29 and 30 for output 2. The relays are shown in the de-energised state, ie with the instrument unpowered. If the instrument has been configured as reverse acting then the relay will energise when power to the load is required for a conventional temperature controller. The relay contact rating is 2A/264V r.m.s.

Logic

815
818

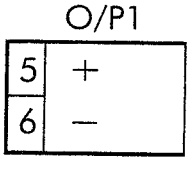


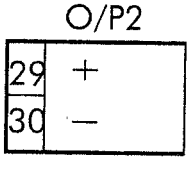


Logic outputs are connected to terminals 5 and 6 for output 1 and at terminals 29 and 30 for output 2. These outputs are isolated dc signals with time proportioning or on/off action. This output is not available for the valve positioner version of the 818 controller.

Isolated DC

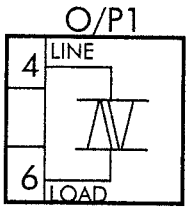
815
818



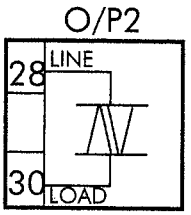


Isolated dc outputs are connected to terminals 5 and 6 for output 1 and at terminals 29 and 30 for output 2. These dc outputs are individually isolated from all other sections of the instrument. This output is not available for the Valve Positioner version of the 818 controller.

815
818



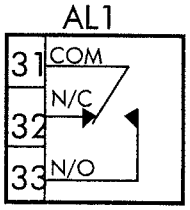
815
818



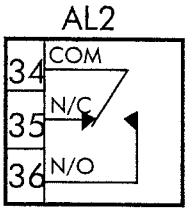
Triac

With controllers provided with triac output, connections are made to terminals 4 and 6 for output 1 and to terminals 28 and 30 for output 2. The live supply is connected to LINE terminals 4 and 28 respectively. One side of the load is connected to the LOAD terminals, the other side of the load should be connected to the neutral line. The triac is rated at 1A/264V rms.
On the Valve Positioner version O/P1 and O/P2 is used to 'raise' and 'lower' the valve. The assignment of either O/P1 or O/P2 to 'raise' and the remaining output to 'lower' is set in the configuration.

815
818



815
818

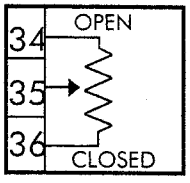


ALARMS

Controllers are provided with relay alarm outputs which are internally connected to terminals* 31, 32 and 33 for Alarm 1 and to *34, 35 and 36 for Alarm 2. Terminals 32 and 35 are N/C when the relays are de-energised. When energised, the voltages at terminals 31 and 34 are switched through to the output terminals 33 and 36 respectively. Relay contact rating is 2A/264V rms. Contact suppression is provided between the N/C contacts and the wiper with the relay de-energised in alarm (fail safe). Suppression is provided between the N/O contacts and wiper with the relay 'energised in alarm'.
*By ensuring that terminals 31 and/or 34 only are taken to the live supply inadvertently plugging an instrument with a retransmission alarm output into this sleeve will not damage the instrument.

NOTE: AL2 is available as an alarm on all versions except the valve positioner with a feedback potentiometer.

818

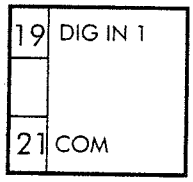


Valve Positioner instrument with feedback potentiometer

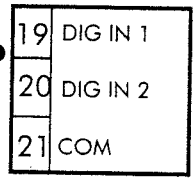
On this version, terminals 34,35 and 36 are used to connect the feedback potentiometer,with a resistance between 100 and 1000 ohms, to the instrument. The 'Valve open' end of the potentiometer is taken to terminal 34 and the 'valve closed' end is taken to terminal 36. The slider is wired to terminal 35.

DIGITAL INPUTS

815S



815P
818



For digital inputs the switch is made by linking terminal 19 (DIG IN 1) or terminal 20 (DIG IN 2), to terminal 21, the COMMON.
These inputs are NOT isolated from the signal input, terminals 25, 26 and 27. (See page IV.)

