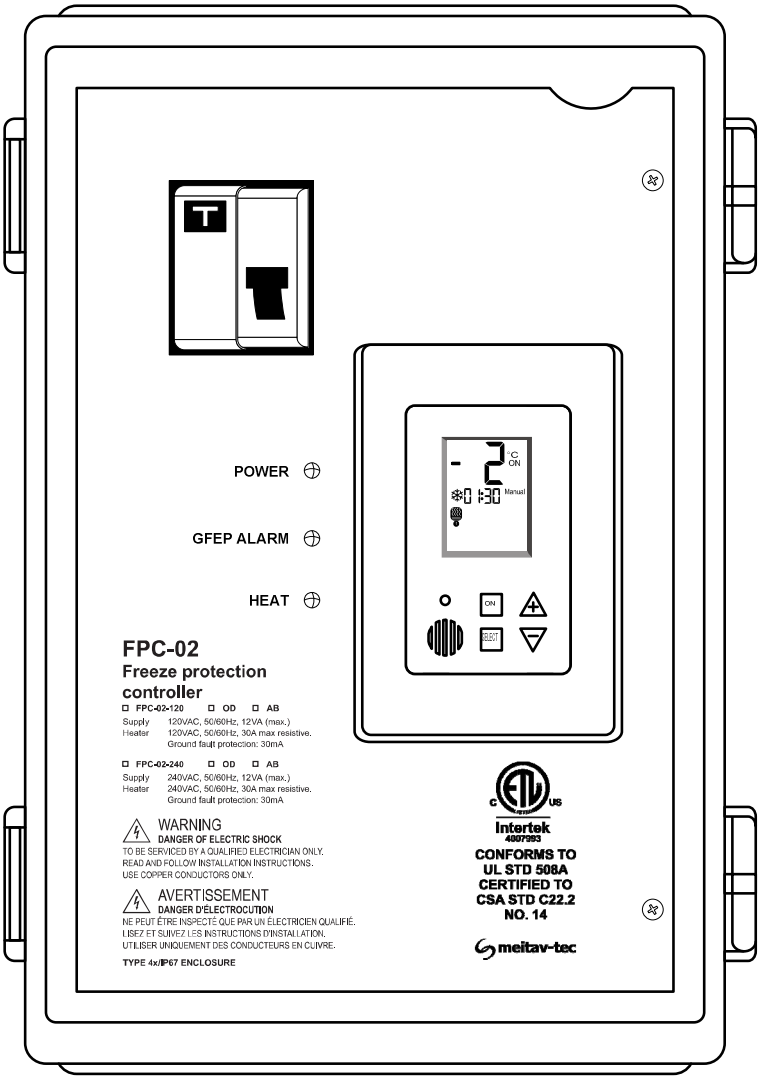


FPC-02-OD Series

Installation and Operating manual

meitav-tec

Rev2.4

Index

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

meitav-tec

Introduction

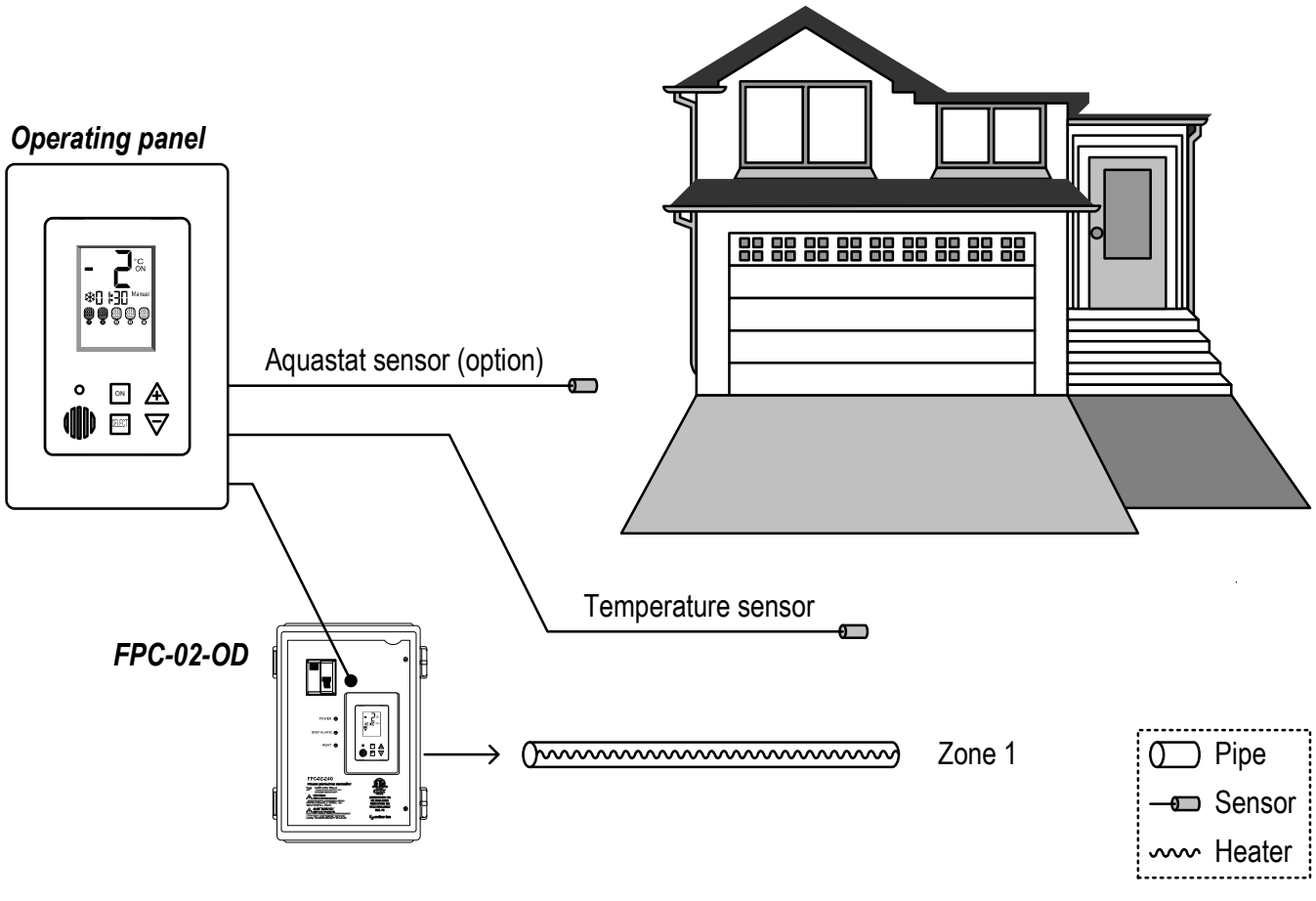
The FPC-02-OD Series power boxes offer smart and easy control for HEAT TRACING SYSTEMS.
It can operate one heating zone.
Typical applications include pipes, valves or tanks.

