



DEF-02N

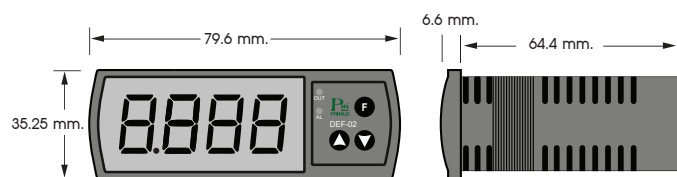
TECHNICAL SPECIFICATION

Power Supply		220 VAC $\pm 15\%$ 50/60 Hz	
		15-30 VAC/10-30 VDC	
Power consumption		3 VA	
Display		7 Segment Size 0.39 Inch, 4 Digit, 1 Row	
Input	Input Type	None Decimal Point	Decimal Point
	0-20 mA	-1999~9999	-19.99~99.99
	4-20 mA		-1.999~9.999
	0-10 VDC		-199.9~999.9
	Accuracy	$\pm 0.1\%$ of Full Scale @ room Temp. (25 °C)	
	Sampling Time	250 mSec / 0.25 Sec	
	Input Volt Impedance	10 k Ω	
	Input Current Impedance	120 Ω	
Output	DC Source for Sensor	12 VDC , 50 mA	
	Relay Output	1 Output 3A/250VAC	
	Output Function	Heating / Cooling	
	Hysteresis	0 to 100 °C (ON/OFF)	
	Relay Alarm	1 Alarm 3A/250VAC	
Ambient Operation	Temperature	-10 °C to 60 °C	
	Humidity	<85% RH Non-Condensing	
Ambient Storage	Temperature	-20 °C to 80 °C	
	Humidity	<85% RH Non-Condensing	
Protection Degree	Front Protection Rating	IP52	
	Case Protection Rating	IP30	
Installation		Pannel Mounting	
Material		ABS-V0	
Size		33 x 75 x 65 mm.	
Weight		230 g.	

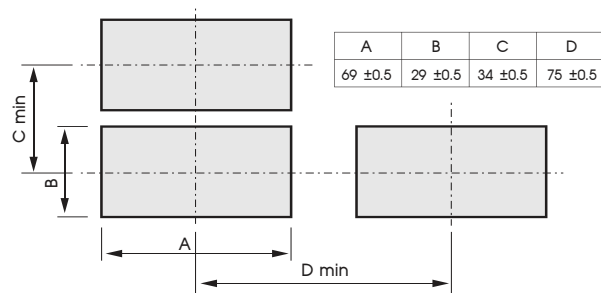
Table 1. Select input sensors and setting range.

Symbol	Input Type	Setting Range/Display Range	
		Non-decimal point	Decimal point
00	0-20mA	-1999~9999	-199.9~999.9
01	4-20mA		-19.99~99.99
02	0-10VDC		-1.999~9.999

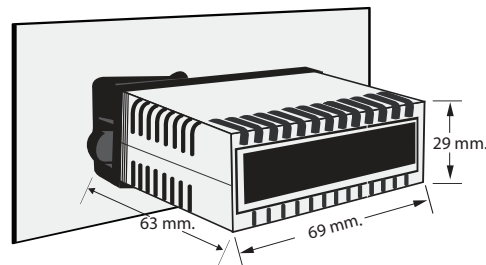
DIMENSION



CUTTING PANEL



INSTALLATION



DESCRIPTION

- DEF-02N is a digital display and controller for 0-20 mA, 4-20 mA, and 0-10 VDC inputs.
- 4 digits 7-Segment LED Display.
- Temperature range: see Table 1.
- Decimal point adjustable.
- Compact design fits small cabinet front panels.
- Main relay (1 set) can function as control or alarm; alarm relay is available in the optional model.
- Hysteresis time: 0-99.59 min.
- Relay output selectable for heating ,cooling or hysteresis by unit or time.

OPERATION

DEF-02N is a compact process controller designed for ON/OFF control.

