Resource
Data Management

ML Multi Stage Thermostat

Commissioning/User Guide
Revision 2.4c

PR0122-STA
PR0123-STA

Contents

Introduction

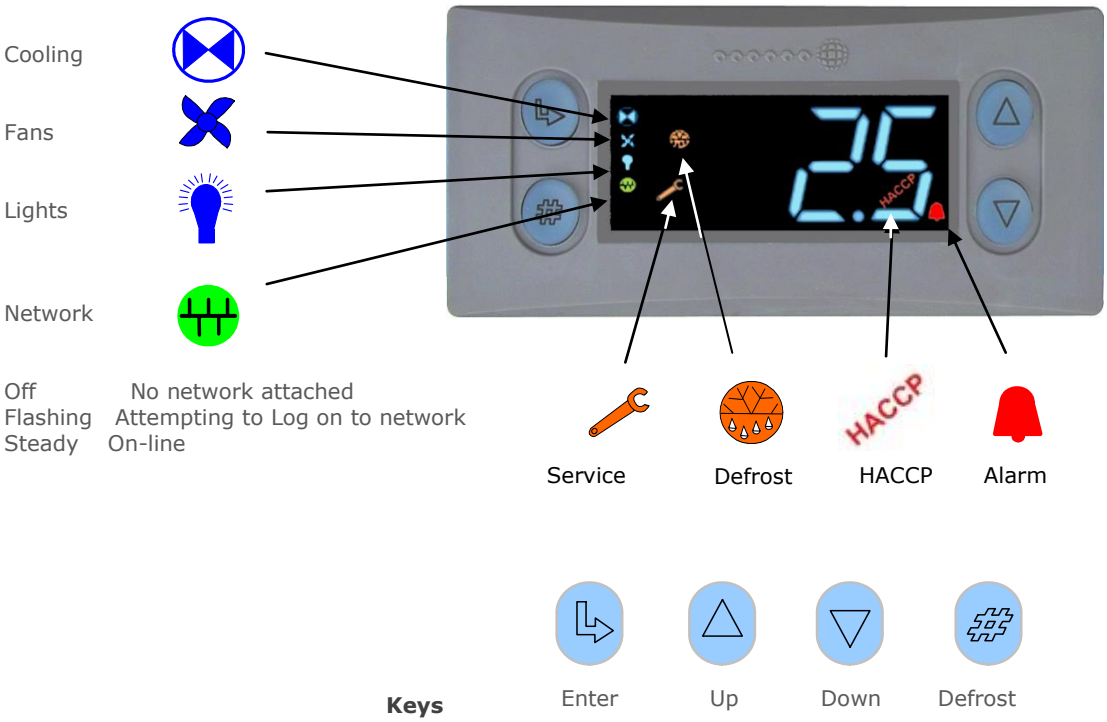
The ML Stat is a multi-stage thermostat with adjustable parameters, incorporating a fan relay with adjustable over-run time. The stat has four stages which can be set-up for heating or cooling. There is an internal 7 day timer as well as the ability to set the stat for a remote time function (Using the GP timer in a data manager) or manually on or off. The controller can be networked back to an RDM Data Manager, see Network Configuration

The main features are: -

- Display with decimal or whole numbers
- Multi stage thermostat (4 stages, heating or cooling per stage)
- 2 x control probes (with control weighting)
- 2 x monitoring probes with optional alarms or 2 Plant fault inputs
- Programmable parameters
- Fan control relay with over-run feature
- High volume Alarm buzzer Installation (Can be switched off) *Please see note Alarm Sounder
- RS232 output for IP Network connection
- RS485 network version (Genus compatible)
- Local or remote timer function
- PT1000, NTC2K, NTC2k25 or 10K probes supported
- Service interval timer
- Degrees C and Degrees F incorporated in one controller

