T2798I2000

- PI (proportional plus integral) control action provides accurate, stable and comfortable temperature control.
- Compatible with series 70 direct-coupled damper / valve actuator like ML7161, ML7174, ML7420 / ML7421series ML7425, ML7984 series, N20010, S10010, M7410E series, CN7505, CN7510 / CN72 series CN7220 & CN7234 also VC79 series etc.
- Backlit LCD to display both setting and measured value.
- Adjustable Zero Energy Band, On/Off Differential, Proportional Band and Temperature Offset.
- Analog output can be forced manually to be convenient for installation & commissioning.
- Optional 2 to 10Vdc or 4 to 20mA direct acting and reverse acting analog output.
- Selectable internal and external temperature sensor.
- Wide temperature control range (-20 to 110 °C by using external temperature sensor) is suitable for extreme temperature control such as steam and ice water.
- Watch Dog Timer: to resume the controller from hanging condition.
- Brownout effect to avoid malfunctioning and care on power ON and power OFF.
- Pluggable terminal block allows pre-wiring outside of the controller.
- Compact size and slim design provide elegant and attractive modern style appearance.

APPLICATION

This standalone micro-controller based LCD temperature controller provides proportional plus integral (P+I) and on/off temperature control for commercial Heating, Ventilating & Air Conditioning System such as Hydronic Heating, Air Handling Unit, Heat Exchanger or Condensing Tower. This controller has a modulating analog 2 to 10Vdc or 4 to 20mA output and a 2A on/off output to realize various optional control functions including cool/heat changeover, heat/cool sequence control, emergency interlocking and auto-alarming control.
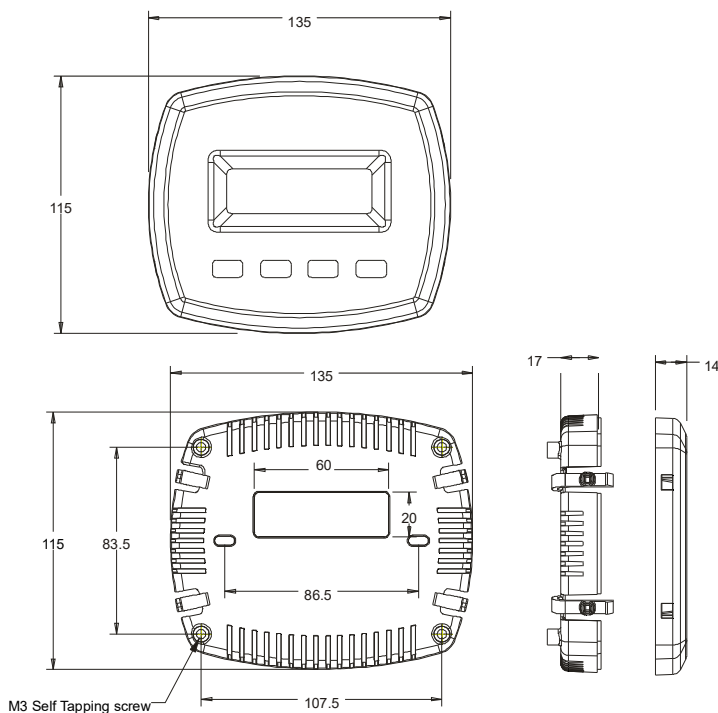
Technical Specification	
Inputs	1) Analog - 1 No. (Only PT1000) 2) Digital - 1 No. (Dry Contact)
Outputs	1) Analog - 1 No. 2) Digital - 1 No.
Setpoint Range	5-50ºC (internal temperature sensor) -20-110ºC (external temperature sensor)
Power Supply	>AC24V ±20%, 50/60Hz, 2 VA.
Analog output	2 to 10Vdc OR 4 to 20mA.
Digital Output:	2A, 24Vac
Mounting	Direct wall mounting with standard electrical mounting box [type-3 module].
Terminals:	Plug-in screw terminals are suitable for 1.5 square mm wire.

Technical Specification

IMPORTANT: The specifications given in this publication do not include normal manufacturing tolerances. Therefore, this unit may not exactly match the listed specifications. Also, this product is tested and calibrated under closely controlled conditions and some minor difference in performance can be expected if those conditions are changed.

MODEL: T2798I2000

Control Performance: This controller provides 4 to 20mA or 2 to 10Vdc Proportional plus Integral modulating control and 4(2) A On/Off control.

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Technical Specification	
Operating Ambient	0-50ºC, 5-80%RH.
Shipping & Storage	–20 - 45ºC, 5-95%RH
Accuracy	< / = +/- 0.30ºC
Remote Sensor	RTD PT1000. Maximum 15m cable length (line resistance < 4.5W)
Enclosure	>ABS Plastic, 2-piece. (IP30)
Operating Parameter	See TABLE 2 for installer selections.
Accessories	Duct Mount Remote Sensor PT1000. DIN Class B. Model # RSPT1000 Probe Length: 300mm (to be ordered separately)

Parameter	Selection
Zero Energy Band	1.5 or 3.0ºC
On/Off Differential	0.5 to 3.0ºC (0.5ºC step change)
Proportional Band	2.0 to 19.0ºC (0.1ºC step change)
Offset	-3.0 to 3.0ºC (0.5ºC step change)
Set Point Definition	Heating, Cooling, H/C midpoint, Heating/Alarming or Cooling/Alarming.
Main Sensor	Remote or Internal

