

Resource
Data Management

ML Hot Cabinet Controller

Commissioning/User Guide
Document Revision 2.2d



PR0120-HOT

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Introduction

The ML Hot controller is a single stage thermostat with adjustable parameters intended for hot cabinet control. The heating relay is controlled using the average of two air probes.

The main features are:

- Display with decimal or whole numbers
- Single stage thermostat, with differential, using on/off relay.
- Over and under temperature alarm.
- Probe 1: air Probe
- Probe 2: air Probe
- Probe 3 & 4: Selectable as temperature or plant fault monitoring input.
- Programmable parameters
- Fan control relay
- Lights control relay
- Optional alarm relay
- Adjustable probe weighting
- High volume alarm buzzer (Option to disable) *Please see note [Alarm Sounder](#)
- PT1000 probes supported
- Degrees C and Degrees F incorporated in one controller

Display



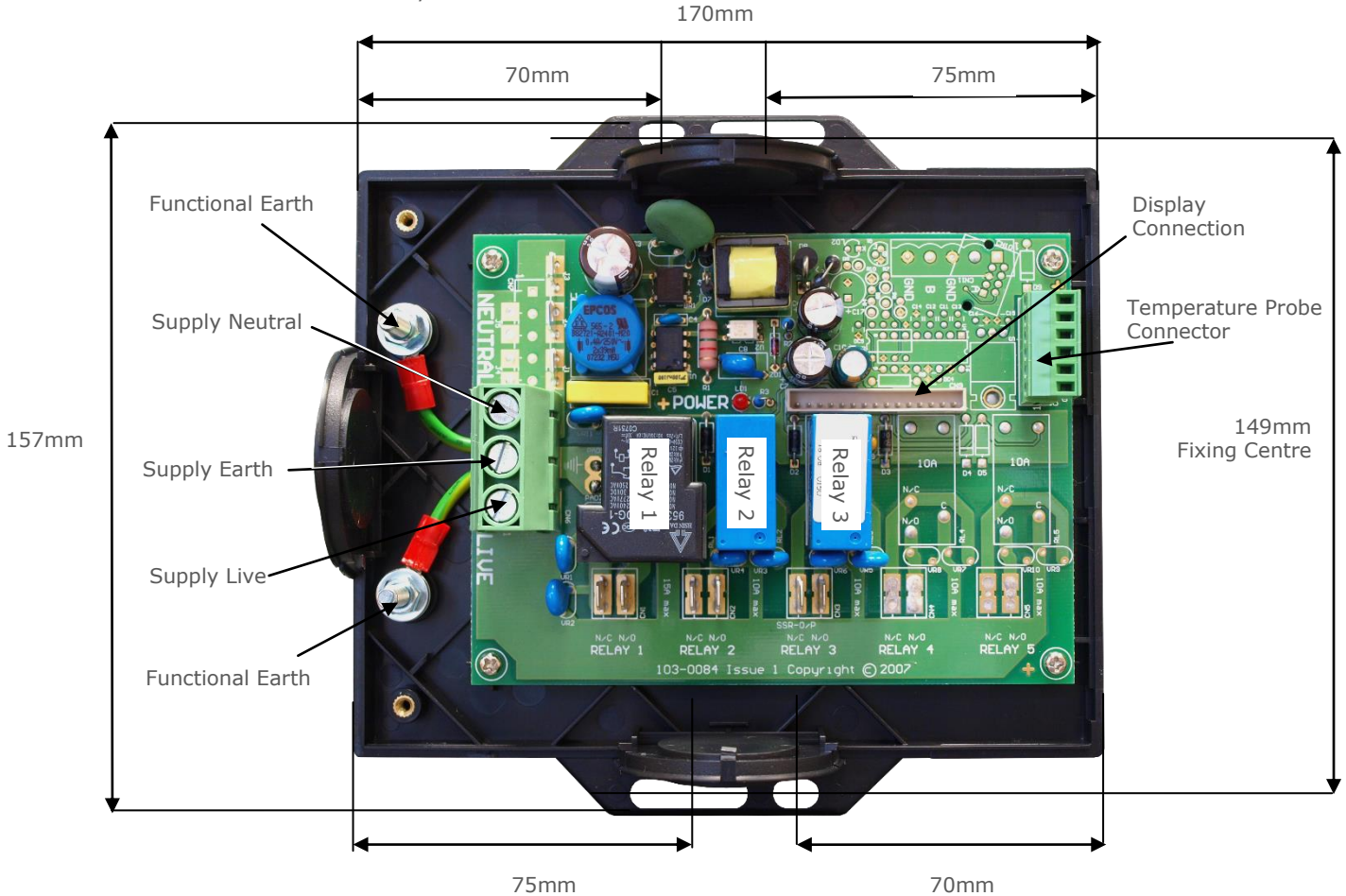
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Relay Modules