Display

LED's: -

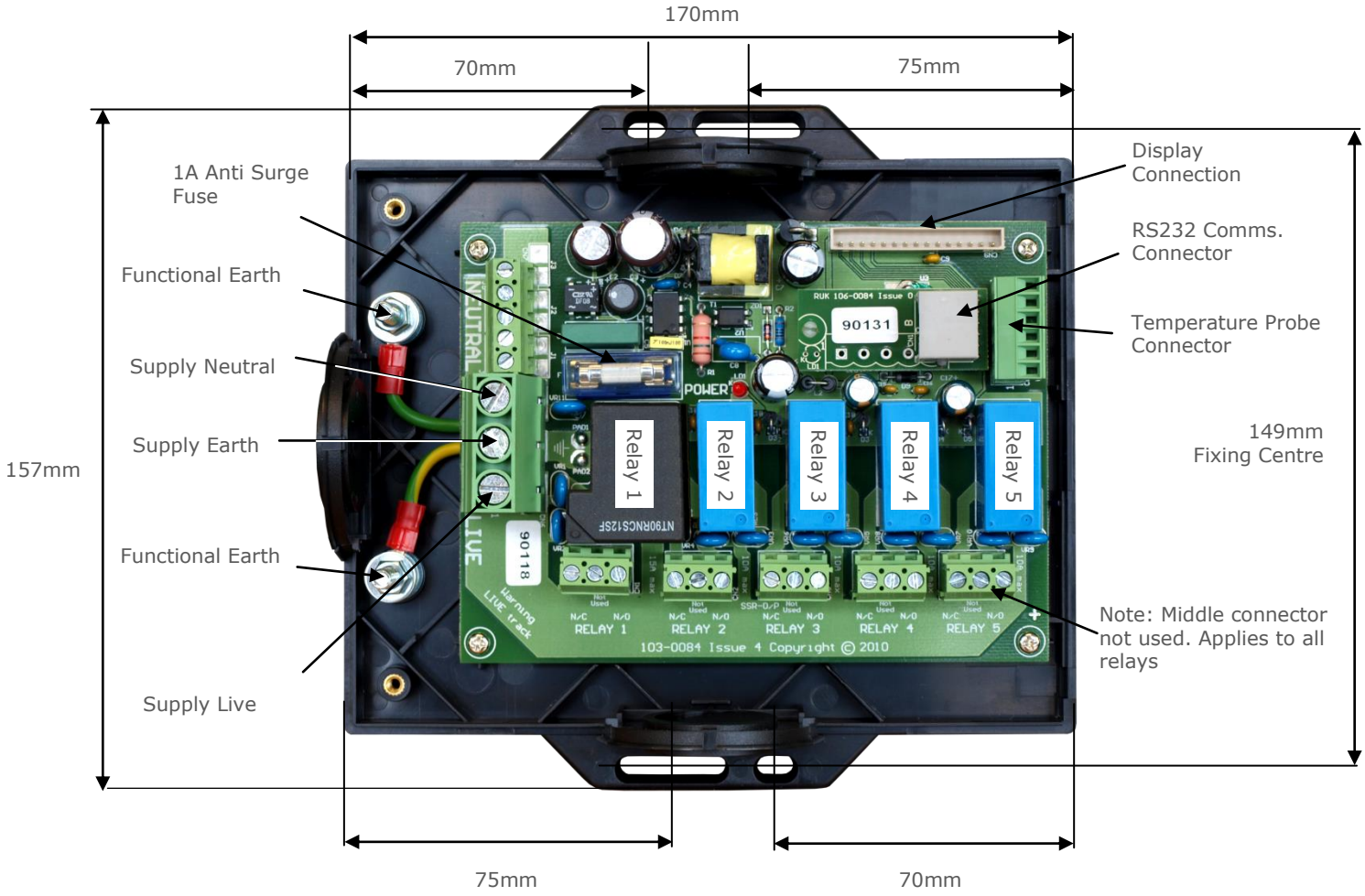


Note: Function keys illuminate when pressed, illumination is turned off 20 seconds after the key is used. Press and hold the defrost button to force a manual defrost

Relay Modules

The ML controller is supplied in two parts, a panel mount display / control unit and a relay / power supply module in a black ABS enclosure.The two units are interconnected using the 5m lead supplied, the control unit derives it's power from the relay module. All the terminals for power, control relays, networking and temperature probes are contained within the relay module as shown below.
The ML controller can be usedwitha 230 Vac 50Hz or 110V 60Hz mains supply, the switched mains outputs for the relays are fed by the relay module so only one mains supply needs to be connected.

5 Relay module with RS232 connector (for connection to an IP Network)



Connections:

NEUTRALS:	Supply Neutral connections
LIVE:	Supply Live connections
N/C:	Relay normally closed contact
N/O:	Relay normally open contact

Probe Connection Detail

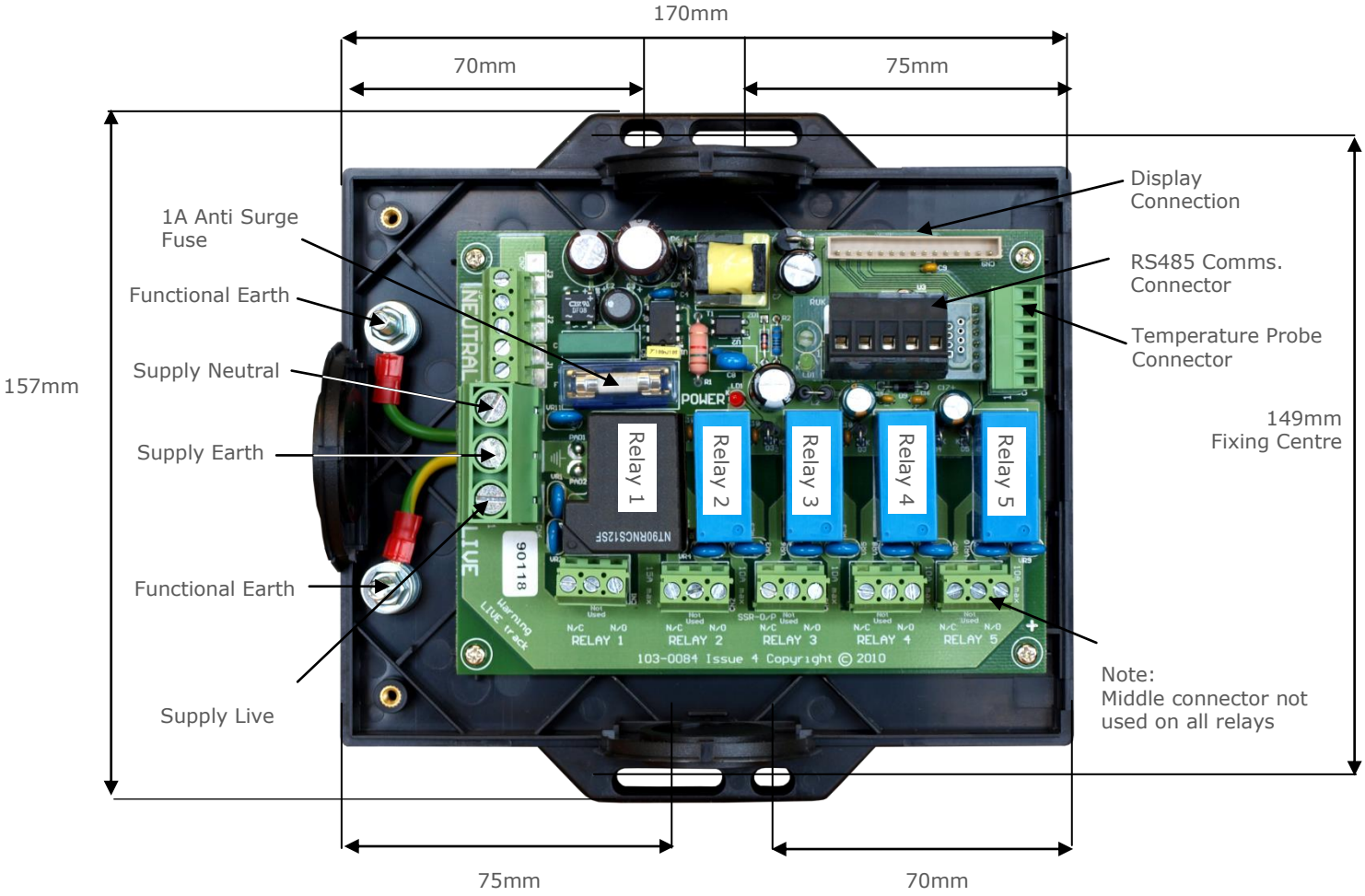
Probe Common
Probe 4 / Plant 2
Probe 3 / Plant 1
Control Probe 2
Control Probe 1
Probe Common