DIMENSIONS:

135

115

135

60

20

115

83.5

86.5

107.5

17

14

M3 Self Tapping screw

WIRING TERMINAL:

1	2	3	4	5	6	7	8

1 & 2 – Relay Output
3 – 0Vac
4 – 24Vac
5 – Digital Input
6 – 2...10Vdc OR 4...20mA analog output 7 & 8 –
PT1000 Remote Sensor

Honeywell

INSTALLATION

The controller can be installed in any position on a flat surface using electrical box [Type-3 Module]. To measure room temperature by internal sensor and choosing wall mounting method, it is recommended to be installed 1.5m (about 5 ft.) above the floor in the area at average temperature conditions.
For all kinds of mounting method, the product must be installed in an area with good air circulation.

Do not install the controller where it may be affected by:

- Draughts or dead air spots behind doors and in corners.
- Hot or cold air from ducts.
- Radiant heat from sun or appliances.
- Concealed pipes and chimneys

CONTROL OPERATION

Input1 –Remote Temperature Sensor

The controller has an integral sensing device mounted internally. It is also possible to install a remote room or duct return sensor at different locations. See wiring diagram.
Note#1: The remote sensor should be PT1000 (Refer Accessories)

Input2- Emergency Input

Input2 is to connect with an On/Off dry contact for system error or emergency interlock control. If the contact is close, the controller will automatically close all output (or open to the maximum position in reverse mode) and cut off the power. The controller can only be restarted manually.

Note#2: If you don't want to use the interlock function/emergency input please use a jumper wire to connect input2 (terminal no.5) and neutral port (Terminal no.3), see wiring diagram.

Output1-Modulating Analog Output (2 to 10Vdc or 4 to 20mA)

Output1 is modulating P+I analog 2 to 10Vdc or 4 to 20mA. It can be selected by Selector switch. The output signal is normal mode (2 to 10Vdc or 4 to 20mA) or reverse mode (10 to 2Vdc or 20 to 4mA) selectable.
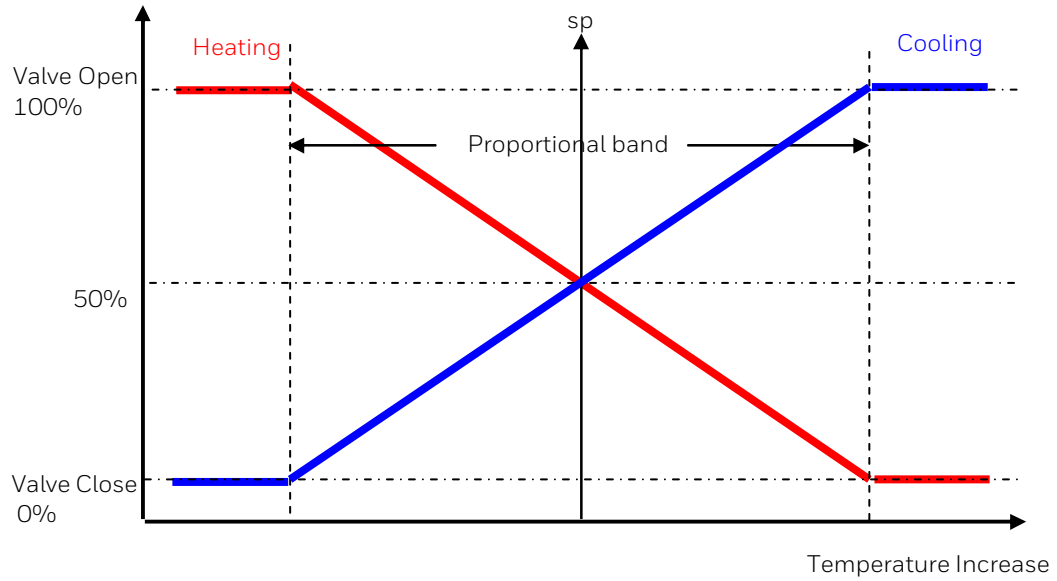
Output2- On/Off digital Output (2A, 24Vac)

Output2 is digital output with 24VAC 2A Contact rating, nominal capacity. It provides On/Off control for electric heater, on/off valve actuator or fan etc.
Output2 can provide limitation control through pre-setting a separate temperature limitation.

Heat / Cool Changeover of Output1

Output1 is suitable for Heat/Cool changeover (manually) control in 2pipe AHU, Zoning control or Hydronic Heating application. Wiring connection is shown in fig. With cooling or heating selected, the user set point (SP) will be positioned at the middle of proportional band. The output percentage is proportional to the temperature measured and decided by proportional band. The proportional band can be set from 2.0℃ to 19.0℃. The control logic is seen in Diagram