It offers two control modes: Heating/Cooling and Alarm functions, selectable via the main relay. For models equipped with Option-B, an additional alarm relay is provided, offering extended functionality beyond the main relay.

ON/OFF Control operation

ON/OFF control of the DEF-02 can be configured in Direct or Inverse

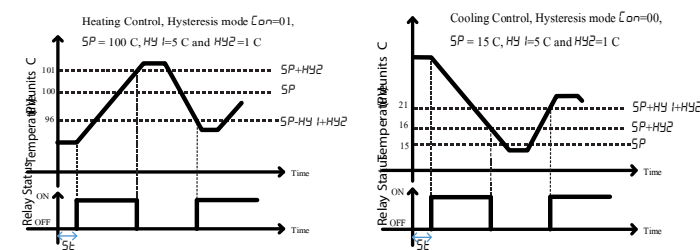
And the ON/OFF control function offers two selectable Control Modes:

- Hysteresis Mode** is the setting interval between ON and OFF. It can set It can set since 0-100. The operation shows as picture 1.
- Time Mode** uses Delay Time ON ($dt1$) and Time OFF ($dt2$) at the Setpoint Value (SP). Time is set in minutes(min), with a range from 00:00 to 99:59 minutes. The two digits before the decimal point represent the minute value, and the two digits after represent seconds.

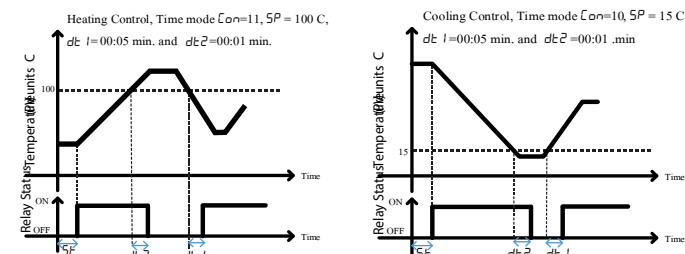
The value can be set from 0 to 99 minutes, with two digits after the decimal point representing seconds from 00 to 59. The operation of this function is illustrated in Picture 2.

The controller allows configuration of a Start Delay Time, measured in minutes, to delay the operation of the Main Relay and Alarm Relay when the device is powered on for the first time. **This function helps prevent rapid ON/OFF cycling of actuators, which may occur due to sudden power loss or unintended power-on. Such conditions can cause immediate switching that may damage equipment such as compressors or heaters.**

The Start Delay Time can be set from 00.01 to 99.59 minutes. The two digits before the decimal point represent the minute value, which can be set from 0 to 99. The two digits after the decimal point represent the second value, which can be set from 00 to 59 seconds when the minute value is . greater than 0, and from 01 to 59 seconds when the minute value is 0.



Picture 1 shows ON/OFF Controller picture in Hysteresis mode



Picture 2 shows ON/OFF Controller operation by use time is Hysteresis. The unit is minute.

Alarm system operation

The operation of Alarm system user can choose operation form 8 forms by show the operation as picture 3 and can be classified into 2 type are

- Deviation** refers to the value used to trigger or deactivate the alarm operation , relative to the Setpoint Value (SP). There are four alarm modes available: High-Low, High Alarm, Low Alarm, and High-Low, Range Alarm. For example, if the setpoint (SP) is 100°C, the alarm mode is set to High Alarm ($FU=2$), and the High Alarm Limit (HI) is set to 10, the Alarm Relay will activate when the temperature exceeds 110°C. If the user changes the SP to 120°C, the alarm will then activate when the temperature exceeds 130°C. Further details and operating thresholds for each alarm mode can be found in the Alarm Function Table.

- Absolute** refers to a fixed value used to determine the operation of the relay, independently from the Setpoint Value (SP). In this mode, the relay operates based on the specified alarm temperature, without involving the SP value in the calculation. There are four available alarm modes: High-Low Alarm, High Alarm, Low Alarm, and High-Low Range Alarm. For example, if the user sets the Setpoint (SP) to 100°C, selects High Alarm ($FU=6$), and sets the High Alarm Limit (HI) to 110°C, the Alarm Relay will activate when the temperature exceeds 110°C, regardless of the SP value.