All relays will output the supply voltage

Note. Earth is a functional earth, not a safety earth

Please ensure all power is switched off before installing or maintaining this product.

5 Relay module with RS485 connector (for connection to Genus compatible Network).



Connections:

NEUTRALS:	Supply Neutral connections
LIVE:	Supply Live connections
N/C:	Relay normally closed contact
N/O:	Relay normally open contact

RS485 Connection Detail

Common (Green)
Data B – (Black)
Common (White)
Data A + (Red)
Screen

Network Cable part number: *Belden 8723 or equivalent

All relays will output the supply voltage

Note. Earth is a functional earth, not a safety earth

Please ensure all power is switched off before installing or maintaining this product.

Setting-up

Access to the controller settings can be achieved several ways,

- Through the display mounted buttons
- Direct access by PC into the RS232 comms port. This requires a software package available on the RDM website
- Through the RDM Data Manager.
- Across an IP network. (Current controller IP address required)

Viewing/Changing Menu Items

1. Press and hold **"ENT" and "DOWN"** for approximately 3 seconds the display will read **"EnT"**
2. Press and release **"ENT",** the display will indicate **"IO"** *This is the inputs and outputs viewing option*
3. Use the **"UP"** or **"DOWN"** keys to cycle round the menu items, press enter at the desired item.

   Example: pressing enter at "PARA" will allow you to view or change parameters
   *Note. If menu item **"ESC"** is entered the controller will **escape** the set up and revert to normal operation*

Menu Items

IO	Displays the inputs and outputs	Inputs and Outputs
PArA	View and change parameters	Set view parameters
Unit	Change the Units (Probe Type)	Set view units
diSP	Change the display	Display
tyPE	View Controller type	Type
Id	Enter an ID (For IP-L Use)	Set view ID
Rtc	Real Time Clock	Real Time Clock
Net	Change the network settings	Network Configuration
hub	Selects Hub/Switch (Mercury or ML)	Hub/Switch Type
SoFt	View the software version	
OFSt	Probe Offsets	Probe Offset
ESC	Escape back to normal operation	

Inputs and outputs

Selecting this menu option allows the user to view the inputs and outputs. Use the up/down button to select the desired input or output and then press "Enter". The value will be shown on the display. See View IO

Parameter Tables

No.	Parameter	Range °C (°F)	Default	Units	Description
P-01	Fans Mode	0 = Local 1 = Remote 2 = Man Off 3 = Man On	Local		Sets the Fans. Note the thermostat is switched off when the fans are off. See : Remote GP Timer
P-02	Probe 3 Select	0 = Off 1 = Probe 2 = Probe with fault 3 = Probe with alarm 4 = Plant N/O 5 = Plant N/C	Off		Sets the function for input 3. If set to "Plant" use a 0V return
P-03	Probe 4 Select	0 = Off 1 = Probe 2 = Probe with fault 3 = Probe with alarm 4 = Plant N/O 5 = Plant N/C	Off		Sets the function for input 3. If set to "Plant" use a 0V return
P-04	Fans Run On	00:00 to 99:00	20:00	Mins:secs	Fans run-on for this period after the timer goes off. Note: the thermostat is off during this period.
P-11	Stat 1 Type	0 = Off 1 = Cooling 2 = Heating	Heating		Sets the thermostat stage function.
P-12	Stat 1 control weight	0 – 100%	50	%	Weighting is biased to Probe 1
P-13	Stat 1 cut-in	--60 to +60 / -76 to 140	15 / 59	°C / °F	Heating relay is on below this set-point. Cooling relay is off below this set-point. *
P-14	Stat 1 diff	-60 to +60 / -76 to 140	1 / 1.8	°C / °F	Heating relay goes off above this set-point. Cooling relay goes off below this set-point.*
P-15	Stat 1 alarm delay	00:00 to 99:00	20:00	Mins:secs	Time delay before the alarm occurs.
P-16	Stat 1 OT alarm	-60 to +60 / -76 to 140	30 / 86	°C / °F	Over temperature alarm set-point
P-17	Stat 1 UT alarm	-60 to +60 / -76 to 140	-5 / 23	°C / °F	Under temperature alarm set-point
P-21	Stat 2 Type	0 = Off 1 = Cooling 2 = Heating	Heating		Sets the thermostat stage function.
P-22	Stat 2 control weight	0 – 100%	50	%	Weighting is biased to Probe 1
P-23	Stat 2 cut-in	-60 to +60 / -76 to 140	18 / 64.4	°C / °F	Heating relay is on below this set-point. Cooling relay is off below this set-point. *
P-24	Stat 2 diff	-60 to +60 / -76 to 140	1 / 1.8	°C / °F	Heating relay goes off above this set-point. Cooling relay goes off below this set-point.*
P-25	Stat 2 alarm delay	00:00 to 99:00	20:00	Mins:secs	Time delay before the alarm occurs.
P-26	Stat 2 OT alarm	-60 to +60 / -76 to 140	30 / 86	°C / °F	Over temperature alarm set-point
P-27	Stat 2 UT alarm	-60 to +60 / -76 to 140	-5 / 23	°C / °F	Under temperature alarm set-point
P-31	Stat 3 Type	0 = Off 1 = Cooling 2 = Heating	Heating		Sets the thermostat stage function.
P-32	Stat 3 control weight	0 – 100%	50	%	Weighting is biased to Probe 1
P-33	Stat 3 cut-in	-60 to +60 / -76 to 140	20 / 68	°C / °F	Heating relay is on below this set-point. Cooling relay is off below this set-point.*