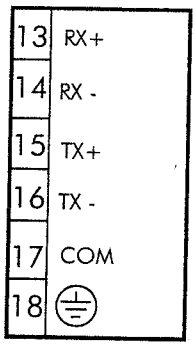
Terminals 19 and 20 can be used to remotely switch several internal functions by contact closure to the COMMON terminal 21.
The functions which can be switched are:-

Control (Auto/Manual)	Ramp (Disable/Enable)
Setpoint (Local/Remote)*	Programme (Hold/Run)**
Adaptive Tune (Off/On)*	Programme (Run/Hold)**
Keylock (Off/On)	Setpoint (One/Two)*
Prog. Reset (Off/On)**	Prog. Segment (Retain/Skip)**
Parameter Security (Off/On)	Parameter Scroll (None/Up)*
Self Tune (Off/On)	Parameter Scroll (None/Down)*

* Only available on instrument type 818
** Only available on instruments suffixed with 'P'.

DIGITAL COMMUNICATIONS

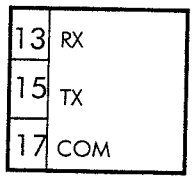
815
818



Digital Communications - RS485 (422)

Terminal 17 is the common and is normally connected externally to earth via the communications bus.The RS 485 interface utilises terminals 13 and 14 for the positive and negative receiver lines and terminals 15 and 16 for the positive and negative transmitter lines.

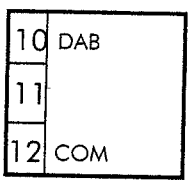
815
818



Digital Communications - RS232

Terminal 17 is the common line. Terminal 13 and 15 are the receiver and transmitter lines for the RS232 interface.

815
818



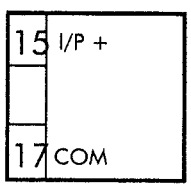
Digital Communications Modification - RS232 and RS485(422)

Terminals 10 and 12 are used to re-enable the front panel buttons and digital input 1 and 2 if these have been disabled by either the RS232 or RS485(422) digital communications.

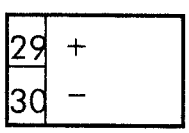
With these terminals open the digital comms can enable and disable 'keylock' and 'Dig in lock'. If terminals 10 and 12 are shorted by relay contacts, switch or open collector transistor these facilities are disabled from the digital communications link. If 'Keylock' and or 'Dig in lock' have been set by the digital comms they are turned off as soon as terminals 10 and 12 are joined and while they remained joined these features cannot be set via the digital comms link. When terminals 10 and 12 are opened both the 'Keylock' and 'Dig in lock' will be 'off' and will only be reinstated when written to, by the status and optional status words.
NOTE: There is no isolation between this input and the communication bus.

REMOTE INPUTS

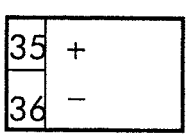
818



8185



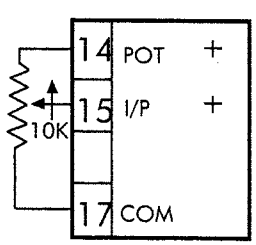
818



Terminals 15 and 17 are used for the remote input to the analogue communications board, terminal 15 being +ve and 17 -ve.
If neither of the above inputs are being used and alarm 2 on the 818 controller or output 2 on the 815 controller is not required then a remote output can be fed into these channels if a d.c. input board is fitted. The connections in this case are terminals 35 and 36, 35 being positive, for the 818 and terminals 29 and 30, 29 being positive, for the 815. With mA inputs (See pages 5 and 7), use a 50Ω resistor.

External potentiometer input

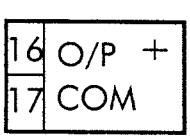
818



If the remote input is to be provided by an external potentiometer rather that an analogue signal wire to terminals 14, 15 and 17 as shown. The potentiometer should be 10K ohms.

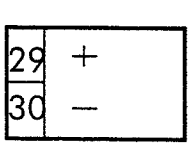
RETRANSMISSION

818



Terminals 16 and 17 are used for a retransmission output if a analogue communications board is fitted. Terminal 16 is +ve.
NOTE: There is no isolation between terminals 15, 16 and 17.

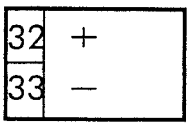
815
818



If no cool channel is required and on model 818 the analogue communications board is not fitted and alarm 1 is not used as a retransmission then a retransmission board

can be fitted into channel 2, the cool channel to give a retransmission signal. This will appear on terminal 29 and 30, terminal 29 being +ve.

818



If alarm 1 is not required and the analogue communications board is not fitted and the cool channel is not configured as a retransmission output then a retransmission board can be fitted in to alarm 1 output. This will give a retransmission signal out of terminals 32 and 33, 32 being +ve.