The backlit LCD screen provides full interface and information to the system status.

The FPC-02-OD offers various operating and programming options such as:

- Switchable temperature scales (°F or °C)
- Both Automatic and Manual modes
- Energy saving temperature limit
- Adjustable heater hold on off delay
- Adjustable Lower ambient temperature limit to stop heater (lockout)
- Commissioning/Test environment

FPC-02-OD General system layout



FPC-02-OD Series
Owner's manual & Technician Settings

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

meitav-tec

PLEASE READ THIS MANUAL AND THE SAFETY WARNINGS CAREFULLY BEFORE INSTALLING AND USING THE CONTROLLER AND SAVE IT FOR FUTURE USE

Installation notes

- Familiarize yourself with the markings, warnings, components and terminology.
- The FPC-02-OD power boxes and its accessories must be installed by a qualified electrician in accordance with local regulations and the requirements of the NEC (NFPA 72) and the CEC part 1.
- WARNING: Ensure the power is disconnect from all circuits before mounting the power box and making any connections. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.
- **Installer must ensure the installation of approved disconnect means, for all power supply circuits feeding this unit.**
- The power box is suitable for either indoor and outdoor wall mount installation.
- The power box is housed inside an IP67, NEMA 4X weather-resistant enclosure; When installed outdoor, use only UL listed, Type 4X, raintight cable glands and conduit hubs.
- Ensure wiring according to the provided schematics using copper conductors only.
- Make sure the wire gauge (AWG) is suitable for the circuit amperage draw, as specified in the NEC/CEC table 1.
- Ensure that the main breakers (fuses) are suitable for the heating systems rating (80% load).
- Grounding means must comply with local regulations and CEC/NEC.
- Ensure that the heating system/de-icing system connected to this unit complies with the UL 499 or UL 515 & CSA 22.2 # 130.3 standard and is certified / listed by an NRTL.
- Ensure that all wiring is rated for the application at 60°C (140°F as per UL 515 CSA 22.2 #130 clause 12 table 12.1.
- Beware that any holes punched for conduit are to compromise the integrity of the enclosure ratings.

Ground fault equipment protection (GFEP)

- The ground fault interrupter/residual current detector installed in this system is a Non class A GFCI, intended for equipment protection.
- Familiar yourself with its operation and required setting.
- The GFEP should be tested monthly. Please refer to the GFEP testing instructions on page 14 of this manual.