Diagram 1

Heating

Cooling

sp

Valve Open
100%

50%

Valve Close
0%

Proportional band

Temperature Increase

Wiring Diagram

0VAC
24VAC
D/I A/O
Pt1000 sensor

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

4 - 20 mA

2 - 10 VDC

110VAC /
230VAC

L
N
E

24VAC

0VAC

PT1000
REMOTE SENSOR

POWER
SUPPLY

2-10VDC /
4-20mA
Actuator
Unit
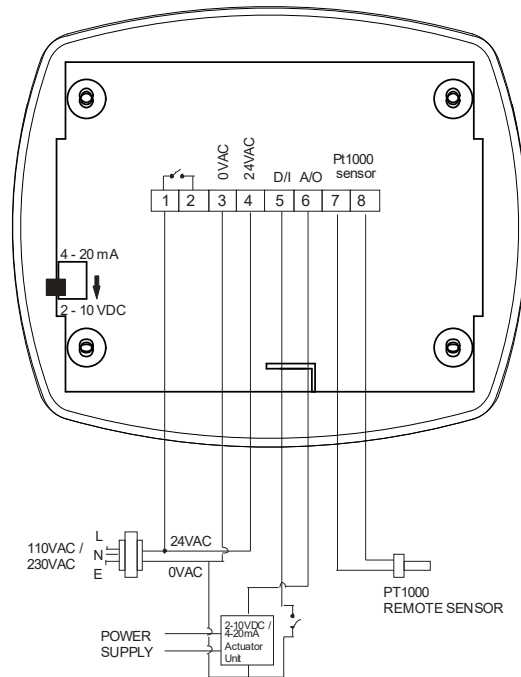
**Note: If Emergency IP [D/I] not used then
Add link between terminal No 5 & 3.**

Heating + Cooling Sequence control with Zero Energy Band

This kind of control requires Zero Energy Band (Z-Band). Z-Band is pre-set. For control purpose, the zero energy band is centered on the user set point (SP), so its value defines the effective heating (H SP) & cooling (C SP) set points. The cooling set point (C SP) will be positioned on the right side of Z-Band & the heating set point (H SP) on the left side of Z-Band. Z-Band can be set as 1.5°C or 3.0°C. Any change of set point will cause both heating and cooling set points to change in parallel. Either output1 or output2 can be used for cooling or heating control. The control logic is seen in Diagram 2 and 3.

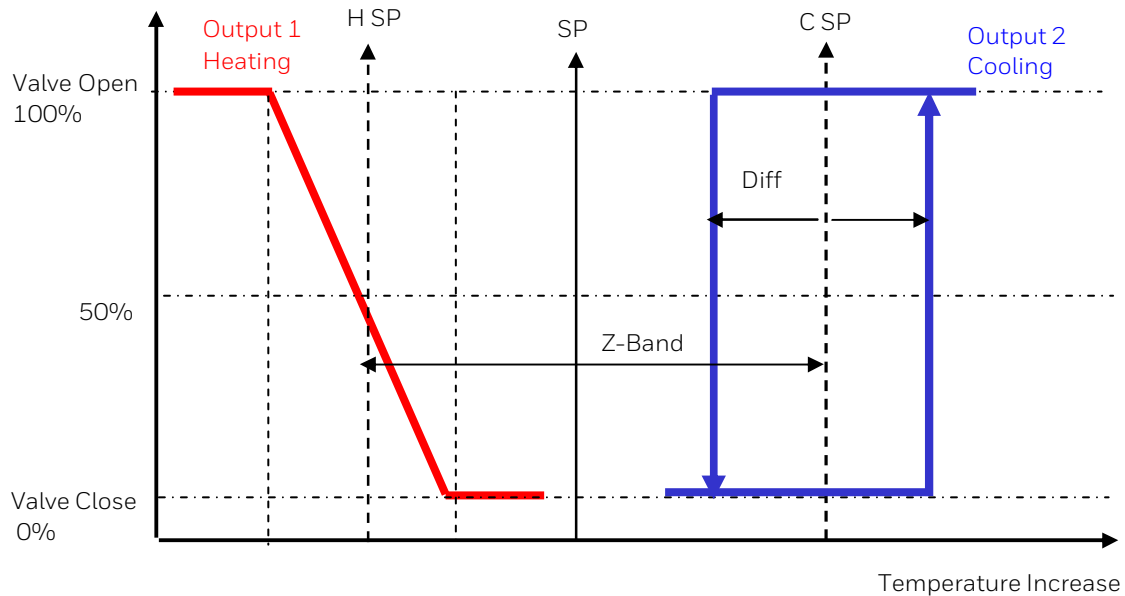## Diagram 2: Heating + Cooling Sequence Control.