The retransmission signal can be configured in software to be one of the following:-

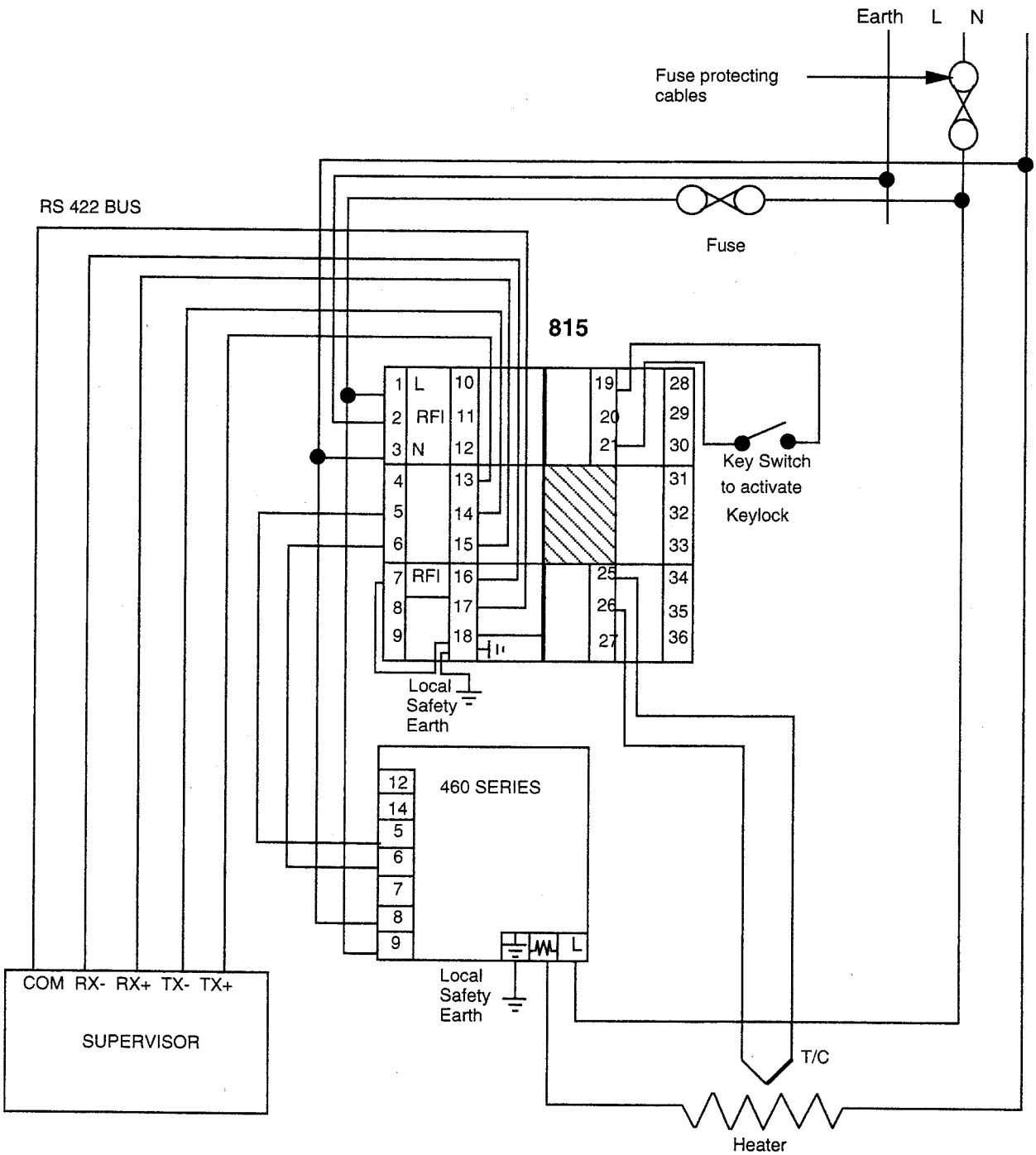
Process Variable
Setpoint
Error
Power
] Only available on model 818