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

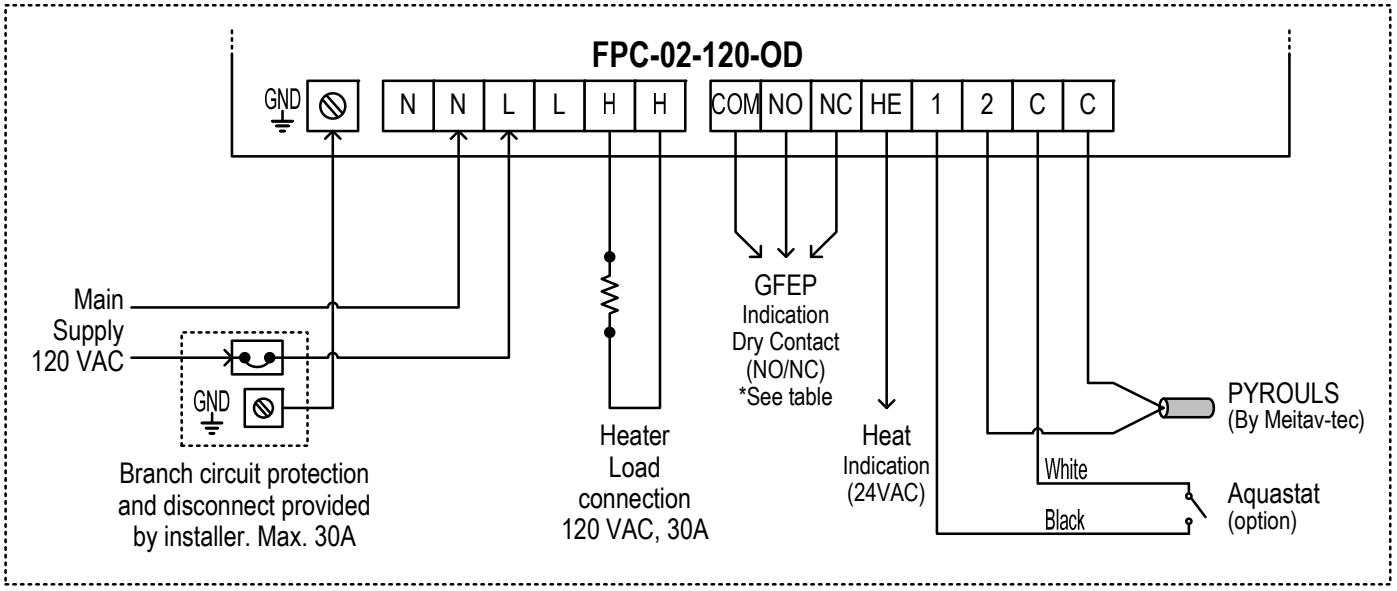
Wiring the FPC-02-120-OD

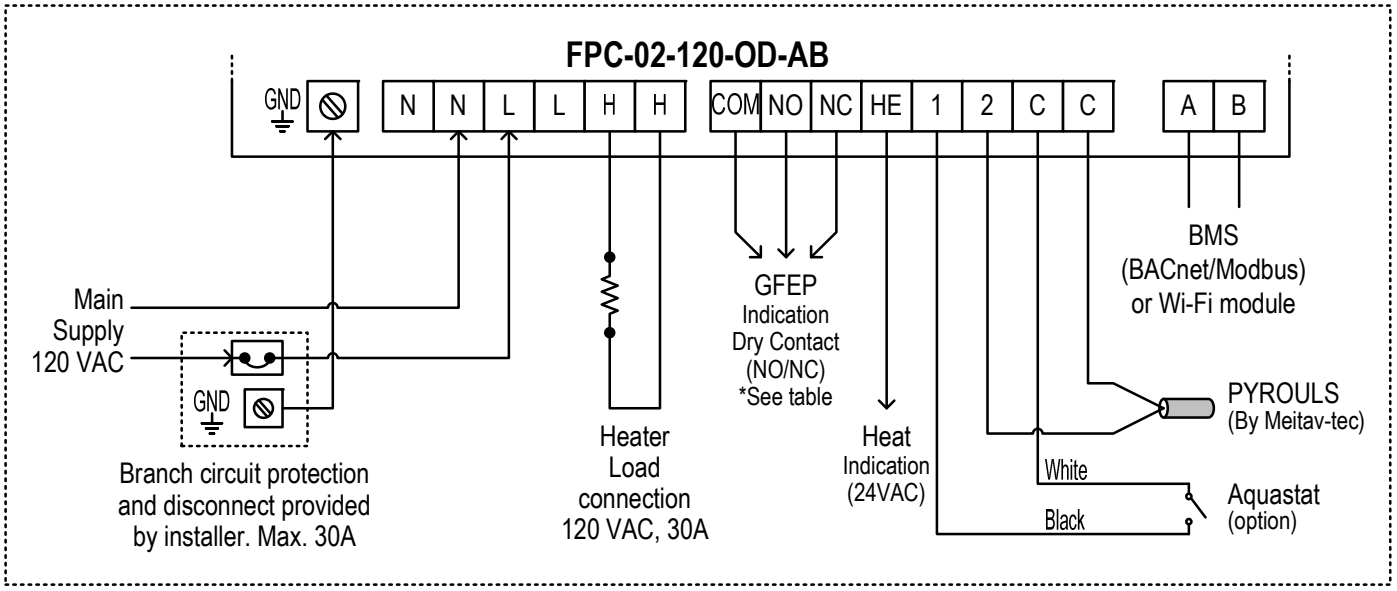
Heater load connection

Provide terminals L, N with up to 120 VAC, 30 AMP.

Make sure the wire Gauge (AWG) is suitable for the circuit Amperage draw, as specified in the NEC/ CEC table 1.

Caution: Incorrect voltage may cause fire or seriously damage the unit.