No.	Parameter	Range °C (°F)	Default	Units	Description
P-34	Stat 3 diff	-60 to +60 / -76 to 140	1 / 1.8	°C / °F	Heating relay goes off above this set-point. Cooling relay goes off below this set-point.*
P-35	Stat 3 alarm delay	00:00 to 99:00	20:00	Mins:secs	Time delay before the alarm occurs.
P-36	Stat 3 OT alarm	-60 to +60 / -76 to 140	30 / 86	°C / °F	Over temperature alarm set-point
P-37	Stat 3 UT alarm	-60 to +60 / -76 to 140	-5 / 23	°C / °F	Under temperature alarm set-point
P-41	Stat 4 Type	0 = Off 1 = Cooling 2 = Heating	Heating		Sets the thermostat stage function.
P-42	Stat 4 control weight	0 – 100%	50	%	Weighting is biased to Probe 1
P-43	Stat 4 cut-in	-60 to +60 / -76 to 140	22 / 71.6	°C / °F	Heating relay is on below this set-point. Cooling relay is off below this set-point.*
P-44	Stat 4 diff	-60 to +60 / -76 to 140	1 / 1.8	°C / °F	Heating relay goes off above this set-point. Cooling relay goes off below this set-point.*
P-45	Stat 4 alarm delay	00:00 to 99:00	20:00	Mins:secs	Time delay before the alarm occurs.
P-46	Stat 4 OT alarm	-60 to +60 / -76 to 140	30 / 86	°C / °F	Over temperature alarm set-point
P-47	Stat 4 UT alarm	-60 to +60 / -76 to 140	-5 / 23	°C / °F	Under temperature alarm set-point
P-51	Alarm Duration	00:00 to 61:00	00:00	Mins:secs	Note: 00:00 sets the buzzer to off; 61:00 sets the buzzer to continuous until muted.
P-52	Service Interval	0 to 128	60	Khours	Sets the service interval (hours x 1000) set to 0 to clear the interval warning. (spanner icon on the controller screen)
P-53	Log alarm delay	00:00 to 99:00	20:00	Mins:secs	Time delay before the alarm occurs.
P-54	Log UT alarm	-60 to +60 / -76 to 140	-5 / 23	°C / °F	Monitor Under temperature alarm set-point
P-55	Log OT alarm	-60 to +60 / -76 to 140	30 /86	°C / °F	Monitor Over temperature alarm set-point
P-61	Sunday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Sunday On Time
P-62	Sunday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Sunday Off Time
P-63	Monday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Monday On Time
P-64	Monday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Monday Off Time
P-65	Tuesday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Tuesday On Time
P-66	Tuesday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Tuesday Off Time
P-67	Wednesday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Wednesday On Time
P-68	Wednesday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Wednesday Off Time
P-69	Thursday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Thursday On Time
P-70	Thursday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Thursday Off Time
P-71	Friday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Friday On Time
P-72	Friday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Friday Off Time
P-73	Saturday Fans On Time	00:00 – 23:59	08:00	hrs:mins	Saturday On Time
P-74	Saturday Fans Off Time	00:00 – 23:59	20:00	hrs:mins	Saturday Off Time
	Dflt				Sets all parameters to their default value

Units

Use this to select the temperature probe type.

0 for PT1000 Celsius
1 for PT1000 Fahrenheit
2 for NTC2K Celsius
3 for NTC2K Fahrenheit
4 for 470R Celsius
5 for 470R Fahrenheit
6 for 700R Celsius
7 for 700R Fahrenheit
8 for 3K Celsius
9 for 3K Fahrenheit
10 for NTC2K25 Celsius
11 for NTC2K25 Fahrenheit
12 for 5K Celsius
13 for 5K Fahrenheit
14 for 6K Celsius
15 for 6K Fahrenheit
16 for NTC10K Celsius
17 for NTC10K Fahrenheit
18 for NTC10K(2) Celsius (USA NTC10K)
19 for NTC10K(2) Fahrenheit (USA NTC10K)

Disp.

Display setting:

0 = Decimal display (1 place)
1 = Integer Display

Type

The controller has only one type so cannot be changed.

ID

Sets the controller ID, (normally used in conjunction with the IP-L network mode). Set a number in the range of 1 – 999

RTC

Real time clock (This will automatically synchronise on network systems)

a. Use the up or down buttons to scroll through the display until the display reads "rtc"
b. Press enter. The display will show "t-1". press enter again
c. Scroll hours up or down (0 – 23) press enter
d. Use up button to select "t-2", press enter
e. Scroll minutes up or down (0 – 59) press enter
f. Repeat for t-3 (seconds 0 – 59)
g. Repeat for t -4 (Days up to 31)
h. Repeat for t -5 (months up to 12)
i. Repeat for t -6 (Year up to 99)
j. Use up button to display "ESC", press enter to display "rtc".

Network Configuration

Network Compatibility

To log the controller onto a network you must first connect the controller to a suitable IP comms module.