TYPICAL WIRING SCHEMES

815/818 DRIVING A SINGLE PHASE LOAD USING DIGITAL COMMUNICATIONS AN KEYLOCK FACILITIES

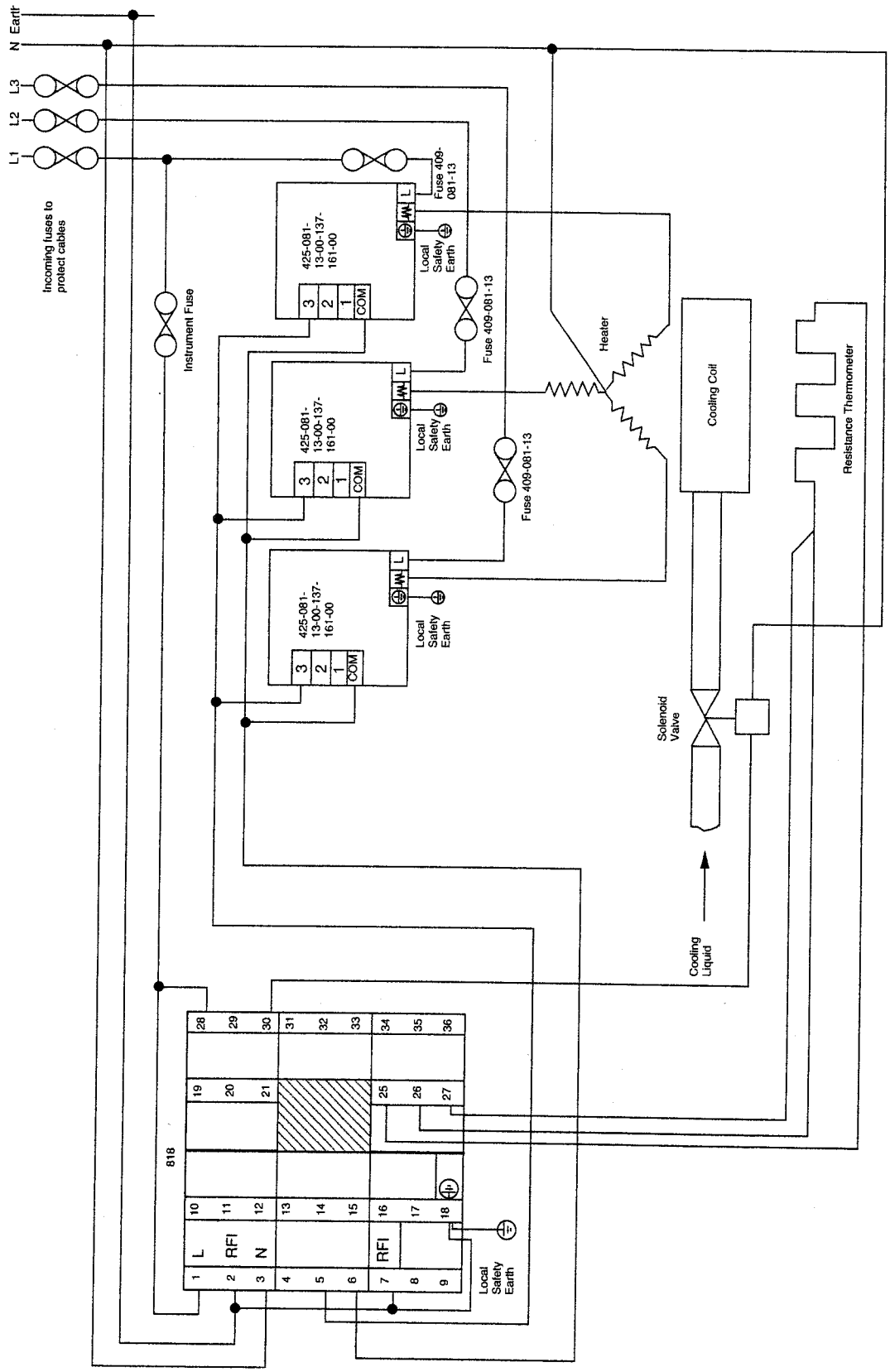
815/818 code (815s/818s-TC-R0V5-NONE-NONE-NONE-485-96-S/SN 03-0-1200-°C-KL-AM-E-IN-M-P)

Note: All wiring and fusing to be carried out in accordance with local regulations (UK; IEE wiring regulations)