*GFEP Indication - Dry Contact / Alarm

	NO - COM	NC - COM
GFEP Tripped	SHORT	OPEN
GFEP NOT Tripped	OPEN	SHORT

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

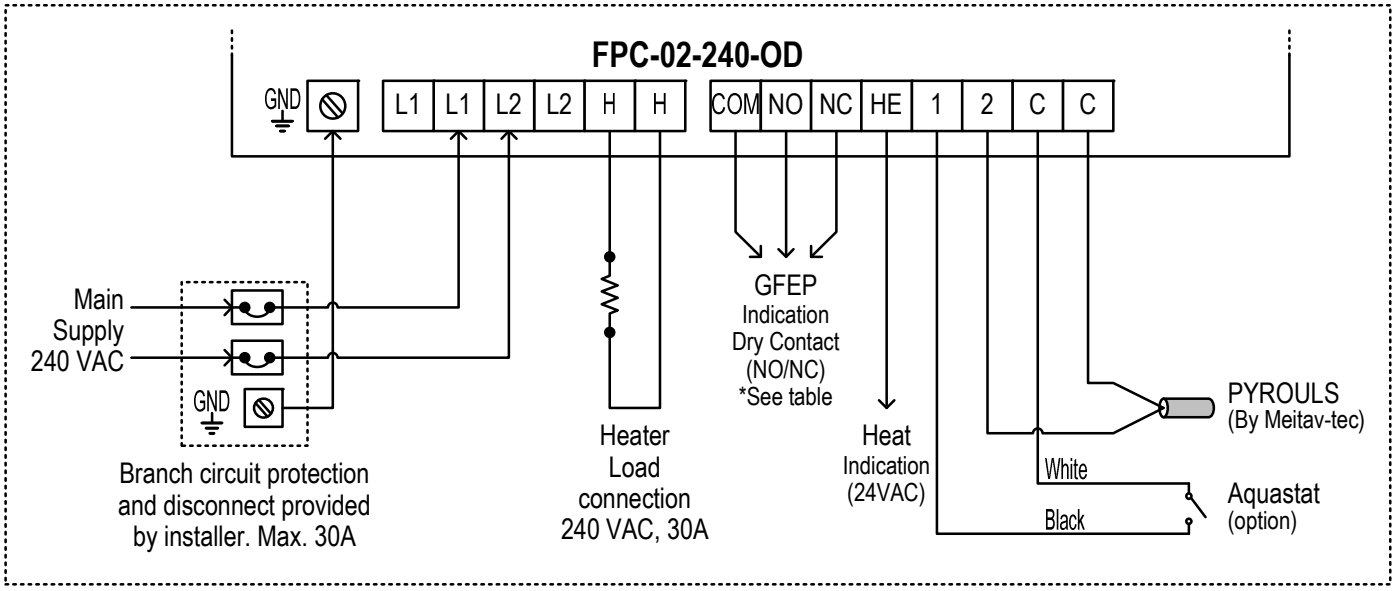
Wiring the FPC-02-240-OD

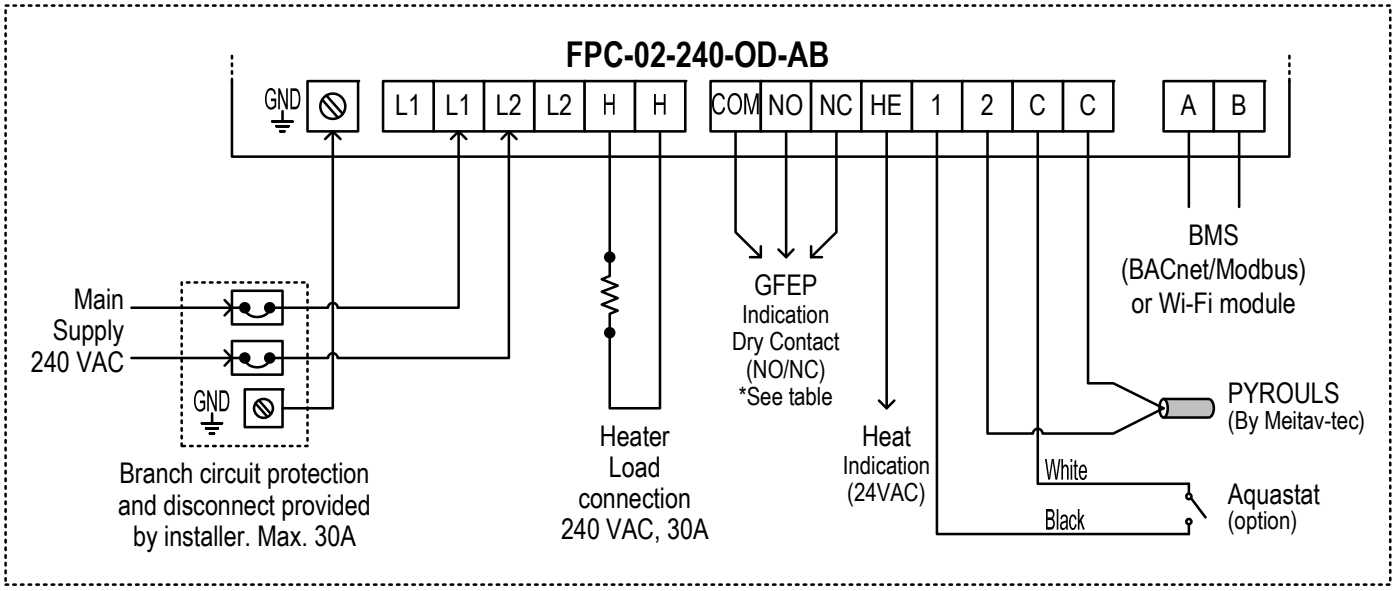
Heater load connection

Provide terminals L, N with up to 240 VAC, 30 AMP.

Make sure the wire Gauge (AWG) is suitable for the circuit Amperage draw, as specified in the NEC/ CEC table 1.

Caution: Incorrect voltage may cause fire or seriously damage the unit.





*GFEP Indication - Dry Contact / Alarm

	NO - COM	NC - COM
GFEP Tripped	SHORT	OPEN
GFEP NOT Tripped	OPEN	SHORT

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

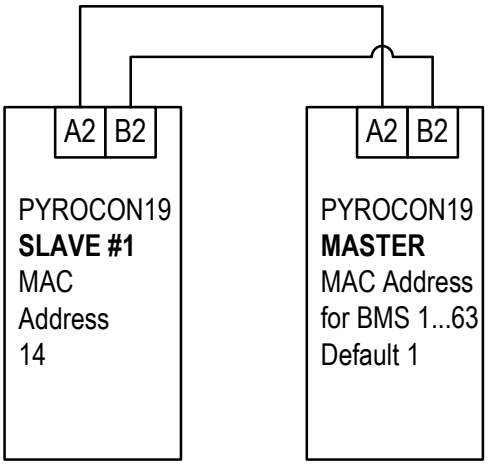
Connecting FPC-02-OD-AB slaves (option)

Number of FPC-02-OD Slaves	Master's MAC Addresses	Slave's MAC Addresses
Up to 3	1-63	14-16