Description	Part Number
IP Futura (Single Mercury to IP Interface)	PR0016
Mercury IP Switch (IP support for 10 controllers)	PR0018
Mercury IP Switch with Pressure/Humidity Inputs	PR0018-PHI
ML IP Comms module (Single ML to IP Interface)	PR0108*
ML IP Switch (IP support for 10 controllers)	PR0109*
Mercury IP Switch with Pressure/Humidity Inputs	PR0109-PHI*

When logging the ML controller on to a Data Manager then one of the above communication modules should be used. The ML range of IP communication modules will soon be obsolete with only spares being made available for replacement purposes. For a limited number of software versions the ability to communicate with both the Mercury and ML communication modules has been included in the ML controller software. This revised software will provide compatibility for both ranges for a short time only. Later versions of software will communicate with Mercury communication modules only. The version of ML controller software which communicates with both Mercury and ML communication modules is shown below:

Part Number	Description	Controller Software Version and IP Communication Compatibility					
		PR0123 V2.0–V2.3	PR0123-TWI V2.0–V2.1	PR0123-STA V2.0–V2.1	PR0123 V2.4& Above	PR0123-TWI V2.2 & Above	PR0123-STA V2.2 & Above
PR0108	ML IP Module*	✓	✓	✓	x	X	x
PR0109	ML Hub*	✓	✓	✓	x	x	x
PR0109-PHI	ML Hub PHI*	✓	✓	✓	x	x	x
PR0016	IP Futura	✓	✓	✓	✓	✓	✓
PR0018	Mercury Hub	✓	✓	✓	✓	✓	✓
PR0018-PHI	Mercury Hub PHI	✓	✓	✓	✓	✓	✓

* Note: software version of the ML IP Module has to be V1.4 or higher. Software versions older than V1.4 are not supported with the revised ML hardware platform.

The ML controller has to be set depending on the type of communication module in use. See Hub/Switch Type for further details.

Network Settings

IP Communications

There are 2 ways the ML controller can be used with an IP Ethernet network: -

1. IP-R Remote IP address given by the Data Manager (DHCP Server)
2. IP-L Local IP address and gateway is set up in the controller.

IP-R

To use the ML controller in IP-R mode, you will require either a PR0016 Mercury IP Module or PR0018 Mercury Hub.When either of these two devices are used, the rotary switches be given a unique setting. Setting 000 must be avoided for IP-R mode.

Once the comms module has been set up and connected to the controller and Data Manager, it will automatically log-on. Once it is online, the IP address given to the controller can be viewed by pressing enter at the "NET" display. Press enter at any one of the sub-menu option to read the value

IP1 = IP address field 1
IP2 = IP address field 2
IP3 = IP address field 3
IP4 = IP address field 4

IP-L

To use the ML controller in IP-L mode, you will require either a PR0016 Mercury IP Module or PR0018 Mercury Hub.
The rotary switches must be set to 000 on the comms module or 00 on the Hub

In this mode the IP address and gateway address must be set up manually in the controller.

Use the following table as a guide: -

Display	Option
IP1	IP Address byte 1
IP2	IP Address byte 2
IP3	IP Address byte 3
IP4	IP Address byte 4
nL	Network Mask Length (see table below)
GT1	Gateway Address byte 1
GT2	Gateway Address byte 2
GT3	Gateway Address byte 3
GT4	Gateway Address byte 4
ESC	Exit network menu. **N.B.** this option **must** be selected to save any changes made in this menu

Setting nL

To ease setup, a single network mask length value is used. If the address has been specified with a network mask value in dotted IP format e.g. 255.255.255.0 then the table below gives the conversion:

Mask	Length	Mask	Length	Mask	Length
		255.255.254.0	23	255.254.0.0	15
255.255.255.252	30	255.255.252.0	22	255.252.0.0	14
255.255.255.248	29	255.255.248.0	21	255.248.0.0	13
255.255.255.240	28	255.255.240.0	20	255.240.0.0	12
255.255.255.224	27	255.255.224.0	19	255.224.0.0	11
255.255.255.192	26	255.255.192.0	18	255.192.0.0	10
255.255.255.128	25	255.255.128.0	17	255.128.0.0	09
255.255.255.0	24	255.255.0.0	16	255.0.0.0	08

The network led will start flashing as the controller is logging on to the network; once logged on, the LED stays on.

485 Networks

RS485 Relay Board will support the following protocol;

- Genus
- Third Party Modbus

Use the controller menu options to set-up the network; press enter at the "net" screen, then choose from the following network set-up screens:

Display	Option
485t	485 Network Type
485A	485 Address/Name
gAdd	Show underlying network address assigned tocontroller
rLog	Re-log the controller back onto the network
CLrA	Clear the address/name from the controller
ESC	Exit network menu. **N.B.** this option **must** be selected to save any changes made in this menu

485T Genus/Third Party Compatible

The **485t** option shows a value representing the network type. The possible values are:

Value	Network Type
1	Genus compatible (all versions)
2	Modbus (9600 Baud Rate, 8 Bit, No Parity, 1 Stop Bit)
3	Modbus (9600 Baud Rate, 8 Bit, No Parity, 2 Stop Bits)

Genus Compatible

485A Genus

The 485A option shows a value representing either the name of the controller in a Genus compatible network.

The value shown is of the form 05-6. This means the controller would try to log onto a Genus compatible network using the name 'RC05-6'. Once the address has been entered, use the net menu items to go to the "Esc" screen and press enter. This registers the network address into the controller and the controller will log on at this point.

Gadd

The gAdd option displays (in hexadecimal format) the underlying network address assigned to the controller when it is loggedonto the network.

RLog

The rLog option allows the controller to be logged back onto the network with its current name. The 'rLog' message will flash for confirmation. Press the Enter button to execute the command, Up or Down buttons to cancel.