The ML Hot Cabinet 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 its power from the relay module. All the terminals for power, control relays and temperature probes are contained within the relay module as shown below.

The ML controller can be used with a 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.

Hot Cabinet Controller Relay Module.



Connections

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

All relays will output the supply voltage

Probe Connection Detail



- Probe Common
- Probe 4
- Probe 3
- Probe 2
- Probe 1
- Probe Common



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



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Setting-up

The controller has a set up method similar to that of the RDM Mercury controller range.

Viewing/Changing Menu Items

1. Press and hold **"ENT"** and **"DOWN"** for approx 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
PARA	View and change parameters
Unit	Change the Units (Deg C or Deg F)
diSP	Change the display (Decimal or Integer)
type	This controller has one type only
Id	Enter an ID (Not used on this controller)
Rtc	Real Time Clock
nEt	Change the network settings (Not used on this controller)
Hub	Selects Hub/Switch (Not used on this controller)
Soft	View the software version
OFSt	Probe Offsets
rLY1	Inverts the operation of Relay 1
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 I/O.

View I/O

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

Number	I/O	Range	Step	Units
I-01	Control Temp.	-60 ° to 190° (-76 ° to 374°)	0.1	°C(°F)
I-02	Probe 1	-60 ° to 190° (-76 ° to 374°)	0.1	°C(°F)
I-03	Probe 2	-60 ° to 190° (-76 ° to 374°)	0.1	°C(°F)
I-04	Probe 3	-60 ° to 190° (-76 ° to 374°)	0.1	°C(°F)
I-05	Probe 4	-60 ° to 190° (-76 ° to 374°)	0.1	°C(°F)
I-11	Plant 1 Input	0 = off, 1= on	1	
I-12	Plant 2 Input	0 = off, 1= on	1	
I-13	MOP	Not Used		
O-01	Heater	0 = off, 1 = on	1	
O-02	Relay 2 Value	0 = off, 1 = on	1	
O-03	Relay 3 Value	0 = off, 1 = on	1	
O-06	Lights	0 = off, 1 = on	1	
O-10	Run Time	0 = off, 1 = on	1	
O-30	Setpoint Offset	0 = off, 1 = on	1	