Diagram 3: Cooling + Heating Sequence Control.
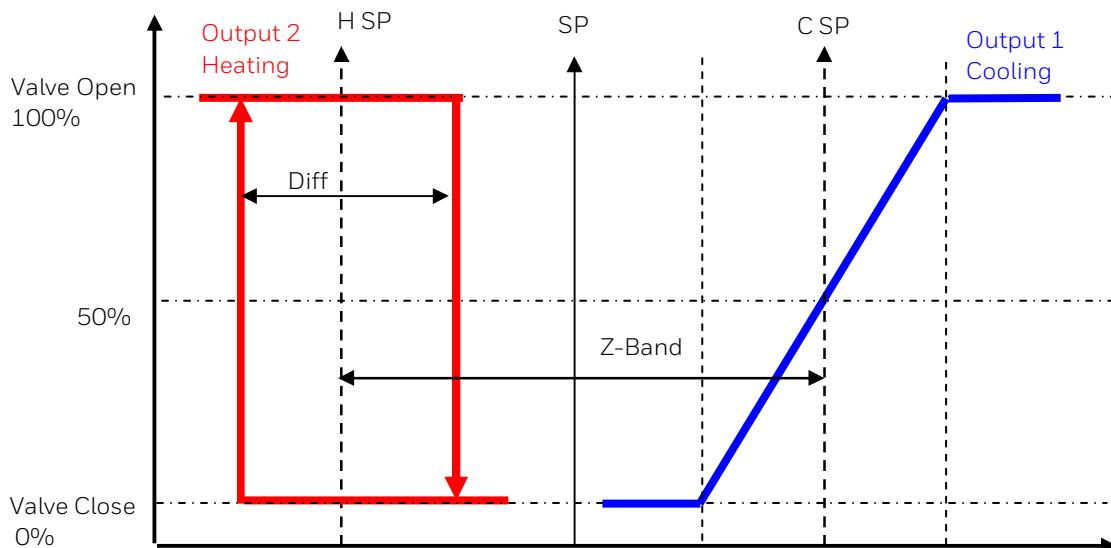
Heating/Cooling + Temperature Limitation Control

Output2 can be used for temperature limitation control. To select this function, 2 temperature set points must be pre-set. One is in the mid of proportional band of output1 (C SP / H SP) as main setting temperature. The second one is the temperature limitation of heating or cooling (A SP). In this mode if the measured temperature is higher (in heating mode) or lower (in cooling mode) than temperature limitation, output2 will close and output an alarming signal. The control logic is seen in Diagram 4 and 5.

Diagram 4: Cooling + Temperature Limit Control.
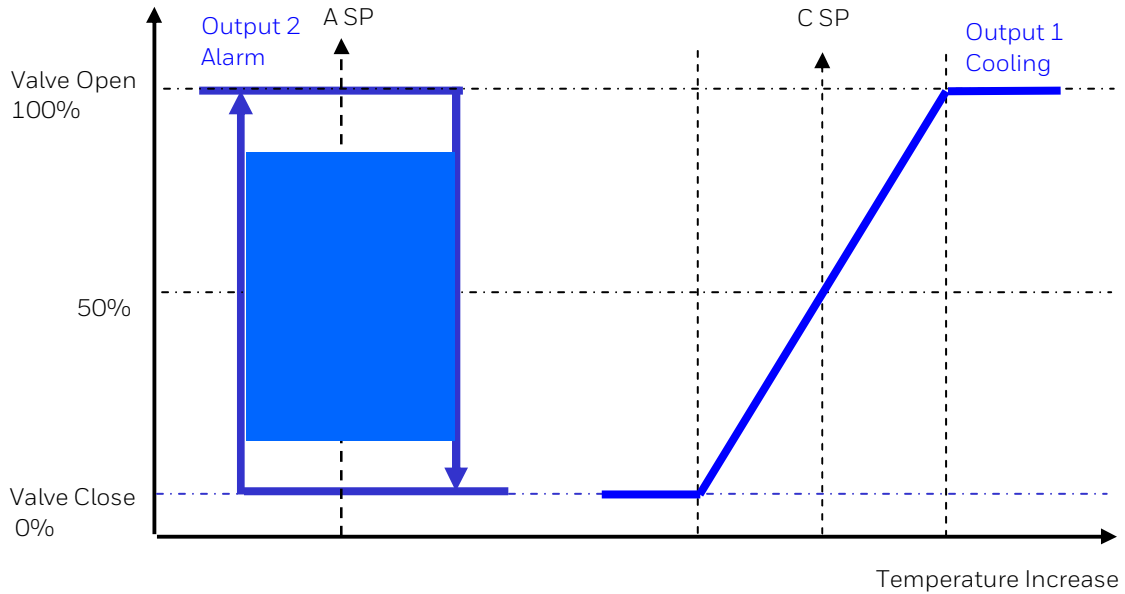
Diagram 5: Heating + Temperature Limit Control.
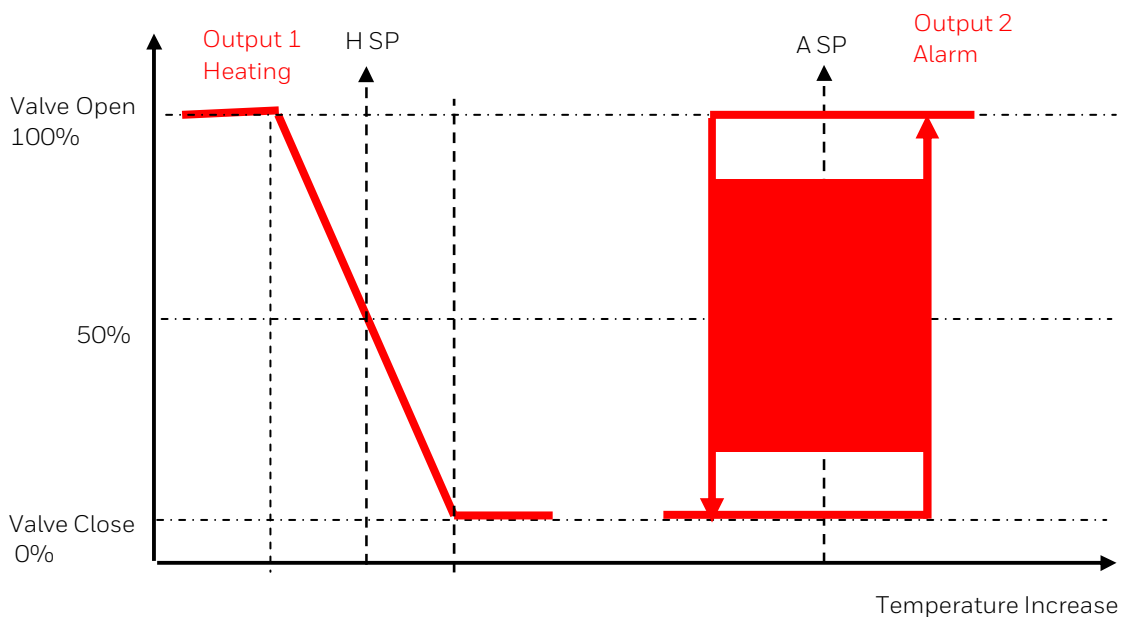
Wiring Diagram
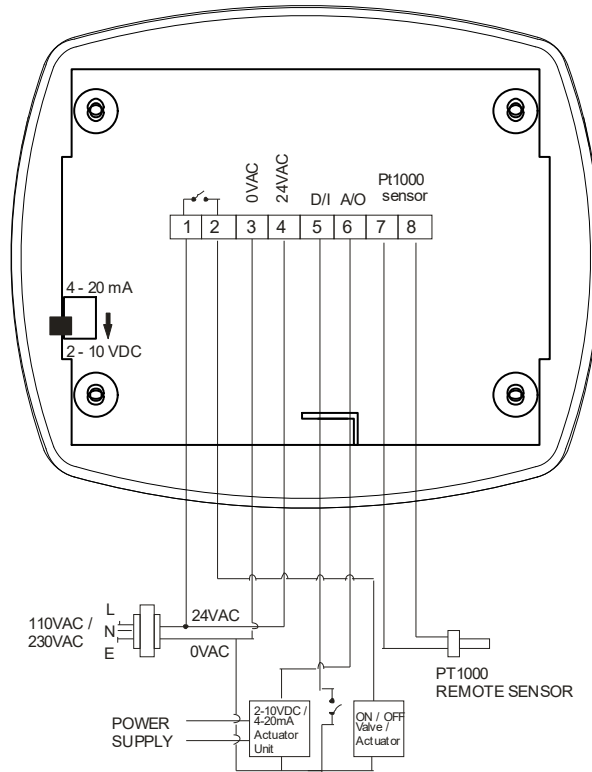
Note : If Emergency IP [D/I] not used then add link between terminal No 5 & 3.