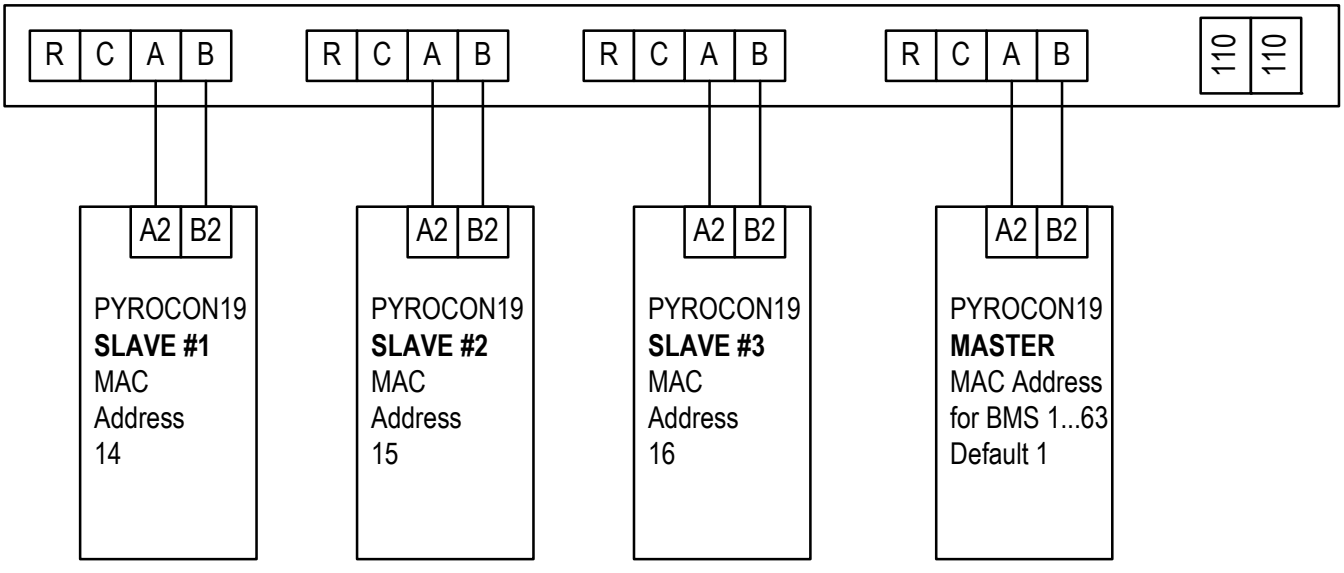
These slaves should be connected directly to A2,B2 terminals on the PYROCON19 thermostat (inside the FPC-02-OD)

PYRO-JBOX junction box with built in 50VA, 110~24VAC transformer can be used, allowing connection and powering of up to 3 slaves.

Option 1 – Direct connection of 1 slave



Option 2 - PYRO-JBOX (up to 3 FPC-02-OD slaves)



Please refer to technician parameter P08 for Salve's MAC Address.

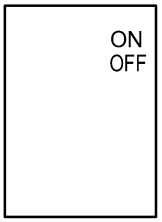
and to parameter P11 for Master/Slave configuration

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

Operating instructions

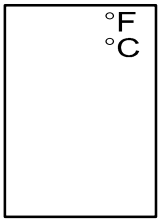
Turning the system ON and OFF

- Press and hold the [ON] button for 0.5 seconds to turn the system ON or OFF.
- The words “ON” or “OFF” will appear on display.
- When ON, the green LED on the front panel will also turn ON .



Selecting temperature scale

- Press the [+] button for Celsius.
- Press the [-] button for Fahrenheit.

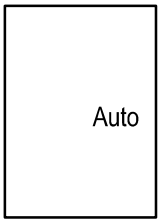


Selecting Automatic or Manual mode

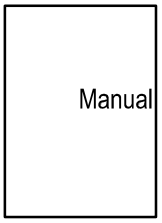
- Press the [SELECT] button to switch between modes:

  “Automatic” Heating will start and stop automatically depending on the set point and ambient temperatures.

  “Manual ON” Heating will start regardless of the set point and ambient temperatures and will stop after a preset time (pls. refer to the “Manual ON” section in the tech. settings).



Note: Mode will always return to “Automatic” after switching the unit OFF and ON.



Heater indication

Black icon – Heater ON

White icon – Heater OFF

Heater ON

Heater OFF

When ON, the red LED on the front panel indicating heater operation will also turn ON .

Snow flake icon and digital time indication

A solid snow flake icon will appear on display during normal heater operation.

A blinking snow flake icon will appear on display during heater off delay or when manual mode is activated. The digital clock will count down the remaining time until the heater is turned off.

The snow flake icon will disappear from display as long as the heater is turned off.

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

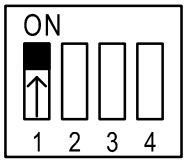
Technician settings

Use the technician settings mode to view and adjust the following parameters:

P01 Temperature set point
P02 Lower ambient temperature limit to stop the heater
P03 Time delay before stopping the heater
P04 ON time for manual mode
P05 Heaters cycle time / Splitting time
P06 Enable/Disable 2nd temperature sensor logic (Aquastat)
P08 MAC Address for BMS and for Master-Slaves
P09 Commissioning / Test mode
P11 Master/Slave
P15 Temperature sensor calibration Offset
Restore defaults

Enter technician settings mode

- **Disconnect power and open the internal door by releasing the two screws.**
- **Move DIP switch S1 located on the side of thermostat to ON position.**
- Press the [SELECT] and [+] buttons simultaneously to move forward to the next technician parameter.
- Press the [SELECT] and [-] buttons simultaneously to return to the previous technician parameter.

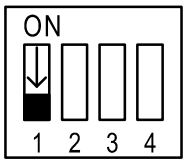


Enter technician settings mode

Save changes and exit technician settings mode

- **Move DIP switch S1 located on the side of thermostat to OFF position.**

Important: Changes made to technician parameters will not take effect as long as DIP switch S1 is in ON position.



Save changes and exit technician settings mode

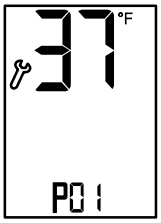
Parameters:

P01 - Temperature set point

- Move DIP switch S1 located on the side of thermostat to ON position.
- "P01" and the temperature set point will appear on display.
- Use the [+] and [-] buttons to adjust the temperature set point.