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Parameter Tables

No.	Parameter	Min	Max	Default	Units
P-01	Temperature set point	-60 (-76)	190 (374)	80 (176)	°C(°F)
P-02	Temperature differential	-60 (-76)	190 (374)	5 (41)	°C(°F)
P-03	Control Weight	0	100	50	%
P-04	Probe 3 Type	0 = Off 1 = Monitor 2 = Monitor with Fault 3 = Monitor with Alarm 4 = Plant N/O 5 = Plant N/C		0	
P-05	Probe 4 Type	0 = Off 1 = Monitor 2 = Monitor with Fault 3 = Monitor with Alarm 4 = Plant N/O 5 = Plant N/C		0	
P-06	Relay 2 Function	0 = Fans 1 = Lights 2 = Alarm		0	
P-07	Relay 3 Function	0 = Fans 1 = Lights 2 = Alarm		1	
P-14	Service Interval	0	128	60	x1000 hrs
P-20	Alarm delay	00:00	99:00	20:00	hrs:mins
P-21	Under Temp Alarm	-60 (-76)	190 (374)	30 (86)	°C(°F)
P-22	Over Temp Alarm	-60 (-76)	190 (374)	160 (320)	°C(°F)
P-23	Monitor probe Alarm delay	00:00	99:00	20:00	hrs:mins
P-24	Monitor probe Under Temp	-60 (-76)	190 (374)	30 (86)	°C(°F)
P-25	Monitor probe Over Temp	-60 (-76)	190 (374)	160 (320)	°C(°F)
P-26	Alarm buzzer duration	00:00	61:00	00:00	hrs:mins
P-98	Lights Control	0 = Off 1 = On			
P-15	Fans Run On	00:00 – 99:00			min:sec
P-60	Lights Mode	0 = Local 1 = Remote (Not Used) 2 = Manual Off 3 = Manual On			0
P-61	Sunday On Time	00:00	23:59	08:00	hrs:mins
P-62	Sunday Off Time	00:00	23:59	20:00	hrs:mins
P-63	Monday On Time	00:00	23:59	08:00	hrs:mins
P-64	Monday Off Time	00:00	23:59	20:00	hrs:mins
P-65	Tuesday On Time	00:00	23:59	08:00	hrs:mins
P-66	Tuesday Off Time	00:00	23:59	20:00	hrs:mins
P-67	Wednesday On Time	00:00	23:59	08:00	hrs:mins
P-68	Wednesday Off Time	00:00	23:59	20:00	hrs:mins
P-69	Thursday On Time	00:00	23:59	08:00	hrs:mins
P-70	Thursday Off Time	00:00	23:59	20:00	hrs:mins
P-71	Friday On Time	00:00	23:59	08:00	hrs:mins
P-72	Friday Off Time	00:00	23:59	20:00	hrs:mins
P-73	Saturday On Time	00:00	23:59	08:00	hrs:mins
P-74	Saturday Off Time	00:00	23:59	20:00	hrs:mins
dflt	Sets parameters to default				



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Parameter Description

No.	Parameter	Description
P-01	Temperature set point	The value above which the controller switches OFF the heater
P-02	Temperature differential	The value below the set point at which the controller turns ON the heater
P-03	Control Weight	Control & Display Weight. 30% = 30% of probe 1 and 70% of probe 2 etc. 100% all probe 1. 0% all Probe 2
P-04	Probe 3 Type	This parameter allows the user to change the function of input 3. See Probe Type
P-05	Probe 4 Type	This parameter allows the user to change the function of input 4. See Probe Type
P-06	Relay 2 Function	Sets the function of relay 2. See Relay Assignment
P-07	Relay 3 Function	Sets the function of relay 3. See Relay Assignment
P-14	Service Interval	This feature illuminates the service icon (Spanner) when the total number of run hours entered has expired. The run hours increment relay 1 is active. To reset service icon set the parameter to "0" then enter the desired number of hours. Set to 0 to permanently disable. Check description.
P-20	Alarm delay	Sets the OT/UT alarm delay
P-21	Under Temp Alarm	Under temperature Alarm setpoint. Uses Control Temperature.
P-22	Over Temp Alarm	Over temperature Alarm setpoint. Uses Control Temperature.
P-23	Monitor probe Alarm delay	Sets the monitor probe OT/UT alarm delay
P-24	Monitor probe Under Temp	Monitor probe Under temperature Alarm setpoint
P-25	Monitor probe Over Temp	Monitor probe Over temperature Alarm setpoint
P-26	Alarm buzzer duration	Sets the buzzer on duration when an alarm occurs. Set to 00:00 to disable the buzzer.*Please see note Alarm Sounder
P-98	Lights Control	For use in future development
P-15	Fans Run On	For use in future development
P-60	Lights Mode	Lights Mode; local use the local schedule below, (Remote uses a front-end GP timer to be used in future development)
P-61	Sunday On Time	Sunday On Time
P-62	Sunday Off Time	Sunday Off Time
P-63	Monday On Time	Monday On Time
P-64	Monday Off Time	Monday Off Time
P-65	Tuesday On Time	Tuesday On Time
P-66	Tuesday Off Time	Tuesday Off Time
P-67	Wednesday On Time	Wednesday On Time
P-68	Wednesday Off Time	Wednesday Off Time
P-69	Thursday On Time	Thursday On Time
P-70	Thursday Off Time	Thursday Off Time
P-71	Friday On Time	Friday On Time
P-72	Friday Off Time	Friday Off Time
P-73	Saturday On Time	Saturday On Time
P-74	Saturday Off Time	Saturday Off Time