II) T2798I2000 wiring with frequently used Actuators

A] WIRING DIAGRAM T2798I2000 WITH ML-7984
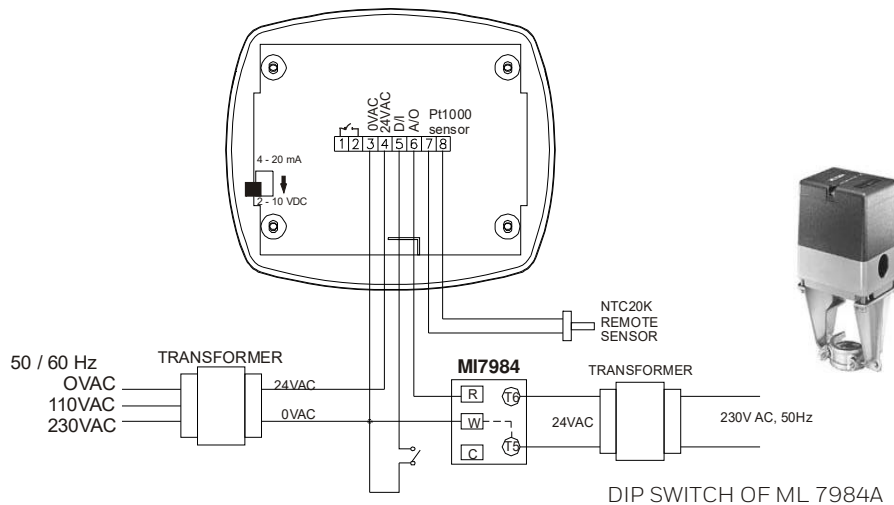
NOTE:
DIRECT ACTING FUNCTION (ACTUATOR STEM MOVES UPWARD WITH SIGNAL INCREASES) OR REVERSAL ACTING FUNCTION (ACTUATOR STEM MOVES DOWNWARDS WITH SIGNAL INCREASES)

DIP SWITCH OF ML 7984A

FUNCTION	DIP SWITCH CONFIGURATION
2-10V DC DIRECT ACTING	ON / OFF — switches 1 2 3 4
10-2V DC REVERSE ACTING	ON / OFF — switches 1 2 3 4