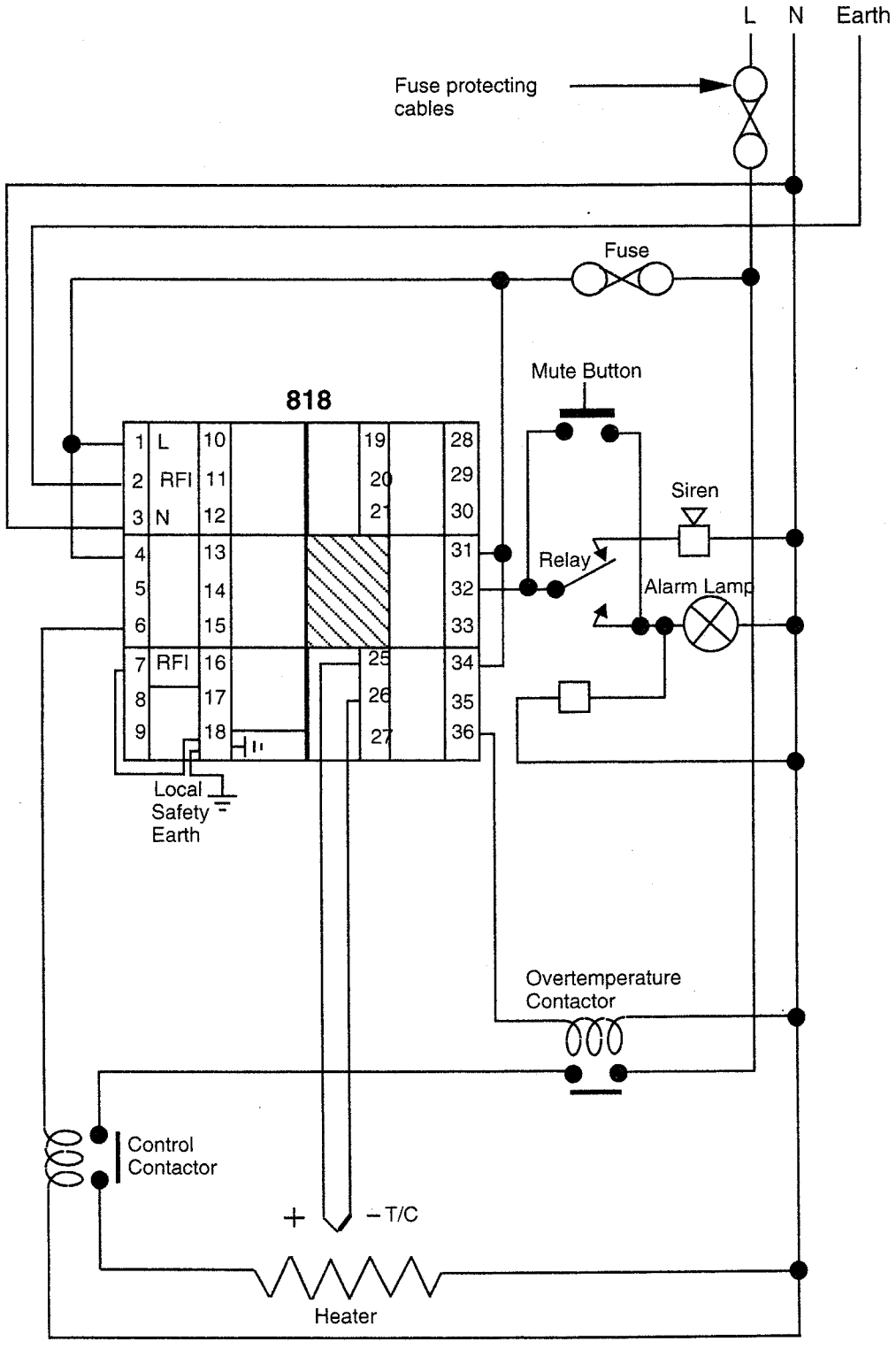
815/818 DRIVING A THREE PHASE HEATING LOAD AND CONTROLLING LIQUID COOLANT

815/818 code(815S/818S-RTD-RLGC- CTRIN-NONE-NONE-NONE-NONE-F/FN 70--80-+150°C-AM-PS-D-N-S-P)



815/818 DRIVING A SINGLE PHASE LOAD WITH ALARM WARING AND OVER TEMPERTURE TRIP

815/818 code (815s/818s-TC-RRLY-NONE-DHD-FHD-NONE-NONE-S/SN-01-0-400-°C-ST-KL-IN-M-P)



818 VALVE POSITIONER, CONTROLLING GAS FIRED BOILER

818S-RTD-RVPR-CFB-NONE-NONE-NONE-NONE-SN 70-0-100-°C-NO-NO-E-N-M-N