Range: 14…77°F / -10…+25°C, Default: 37°F / 3°C

As long as the ambient temperature is lower than the temperature set point P01, the FPC-02-OD will turn ON.



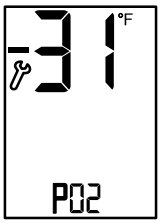
Temperature set point

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

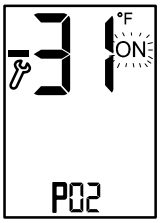
Technician settings (Cont')

P02 - Lower limit temperature for heating

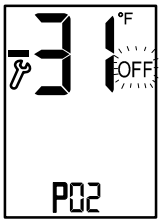
- Press the [SELECT] and [+] buttons simultaneously.
- "P02" and the low limit temperature will appear on display.
  When the temperature on the temperature sensor drops below the low temperature limit, the heating system will stop.
- Use the [+] and [-] buttons to adjust the temperature set point.
  Range: -40…+32°F / -40…-5°C Default: -31°F / -35°C
- Press the [SELECT] and [+] buttons simultaneously again.
- The word "ON" or "OFF" will appear on display.
- Use the [+] and [-] buttons enable (ON) or disable (OFF) the P02 parameter.
  If disabled, the heating system will operate without low temperature limitations.



Low limit Temperature



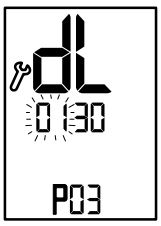
P02 enabled



P02 disabled

P03 -Time delay before stopping the heaters

- Press the [SELECT] and [+] buttons simultaneously.
- "P03", "dL" and the time delay before stopping the heaters (Hold ON) will appear on display.
- Use the [+] and [-] buttons to adjust the time delay - Hours.
  Range: 0...99 hours Default: 1 hour
- Press the [SELECT] and [+] buttons simultaneously again.
- Use the [+] and [-] buttons to adjust the time delay - Minutes.
  Range: 0...59 minutes Default: 30 minutes



Time delay (hours)

Time delay (minutes)

Note: The time delay countdown will start when the ambient temperatures rises above the set point temperature.

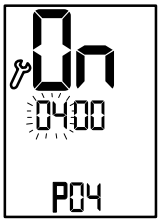
↳ Cont'

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

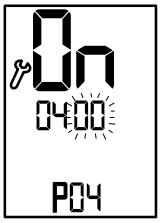
Technician settings (Cont')

P04 - Manual mode ON time

- Press the [SELECT] and [+] buttons simultaneously.
- "P04", "On" and the "Manual ON" mode time period will appear on display. The time frame in which the heaters remain ON after receiving an "Manual ON" command.
- Use the [+] and [-] buttons to adjust the "Manual ON" time (Hours).
  Range: 1...48 hours Default: 4 hours
- Press the [SELECT] and [+] buttons simultaneously again.
- Use the [+] and [-] buttons to adjust the "Manual ON" time (Minutes).
  Range: 0...59 minutes Default: 30 minutes



Manual ON (hours)



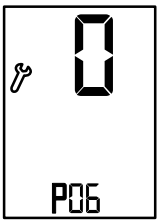
Manual ON (minutes)

P05 – Not in use

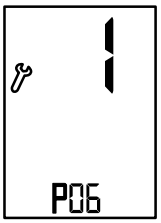
- Press the [SELECT] and [+] buttons simultaneously.
- "P05" will appear on display.
- Proceed to P06.

P06 – Enable/Disable Temperature sensor / Aquastat logic

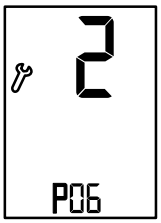
- Press the [SELECT] and [+] buttons simultaneously.
- "P06" and the number "0" or "1" will appear on display.
- Use the [+] and [-] buttons to select between:
  - "0" - Logic set by both TEMPERATURE SENSOR and AQUASTAT (default).
  - "1" - Logic set by TEMPERATURE sensor only.
  - "2" - Logic set by AQUASTAT sensor only (The display will not show the temperature)



Logic by temperature sensor and aquastat



Logic by temperature sensor only



Logic by aquastat sensor only

↳ Cont'

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

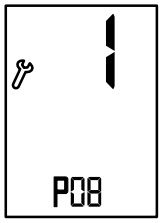
meitav-tec

P08 – MAC Address for BMS and for Master-Slaves

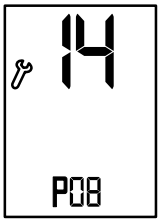
- Press the [SELECT] and [+] buttons simultaneously.
- "P08" and the MAC Address will appear on display.
- Use the [+] and [-] buttons to set the MAC Address of the unit.

Setting the MAC address for the unit will make it available through the home automation system.

- For controller set by P11 as Master –
  Address range for BMS 1...63, default 1
- For controller set by P11 as Slave –
  Address range 14...16, default 14
  Select "0" for NO COMMUNICATION system (default).



MAC Address (Master)



MAC Address (Slave)

↳ Cont'

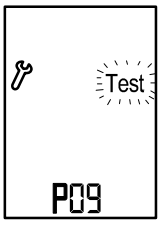
Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

Technician settings (Cont')

P09 - Test conditions mode / Technician commissioning mode

Turn ON test conditions to check the functionality of the system regardless of temperature sensors parameters (i.e. during the summer).
In test conditions, the Ambient temperature is always -7°C/19°F.

- Press the [SELECT] and [+] buttons simultaneously.
- "P09" will appear on display. The hours will blink.
- Use the [+] button to enter test/commissioning mode – the word "Test" will appear on display.
- Use the [-] button to manually exit test/commissioning mode – the word "Test" will disappear from display.