Monitor Probe

Off	If selected probe is not used.
Monitor	If selected, controller will monitor temperature but will not alarm out.
Monitor with Fault	If selected, controller will monitor temperature and alarm out for probe fault but not over or under temperature.
Monitor with Alarm	If selected, controller will monitor temperature and alarm out for probe faults and over and under temperature alarms.
Defrost	The selected probe will be used as a defrost termination probe (instead of Air Off probe).
Plant N/O	If selected, controller will generate a Plant fault alarm when the probe input sees a short circuit.
Plant N/C	If selected, controller will generate a Plant fault alarm when the probe input sees an open circuit



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Units

Use this to select the temperature units.

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

Disp

Display setting:

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

Relay Assignment

Relay 1	Heating Element
Relay 2	Fans or Lights or Alarm
Relay 3	Fans or Lights or Alarm

For correct operation on Heating, fans and lights the Normally Open contact should be used on the Relay board. For Alarm relay Normally Closed contact should be used.

Alarm relay Operation

On normal operation alarm relay will be energised. When any alarm is generated the alarm relay will de-energise.

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".



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Specification

General

Supply Voltage Range:	90 - 270 Vac \pm 10%	
Supply Frequency	50 - 60 Hz \pm 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 \pm 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, look at the label on the enclosure lid for the correct Relay rating.

Relay	Contact	
Relay 1 Heater Relay	N/O contact 230 Vac/16A	Resistive Load
	N/C contact 230 Vac/16A	Resistive Load
Relay 2 Selectable	N/C contact 230 Vac/10A	Resistive Load
	N/C contact 230 Vac/3A	Inductive Load Cos Φ =0.4
	N/O contact 230 Vac/10A	Resistive Load
	N/O contact 230 Vac/3A	Inductive Load Cos Φ =0.4
Relay 3 Selectable	N/C contact 230 Vac/10A	Resistive Load
	N/C contact 230 Vac/3A	Inductive Load Cos Φ =0.4
	N/O contact 230 Vac/10A	Resistive Load
	N/O contact 230 Vac/3A	Inductive Load Cos Φ =0.4

Please Note:

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



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Part Numbers

Controller Variant	Part Number
ML Hot Controller with 3 Relays and Faston connectors	PR0120-HOT
ML Hot Controller with 3 Relays and Faston connectors (20 Units)	PR0120-HOT-20
ML Hot Controller with 3 Relays and Faston connectors (100 Units)	PR0120-HOT-50

Alarm Sounder

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

Disclaimer

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Revision History

Revision	Date	Changes
V2.0	24/02/2012	New layout and diagrams
V2.2	24/04/2015	NTC2K, 470R, 700R, 3K, 5K, 6K, NTC10K and NTC10K (2) probe type added.
V2.2a	29/10/2015	EMC standard updated & Part number amended.
V2.2b	21/06/2018	New documentation format.
V2.2c	20/01/2019	Update to Specification
V2.2.d	15/04/2020	Sounder not included in standard build option.



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