ClrA

The CLrA option will clear out the network address and name in the controller. The 'ClrA' message will flash for confirmation. Press the Enter button to execute the command, Up or Down buttons to cancel.

To enter this mode, hold the Enter, Up and Down buttons together for approximately 3 seconds until the message CLrA appears on the display. CLrA is the first option in the menu consisting of the following options:

Display	Option
CLrA	Clear the address/name from the controller
ESC	Exit Setup mode

Pressing the Enter button to select the CLrA option will cause the 'CLrA' message to flash for confirmation, if the network type is set to Genus compatible. Press the Enter button to execute the command, Up or Down buttons to cancel. If the network type is not set to Genus compatible then the ClrA message will not flash and the ESC option can be used to exit the menu.

MODBUS

From 485t the user can select either 2 or 3 for Modbus communications.

2) Third Party Modbus 9600 Baud Rate, 8 Bit, No Parity, 1 Stop Bit.
3) Third Party Modbus 9600 Baud Rate, 8 Bit, No Parity, 2 Stop Bits.

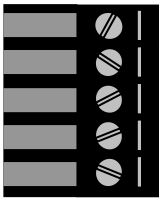
The 485A option shows a value representing the Modbus address that has to be entered in the Data Manager

The value shown is in the range 0 to 247

Note: For Modbus table information, please see the Appendix

RS485 Connection

Using a suitable network cable* connect the RS485 Relay module to a network manager (such as RDM Data Manager) with the following connections:



Common green
Data (B / -) black
Common white
Data (A / +) Red
Screen

Network Cable part number: *Belden 8723 or equivalent

Hub/Switch Type

Select the desired value for the type of communication module in use.

0 = Mercury Hub/Switch
1 = ML Hub/Switch

SoFt (Software version)

Press "Enter" at this display to show the software version.

OFSt

Probe offsets: - select a channel (1 - 4) and select an offset +/- 20 ^{O}C (68 ^{O}F)

ESC

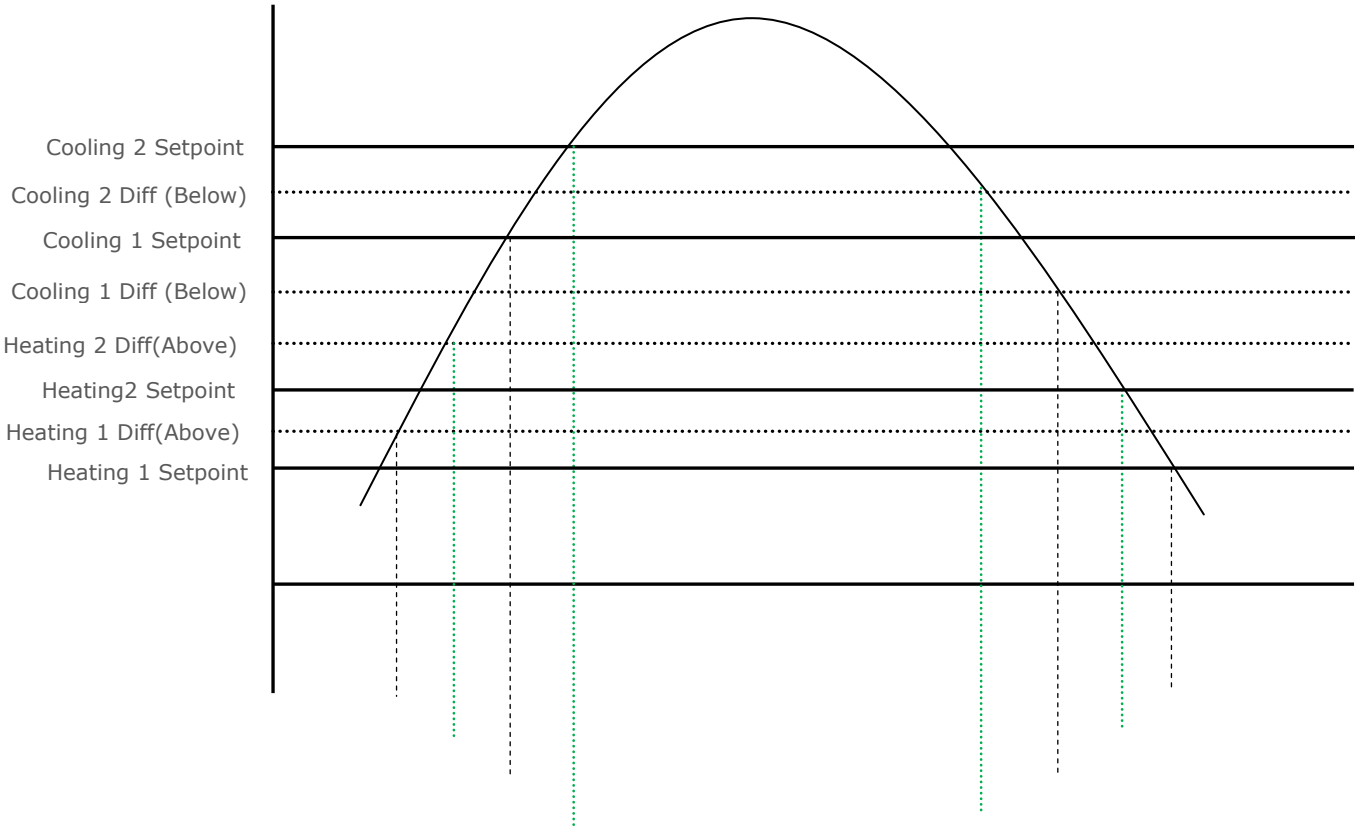
Press enter at this display to quit out of the menu.