B] WIRING DIAGRAM T2798I2000 WITH ML–7421

ML-7421

%			
100	50	0	V
0	0	0	mA

0-10V / 0-20mA
2-10V / 4-20mA

10V / 20mA
10V / 20mA

4 - 20 mA
2 - 10 VDC

TRANSFORMER

50 / 60 Hz
0VAC
110VAC
230VAC

24VAC
0VAC

PT1000
REMOTE
SENSOR

TRANSFORMER
L
24VAC
N
230VAC, 50Hz

C] WIRING DIAGRAM T2798I2000 WITH M7410E

4 - 20 mA
2 - 10 VDC

M7410E

100 - 0%
0 - 100%

0 - 10V
2 - 10V

0 - 100%
100 - 0%

0 - 10V
2 - 10V

TRANSFORMER

50 / 60 Hz
0VAC
110VAC
230VAC

24VAC
0VAC

PT1000
REMOTE
SENSOR

GREEN
BROWN
WHITE

NOTE:
SELECT 2-10V OPTION FOR
USING M7410E with T2798I2000
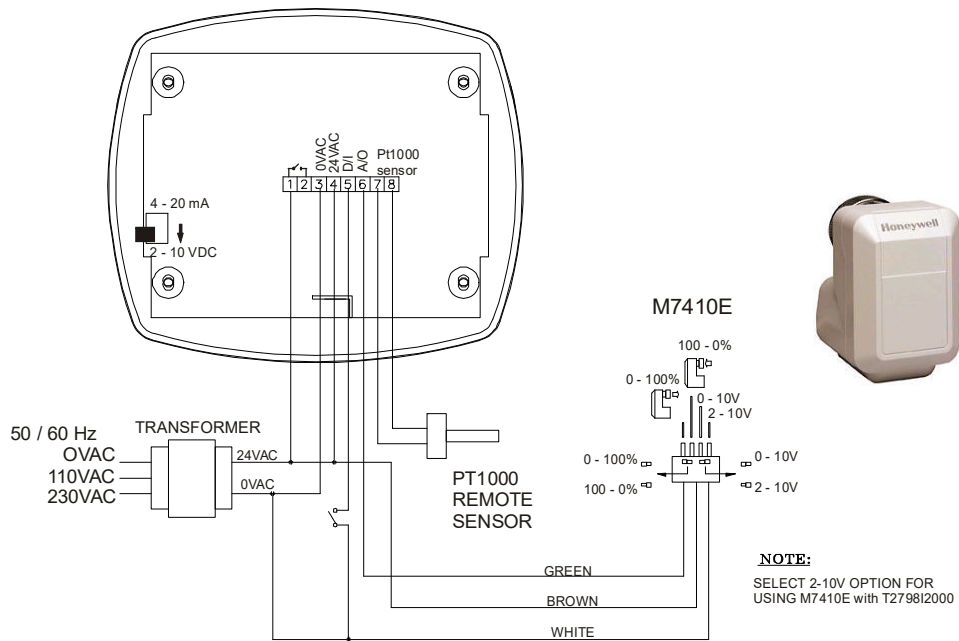
D] WIRING DIAGRAM T2798I2000 WITH N10010/N20010/N34010/CN7510

CN-7510

0VAC
24VAC
D/I
A/O
Pt1000 sensor

1 2 3 4 5 6 7 8

4 - 20 mA

2 - 10 VDC

HOT
COM
INPUT
FEEDBACK

1 2 3 4 5

PT1000
REMOTE
SENSOR

To IMS
optional

50 / 60 Hz
0VAC
110VAC
230VAC

TRANSFORMER

24VAC

0VAC
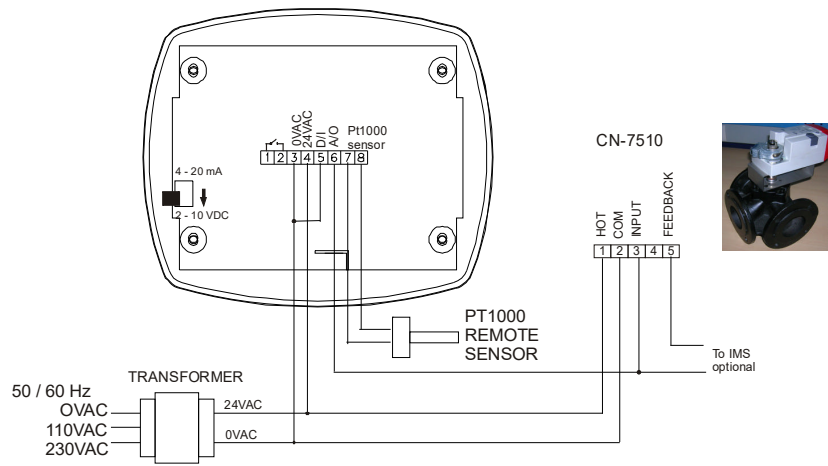
E] WIRING DIAGRAM T2798I2000 WITH VC–7934