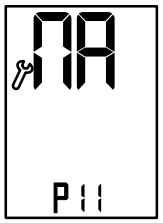


Test conditions mode

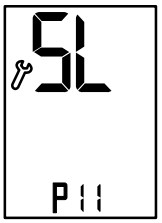
Note: If the technician did not manually exit test/commissioning mode, the unit will automatically return to normal mode after 5 hours.

P11 – Master/Slave

- Press the [SELECT] and [+] buttons simultaneously.
- "P11" will appear on display.
- Use the [+] and [-] buttons to select between:
  - "MA" - Master (When using one FPC-02-OD or when controlling other FPC-02-OD devices connected to A,B as slaves) - default
  - "SL" - Slave (controlled by another FPC-02-OD connected to A,B)



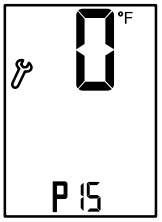
Master



Slave

P15 – Temperature sensor calibration offset

- Press the [SELECT] and [+] buttons simultaneously.
- "P10" will appear on display.
- Use the [+] button to adjust the offset for calibration of measured temperature.
  Range: -9…+9°F / -6…+6°C Default: 0°F / 0°C



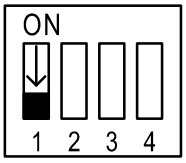
Offset

Note: If the technician did not manually exit test/commissioning mode, the unit will automatically return to normal mode after 5 hours.

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

Save changes and return to normal display

- In order to save changes and return to normal display, move DIP switch S1 back to OFF position.



Important: Changes made to technician parameters will not take effect as long as DIP switch S1 is in ON position.

Restore default values

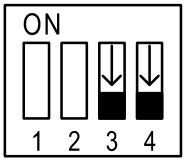
- Move DIP switch S1 to ON position.
- Press and hold the [ON] button for 10 seconds. The controller will beep.
- Move DIP switch S1 back to OFF position.

Short measuring times (test only) - DIP switch S2

- Use DIP switch S2 to short the
  - "ON" - Short measuring times – for test/commissioning only (measuring times will be divided by 60).
  - "OFF" - Normal operation.

Short measuring times: A real 1 hour will take 1 minute and a real 1 minute will take 1 second.

DIP switches S3 and S4 – Not in use (must be in OFF position)

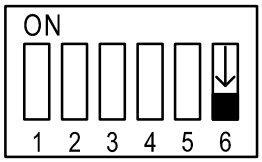


S3 OFF, S4 OFF

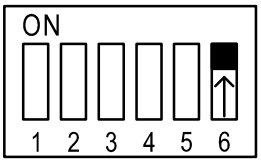
Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

BMS – BACnet/Modbus (FPC-02-OD-AB only!)

- **Use DIP switch S6 located on the side of thermostat to select BMS (A,B) network protocol:**
  - S6 ON – BACnet
  - S6 OFF - MODBUS



Modbus

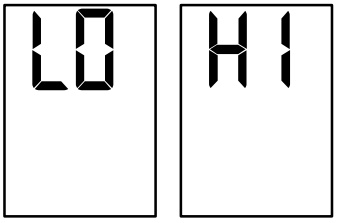


BACnet

Temperature readings and Communication errors

Temperature sensor readings is out of reliable measuring range

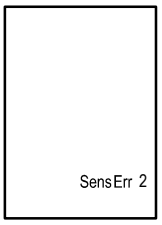
Low temperature readings: Ambient temperature < -31°F/-35°C
High temperature readings: Ambient temperature > 91°F/35°C



Temperature sensor is not connected or short circuit

"SensErr 2" Will appear on display.

"SensErr" Will appear on display with internal sensor fault .

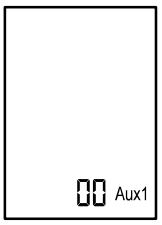


Temperature Sensor error

Slaves – Communication error

Aux1 - Slaves communication error

"Aux1" and "00" Will appear on display.



Slaves communication error

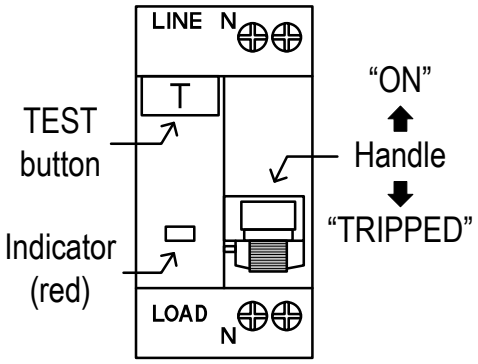
Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

GFEP

The GFEP is designed to protect circuits by sensing when a ground fault or earth leakage is greater than 30mA and automatically open the circuit.

The GFEP should be tested regularly, at least once per month.

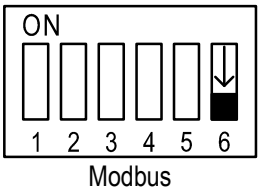
- Press TEST button “T”, GFEP should open automatically and the red indicator should act.
- Move the handle back to “ON” position to return to normal operation and reestablish power and protection.
- Test button should be pressed 3 times and the GFEP should work normally.
- If the GFEP is not operating normally, it must be replaced.



Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

Object list - Modbus (FPC-02-OD-AB only!)