Relay Assignment

Relay 1	Fans	Use N/O contact
Relay 2	Thermostat Stage 1	Use N/O contact
Relay 3	Thermostat Stage 2	Use N/O contact
Relay 4	Thermostat Stage 3	Use N/O contact
Relay 5	Thermostat Stage 4	Use N/O contact

Operation

The stat has 4 relays which have their own set-points, diff and alarm settings. Each can be set-up as either a heating stage or a cooling stage. When set as a heating stage, the diff acts above the set-point; when set to cooling, the diff acts below the set-point.
The thermostat function will not operate unless the fans are running.
Fans can be set to manually on, off, on through a 7 day internal timer (local) or through a GP timer in a Data Manager/Director front panel (remote).
When the timer period goes off, the thermostat function will stop, but the fans can have a run-on period (P-04) which will keep the fans running until the run-on period expires.



Heating 1 Relay	ON	OFF	ON
Heating 2 Relay	ON	OFF	ON
Cooling 1 Relay	OFF	ON	OFF
Cooling 2 Relay	OFF	ON	OFF

Network Alarms

Alarm text	Type # (index)
Over Temperature	4
Under Temperature	5
Log Over Temperature	8
Log Under Temperature	9
Probe 1 Fault	6
Probe 2 Fault	6
Probe 3 Fault	6
Probe 4 Fault	6
Plant Fault 1	3
Plant Fault 2	3

View I/O

Press "Enter" in the menu at "IO" to view the inputs and outputs.

Number	I/O	Range (dependant on probe type)	Step	Units
I-01	Probe 1	-60 to +60 / -76 to 140	0.1	Deg
I-02	Probe 2	-60 to +60 / -76 to 140	0.1	Deg
I-03	Probe 3	-60 to +60 / -76 to 140	0.1	Deg
I-04	Probe 4	-60 to +60 / -76 to 140	0.1	Deg
I-05	Plant 1	0 = Unused, 1 = OK, 2 = Alarm		
I-06	Plant 2	0 = Unused, 1 = OK, 2 = Alarm		
I-11	Stat 1 Temp	-60 to +60 / -76 to 140	0.1	Deg
I-12	Stat 2 Temp	-60 to +60 / -76 to 140	0.1	Deg
I-13	Stat 3 Temp	-60 to +60 / -76 to 140	0.1	Deg
I-14	Stat 4 Temp	-60 to +60 / -76 to 140	0.1	Deg
O-01	Fans Relay	0 = Off, 1 = On		
O-02	Stat 1 Relay	0 = Off, 1 = On		
O-03	Stat 2 Relay	0 = Off, 1 = On		
O-04	Stat 3 Relay	0 = Off, 1 = On		
O-05	Stat 4 Relay	0 = Off, 1 = On		
O-10	Run Time	0 to 128		Hours x 1000
O-11	Fan Control	0 = Off, 1 = On		

Specification

General

Supply Voltage Range:	90 - 270 Vac ±10%	
Supply Frequency	50 - 60 Hz ±10%	
Maximum Supply Current	55A	With relays 1 to 5 fully loaded
Typical Supply Current	<1A	With relays 1 to 5 off load
Supply Fuse	1Amp anti-surge 20 x 5mm	
Operating temperature range	+5 °C to 50 °C	
Storage temperature	-20 °C to 65 °C	
Operating Humidity	80% maximum	
Environmental	Indoor use at altitudes up to 2000m, Pollution Degree 1 Installation Category II. Voltage fluctuations not to exceed ±10% of nominal voltage	
Controller Size	79mm x 37mm x 73mm WxHxD	
Panel Cut-out for Controller	72mm x 29mm	
Relay Board Size	170mm x 157mm x 52mm LxWxH	NB – width includes mounting feet
Maximum Weight (combined)	1.25kg	
Safety (Relay Board)	Class II LVD	This product is double insulated when used with the original enclosure
Safety (Controller)	Class II LVD	Only use the cable provided to connect the controller to the relay board.
Safety	Conforms to EN60730-1 based on UL 60950-1; UL 62368-1 as referenced to IEC60730-1	
EMC	EN61326-1 : 2013	
Ventilation	No requirement for forced ventilation	
Insulation	Class I for Relay board Class II for controller	

Relays

IMPORTANT: Some early versions of Relay modules had relays fitted in position 1 that had a lower N/O contact rating (0.5 HP) Look at the label on the enclosure lid for the correct Relay rating.

Relay 1 Fans	N/O contact 230 Vac/16A N/O contact 230 Vac/(2HP)	Resistive Load Motor Load
	N/C contact 230 Vac/10A N/C contact 230 Vac/1/2HP)	Resistive Load Motor Load
Relays 2 – 5	N/C contact 230 Vac/10A N/C contact 30 Vac/3A	Resistive Load Inductive Load CosΦ =0.4
	N/O contact 230 Vac/10A N/O contact 30 Vac/3A	Resistive Load Inductive Load CosΦ =0.4

Damage to relays through out of specification usage will invalidate the warranty.

Inputs

Input 1	Thermistor probe
Input 2	Thermistor probe
Input 3	Thermistor probe or 0V return
Input 4	Thermistor probe or 0V return

Part Numbers

Controller Variant	Part Number
ML Stat Controller, 5 Relay, RS485 Comms and Screw Terminals	PR0122-STA
ML Stat Controller, 5 Relay, RS485 Comms and Screw Terminals: (100 Units)	PR0122-STA-50
ML Stat Controller, 5 Relay, RS485 Comms and Screw Terminals: (10 Units)	PR0122-STA-10
ML Stat Controller, 5 Relay, RS232 for IP Comms and Screw Terminals	PR0123-STA
ML Stat Controller, 5 Relay, RS232 for IP Comms and Screw Terminals: (100 Units)	PR0123-STA-50
ML Stat Controller, 5 Relay, RS232 for IP Comms and Screw Terminals: (10 Units)	PR0123-STA-10

Alarm Sounder

The sounder is not included or fitted to the standard build but it is an optional build for quantity orders.