0VAC
24VAC
D/I
A/O
Pt1000 sensor

1 2 3 4 5 6 7 8

4 - 20 mA

2 - 10 VDC

VC-7934

HOT
COM
INPUT

1 2 3

PT1000
REMOTE
SENSOR

BLACK

50 / 60 Hz
0VAC
110VAC
230VAC

TRANSFORMER

24VAC

0VAC

BROWN

BLUE
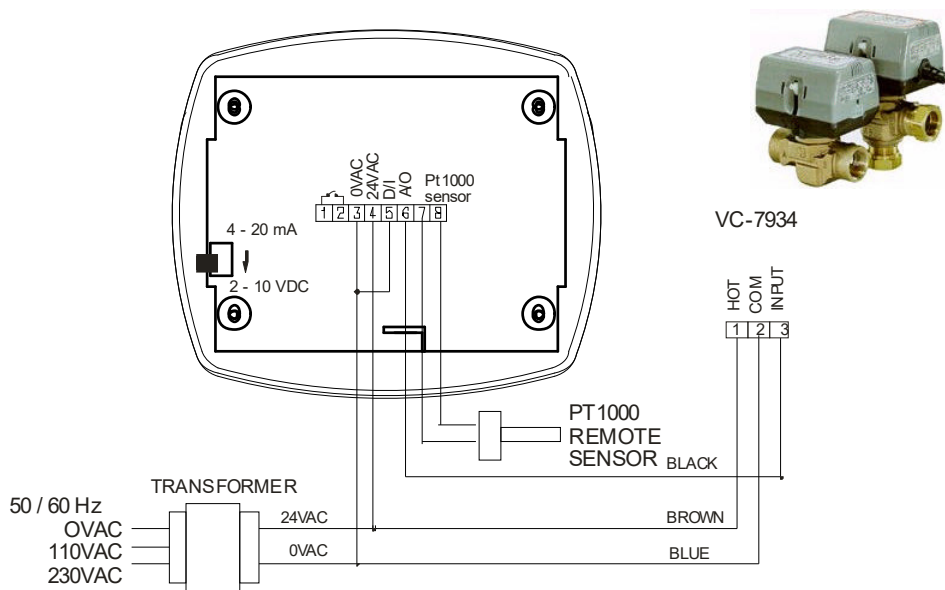
Installer Set-Up

1. Power ON/OFF :

- Connect the main power. Display will show "Honeywell", as shown in fig.1, for 5 Sec. Then display will show the Process value (PV) and Set point (SP) as shown in fig.2

			H	o	n	e	y	w	e	l	l				

Fig. 1

2. Set Point configuration (SP):

- Press ▲ key one time to step up the set point value by 0.1°C. If ▲ pressed continuously for more than ten steps then the value will increment by the step of 1.0°C up to 60.0°C (for internal sensor) or 110.0°C (for external sensor). Release ▲ key to stop the increment of temp set value.

- Press ▼ key one time to step down set point value by 0.1°C. If ▼ pressed continuously for more than ten steps then the value will decrement by the step of 1.0°C up to 10.0°C (for internal sensor) or –20.0°C (for external sensor). Release

  ▼ key to stop decrement of temp set value.
- Press "ENTER" key to save the set value.

P	V		:						3	0	.	2	°	C
S	P		:						1	9	.	0	°	C

Fig. 2

3. **Zero Energy Band setting:**
   - Press "SELECT" to choose "Zero Energy Band Setting", the display will show as in fig.3

   - Press ▲ key one time to switches from 1.5°C to 3.0°C. key
   - Press ▼ one time to switches from 3.0°C to 1.5°C.

   - Press "ENTER" key to save the set value.

P	V		:						3	0	.	2	°	C
Z	–	B	A	N	D					3	.	0	°	C

Fig. 3

4. **Differential setting:**
   - Press "SELECT" to choose "Differential Setting", the display will show as in fig.4
   - Press ▲ key one time to step up the differential setting by 0.5°C, it will stop incrementing at 3.0°C. The range is 0.5 to 3.0 °C.
   - Press ▼ key one time to step down the differential setting by 0.5°C. It will stop decrementing at 0.5°C. The range is 3.0 to 0.5 °C.
     - Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	°	C
D	I	F	F							1	.	0	°	C

Fig. 4

5. **Proportional Band Setting:**
   - Press "SELECT" to choose "Proportion Band Setting", the display will show as in fig.5

   - Press ▲ key one time to step up the Proportional band by 0.1ºC. If ▲ pressed continuously for more than ten steps then the value will increment by the step of 1.0ºC up to 19.0ºC. Release ▲ key to stop the increment of the value.

   - Press ▼ key one time to step down Proportional Band by 0.1ºC If ▼ pressed continuously for more than ten steps then the value will decrement by the step of 1.0ºC up to 2.0ºC. Release ▼ key to stop the decrement of the value.

   - Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	º	C
P	-	B	A	N	D				1	0	.	0	º	C

Fig. 5

6. **Offset Setting:**
   - Press "SELECT" to choose "Offset Setting", the display will show as in fig.6

   - Press ▲ key one time to step up Offset by 0.1ºC. If ▲ pressed continuously for more than ten steps then the value will increment by the step of 1.0ºC up to 3.0ºC. Release ▲ key to stop increment of the value. The range is –3.0 to 3.0 ºC.

   - Press ▼ key one time to step down Offset by 0.1ºC. If ▼ pressed continuously for more than ten steps then the value will decrement by the step of 1.0ºC up to -3.0ºC. Release ▼ key to stop increment of the value. The range is 3.0 to –3.0 ºC.

   - Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	º	C
O	F	F	S	E	T				-	1	.	0	º	C

Fig. 6

7. **Mode Setting:**
   - Press "SELECT" to choose "MODE Setting", the display will show as in fig.7
   - Press ▲ key one time to step up. The total number of modes is 6. It will stop incrementing at last mode i.e. H/AL mode.
   -

MODES:	Output 1 function:	Output 2 function:
COOL	Cooling	No Function
HEAT	Heating	No Function
C/H	Cooling	Heating
H/C	Heating	Cooling
C/AL	Cooling	Low Temp. limit Alarm
H/AL	Heating	High Temp. limit Alarm

   - Press ▼ key one time to step down. The total number of modes is 6. It will stop decrementing at first mode i.e. COOL mode. -
   Press "ENTER" key to save the setting value. -

P	V		:						3	0	.	2	º	C
M	O	D	E						C	O	O	L		

Fig. 7

8. **Sensor setting :**

- Press "SELECT" to choose "Sensor Setting", the display will show as in fig. 3
- Press ▲ key one time to switches from INT to EXT. :
  INT   Internal sensor
  EXT   : External sensor
- Press ▼ key one time to switches from EXT to INT.

- Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	°	C
S	E	N	S	O	R				I	N	T			

Fig. 8

9. **Reverse Action Setting :**

- Press "SELECT" to choose "Reverse Setting", the display will show as in fig. 9

- Press ▲ key one time to switches from OFF to ON.
  OFF   : Output1 in normal mode, i.e. 2 - 10Vdc or 4 - 20mA
  ON   : Output in reversing mode, i.e. 10 - 2Vdc or 20 - 4mA. key
- Press ▼ one time to switches from ON to OFF.

- Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	°	C
R	E	V	E	R	S	E			O	F	F			

Fig. 9

10. **Display Setting :**

- Press "SELECT" to choose "Display Setting", the display will show as in fig.10
- Press ▲ key one time to switches from OFF to ON.
  OFF   : Normal mode, as shown in fig. 2.
  ON   : Percentage mode, output1 is percent value (2Vdc or 4mA – 0% & 10Vdc

  or 20mA – 100%) as shown fig.11.
- Press ▼ key one time to switches from ON to OFF.
- Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	°	C
D	I	S	P	L	A	Y			O	F	F			

Fig. 10

P	V		:						3	0	.	2	°	C
A	0		:									9	1	%

Fig. 11

11. Manual Setting:

- Press "SELECT" to choose "Manual Setting", the display will show as in fig.12
- Press ▲ key one time to switches from OFF to ON.
  OFF: Manual OFF
  ON : Manual ON

- Press ▼ key one time to switches from ON to OFF.
- Press "ENTER" key to save the setting value.
- If manual on, the display will show as in fig.13

	P	V		:						3	0	.	2	°	C
	M	A	N	U	A	L							O	N		

Fig. 12

	P	V		:						3	0	.	2	°	C
	A	O		:									9	1	%

Fig. 13

- If manual ON, press ▲ key one time to step up the display value by 1%. If ▲ pressed continuously for more than ten steps then the value will increment by the step of 1.0% up to 100%. Release ▲ key to stop the increment of value.
- If manual ON, press ▼ key one time to step down the display value by 1%.
- If ▼ press continuously more than ten steps then the value will decrement by the step of 1.0% up to 0%. Release ▼ key to stop the decrement of value.
- After 90 minutes of manual ON operation the controller will return to manual OFF mode automatically.

12. F1 Setting :

- Press "SELECT" to choose "F1 setting", the display will show as in fig.14
- Press ▲ key one time to step up the Integral time by 0.1Sec. If ▲ pressed continuously for more than ten steps then the value will increment by the step of 1.0Sec. up to 60.Sec. Release

  ▲ key to stop the increment of value.
  The range is 0.1 to 60-Sec.
- Press ▼ key one time to step down the Integral time by 0.1Sec. If ▼ pressed

  continuously for more than ten steps then the value will decrement by the step of

  1.0Sec. up to 0.1Sec. Release to ▼ key to stop the decrement of value. The range is 60 0.1Sec.

- Press "ENTER" key to save the setting value.
- This value setting shows how long the output1 will update the output value

	P	V		:						3	0	.	2	°	C
	F	1	(	I	)					1	.	0	S	E	C

Fig. 14

13. F2 Setting :

- Press "SELECT" to choose "F2 setting", the display will show as in fig.15
- Press ▲ key one time to step up the Alarm Set point by 0.1°C. If ▲ is pressed continuously for more than ten steps then the value will increment by the step of 1.0°C up to 60.0°C (for internal sensor) or 110.0°C (for external sensor). Release ▲ key to stop the increment of value.

- Press ▼ key one time to step down the Alarm set point by 0.1°C. If ▼ pressed continuously for more than ten steps then the value will decrement by the step of 1.0°C up to 10.0°C (for internal sensor) or -20.0°C (for external sensor).
  Release ▼ key to stop decrement of value.
- Press "ENTER" key to save the setting value.

P	V		:						3	0	.	2	°	C
F	2								3	0	.	0	°	C

Default Setting:

Setting Parameters	Default Value
Z-BAND	1.5°C
DIFF	0.5°C
P-BAND	2.0°C
OFFSET	0°C
MODE	C/AL (COOL+ALARM)
REVERSE	OFF
DISPLAY	OFF
MANUAL	OFF
SP	21°C
F1 (I)	15 SEC
ALARM (F2)	10°C

IMPORTANT: Before setting, please check the following points.
1. Inspect the controller visually & check the push button before connecting the main power.
2. There should not be any abnormal phenomena or obvious shipping damage.
3. Check the Selector Switch & make sure that the switch is set at the right position.

T2798I2000

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