- **Use DIP switch S6 located on the side of thermostat to select BMS (A,B) network protocol - S6 OFF – Modbus**



Modbus

MODBUS RTU Mode, Address Slave 1-127,
Baud rate: 9600, n, 8, 1

Supported Commands:
0x03 = Read Holding Registers (for all).
0x06 = Preset Single Register (For R/W registers only),
Command 0x2B is used to identify controller

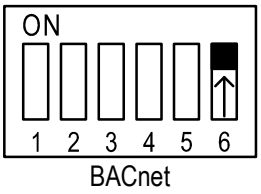
N°	Address	Value	Object Name	Default	Access
1	0 [0x00]	-40...35°C (-40...95°F)	TemperatureOutside	-	R
2	1 [0x01]	-10...25°C (14...77°F)	SetPoint	3°C (37°F)	R/W
3	2 [0x02]	-40...0°C (-40...32°F)	LowLimitHeat	-35°C (-31°F)	R/W
4	3 [0x03]	1...6000 min	HeatersOffDelay	90 min	R/W
5	4 [0x04]	10...6000 min	ManualPeriodTime	240 min	R/W
6	5 [0x05]	10...1999 min	StaggeringTime	120 min	R/W
7	6 [0x06]	0...2	TemperatureAquastatLogic	0	R/W
8	7 [0x07]	0...4	HeaterMode	0	R/W
9	8 [0x08]	1-On,0-Off	CommissioningMode	0-Off	R/W
10	9 [0x09]	1-On,0-Off	Heater 1	-	R
11	10 [0x0A]	1-On,0-Off	Heater 2	-	R
12	11 [0x0B]	1-On,0-Off	Heater 3	-	R
13	12 [0x0C]	1-On,0-Off	Heater 4	-	R
14	13 [0x0D]	1-On,0-Off	Heater 5	-	R
15	14 [0x0E]	1-On,0-Off	Aquastat_Signal	-	R
16	15 [0x0F]	1-On,0-Off	SettingMode	-	R
17	16 [0x10]	1-On,0-Off	ShortTimeMode	-	R
18	17 [0x11]	1-On,0-Off	StageringMode	-	R
19	18 [0x12]	1-On,0-Off	StageringMode	-	R
20	19 [0x13]	1-On,0-Off	OnOff	0-Off	R/W
21	20 [0x14]	1-On,0-Off	C_F_Scale	0-Off	R/W
22	21 [0x15]	1-On,0-Off	RestoreDefaults	0-Off	R/W
23	22 [0x16]	1-On,0-Off	GroundFault	0-Off	R
24	23 [0x17]	-40...35°C (-40...95°F)	InternalTemperature(T3)	-	R
25	24 [0x18]	1-On,0-Off	InternalHeater	-	R
26	25 [0x19]	0...99	Sensors error	0	R/W
		0 – No error 1 – Internal sensor 2 – External sensor			

The MODBUS Register No. X is addressed in the MODBUS Register Address (PDU) X-1.
All Registers are signed Integer 16 bit.

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

Object list – BACnet (FPC-02-OD-AB only!)

- **Use DIP switch S6 located on the side of thermostat to select BMS (A,B) network protocol - S6 ON – BACnet**



BACnet

BACnet MSTP Baud rate: 9600, 19200, 38400, 76800 no parity, 8 data bits, 1 stop bit

N°	Object	Value	Object Name	Default	Access
1	AnalogValue_#0	-10...25°C (14...77°F)	SetPoint	3°C (37°F)	R/W
2	AnalogValue_#1	-40...0°C (-40...32°F)	LowLimitHeat	-35°C (-31°F)	R/W
3	AnalogValue_#2	1...6000 min	HeatersOffDelay	90 min	R/W
4	AnalogValue_#3	10...6000 min	ManualPeriodTime	240 min	R/W
5	AnalogValue_#6	10...1999 min	StaggeringTime	120 min	R/W
6	AnalogValue_#7	-40...35°C (-40...95°F)	TemperatureOutside	-	R
7	AnalogValue_#8	0...6000 min	HeatersOffTimeDelay	-	R
8	AnalogValue_#9	0...4	HeaterMode	0	R/W
9	AnalogValue_#20	-10...15°C (14...59°F)	InternalTemperature(T3)	-	R
10	AnalogValue_#24	1… 4194303	BacnetDeviceInstanceNumber	315000+MAC	R/W
11	AnalogValue_#29	0...2	TemperatureAquastatLogic	0	R/W
12	AnalogValue_#30	0...99	Sensors error	0	R/W
		0 – No error 1 – Internal sensor 2 – External sensor			
13	BinaryInput_#2	1-On,0-Off	SettingMode	-	R
14	BinaryInput_#3	1-On,0-Off	ShortTimeMode	-	R
15	BinaryInput_#4	1-On,0-Off	StageringMode	-	R
16	BinaryInput_#5	1-On,0-Off	StageringMode	-	R
17	BinaryInput_#8	1-On,0-Off	Aquastat_Signal	-	R
18	BinaryOutput_#0	1-On,0-Off	Heater 1	-	R
19	BinaryOutput_#1	1-On,0-Off	Heater 2	-	R
20	BinaryOutput_#2	1-On,0-Off	Heater 3	-	R
21	BinaryOutput_#3	1-On,0-Off	Heater 4	-	R
22	BinaryOutput_#4	1-On,0-Off	Heater 5	-	R
23	BinaryOutput_#5	1-On,0-Off	InternalHeater	-	R
24	BinaryValue_#0	1-On,0-Off	OnOff	0-Off	R/W
25	BinaryValue_#2	1-On,0-Off	C_F_Scale	0-Off	R/W
26	BinaryValue_#4	1-On,0-Off	CommissioningMode	0-Off	R/W
27	BinaryValue_#5	1-On,0-Off	RestoreDefaults	0-Off	R/W
28	BinaryValue_#14	1-On,0-Off	GroundFault	0-Off	R

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
meitav-tec

Notes

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com

Tel: (856) 2882882
Tel: +972-3-9626462
Fax: +972-3-9626620
support@meitavtec.com
www.meitavtec.com