Appendix 1: ML Multistage Thermostat Modbus® address registers

Register	Name	Min	Max	Unit	Register Type	Item Type		
0	Probe 1	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
1	Probe 2	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
2	Probe 3	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
3	Probe 4	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
4	Plant Fault 1	0 = Unused 1 = OK 2 = Alarm			3 – Holding	Word		
5	Plant Fault 2	0 = Unused 1 = OK 2 = Alarm			3 – Holding	Word		
6	Stat Temp 1	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
7	Stat Temp 2	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8	Stat Temp 3	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
9	Stat Temp 4	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
4096	Fans Relay	0 = Off 1 = On			3 – Holding	Word		
4097	Stat 1 Relay	0 = Off 1 = On			3 – Holding	Word		
4098	Stat 2 Relay	0 = Off 1 = On			3 – Holding	Word		
4099	Stat 3 Relay	0 = Off 1 = On			3 – Holding	Word		
4100	Stat 4 Relay	0 = Off 1 = On			3 – Holding	Word		
4101	Run Time	0	128	K Hrs	3 – Holding	Word	× 1	
4102	Setpoint Offset	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
20480	Haccp Command	0 = Off 1 = On 2 = Flash			3 – Holding	Word		
24576	Unused				3 – Holding	Word		
24577	Missed Defrost				3 – Holding	Word		
24578	Probe 1 Fault				3 – Holding	Word		
24579	Probe 2 Fault				3 – Holding	Word		
24580	Probe 3 Fault				3 – Holding	Word		
24581	Probe 4 Fault				3 – Holding	Word		
24582	Over Temperature				3 – Holding	Word		

Register	Name	Min	Max	Unit	Register Type	Item Type		
24583	Under Temperature				3 – Holding	Word		
24584	Log Over Temperature				3 – Holding	Word		
24585	Log Under Temperature				3 – Holding	Word		
8192	Fans Mode	0 = Local 1 = Remote 2 = Man Off 3 = Man On			3 – Holding	Word		
8193	Probe 3 Select	0 = Off 1 = Prb 2 = Prb/Flt 3 = Prb/Alm 4 = PltN/O 5 = PltN/C			3 – Holding	Word		
8194	Probe 4 Select	0 = Off 1 = Prb 2 = Prb/Flt 3 = Prb/Alm 4 = PltN/O 5 = PltN/C			3 – Holding	Word		
8195	Fans Run On	00:00	99:00	mm:ss	3 – Holding	Word	× 60	
8196	Stat 1 Type	0 = Off 1 = Cooling 2 = Heating			3 – Holding	Word		
8197	Stat 1 Control Weight	0	100		3 – Holding	Word	× 1	
8198	Stat 1 Cut In	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8199	Stat 1 Diff	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8200	Stat 1 Alarm Delay	00:00	99:00	mm:ss	3 – Holding	Word	× 60	
8201	Stat 1 OT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8202	Stat 1 UT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8203	Stat 2 Type	0 = Off 1 = Cooling 2 = Heating			3 – Holding	Word		
8204	Stat 2 Control Weight	0	100		3 – Holding	Word	× 1	
8205	Stat 2 Cut In	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8206	Stat 2 Diff	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8207	Stat 2 Alarm Delay	00:00	99:00	mm:ss	3 – Holding	Word	× 60	
8208	Stat 2 OT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend

Register	Name	Min	Max	Unit	Register Type	Item Type		
8209	Stat 2 UT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8210	Stat 3 Type	0 = Off 1 = Cooling 2 = Heating			3 – Holding	Word		
8211	Stat 3 Control Weight	0	100		3 – Holding	Word	× 1	
8212	Stat 3 Cut In	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8213	Stat 3 Diff	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8214	Stat 3 Alarm Delay	00:00	99:00	mm:ss	3 – Holding	Word	× 60	
8215	Stat 3 OT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8216	Stat 3 UT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8217	Stat 4 Type	0 = Off 1 = Cooling 2 = Heating			3 – Holding	Word		
8218	Stat 4 Control Weight	0	100		3 – Holding	Word	× 1	
8219	Stat 4 Cut In	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8220	Stat 4 Diff	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8221	Stat 4 Alarm Delay	00:00	99:00	mm:ss	3 – Holding	Word	× 60	
8222	Stat 4 OT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8223	Stat 4 UT Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8224	Alarm Duration	00:00	61:00	mm:ss	3 – Holding	Word	× 60	
8225	Service Time	0	128	K Hrs	3 – Holding	Word	× 1	
8226	Log Alarm Delay	00:00	99:00	mm:ss	3 – Holding	Word	× 60	
8227	Log U/T Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8228	Log O/T Alarm	-60 (-76)	60 (140)	C (F)	3 – Holding	Word	÷ 10	Extend
8229	Sun On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8230	Sun Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8231	Mon On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8232	Mon Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8233	Tue On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8234	Tue Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8235	Wed On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8236	Wed Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8237	Thu On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8238	Thu Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8239	Fri On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8240	Fri Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8241	Sat On	00:00	23:59	hh:mm	3 – Holding	Word	× 1	
8242	Sat Off	00:00	23:59	hh:mm	3 – Holding	Word	× 1	

Revision History

Revision	Date	Changes
V2.3	20/06/2011	New layout and diagrams
V2.3a	16/03/2015	Modbus® register table address added
V2.4	11/05/2015	470R, 700R, 3K, 5K. 6K and NTC10K(2) probe type added
V2.4a	29/10/2015	EMC standard updated & Part number amended
V2.4b	29/06/2018	New documentation format
V2.4c	20/01/2020	Update to Specification
V2.4d	15/04/2020	Sounder not included in standard build option.

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