The relay will operate when the temperature exceeds 110°C. If the user changes the Setpoint (SP) to 120°C, the Alarm Relay will still activate at 110°C, since the alarm value is fixed and does not depend on the SP. For more information, refer to the Alarm Output section.

How to choose work function of Main Relay and Alarm Relay

The relay of the DEF-02 can be configured to operate in either ON/OFF control mode or alarm function mode. The operation mode of the Main Relay can be selected through the device settings.

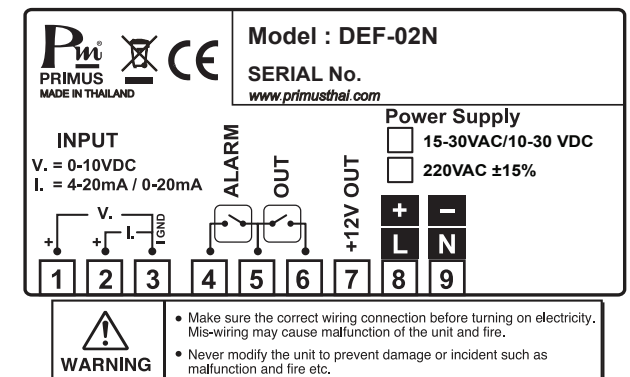
- DEF-02N-A model is equipped with a main relay that can be configured to operate either as a control output or as part of the alarm function. When set to the alarm mode using the Absolute type, the relay can function in one of four forms: Absolute High-Low Alarm, Absolute High Alarm, Absolute Low Alarm, and Absolute High-Low Range Alarm. These modes allow the relay to respond to specific fixed temperature thresholds, independently from the setpoint value.

- DEF-02N-A-B is equipped with both a Main Relay and an Alarm Relay. The operation mode can be selected based on the desired function as

- If the Main Relay is set to Output Function, it can be configured to control in either Heating or Cooling mode. In this case, the Alarm Relay can be configured to operate in any of the 8 available alarm types, which include both Deviation and Absolute alarms, as detailed in the Alarm Function Table.

- If the Main Relay is set to Alarm Function, both the Main Relay and the Alarm Relay can be configured to operate using any of the 4 Absolute Alarm types, as specified in the Alarm Function Table.

WIRING DIAGRAM



ORDERING CODE

DEF -02N- A-	B	-	
... Remark		CODE	SUPPLY
		24	15-30 VAC/10-30 VDC
		220	220 VAC $\pm 15\%$ 50/60 Hz
A=1 Output Relay /Alarm Standard model		CODE	OPTION
		B	Alarm

• Power ON

When the device start operation (start supply power)
The device will shows **8888** flash light for 4 second after that will show Input type

• Show Version

rEu0 → **00**
The device will show lasted version

• Show Input Type

The device shows **inp** and the number of Input Type that was set previously after that device will shows measured PV.

• Operation mode display

Display measured PV in the present by show decimal point result depend on the setting Parameter **dP** from previous setting. When needs to edit or look the Setpoint value (SP) the user can do by press **▲** or **▼**

Press **▲** or **▼**
No pressing for 10 Sec.

Setpoint Value (SP)

5P → **100**
Press **▲** **▼** set Setpoint value follow while setting value the display will shows SP Value toggle with the letter **-5P-**

1. Input type setting

inp → **00**

Choose Input Type
00 is 0-20 mA.
01 is 4-20 mA.
02 is 0-10 VDC
Range for each Input Type
For detail please see Input Table 1

2. PV correction

PuS → **0**

PuS compensate PV value at from device to made the result follow as require this value will include with PV value which use to display and control Max-Min value that can set depend on Input Type for detail please look at Input Table 1

3. Filter Input

LPF → **0**

LPF is number of work sequence of Digital Filter of Process Value (PV) made the measured value has slow changed by setting since 0 -15 Sec.

4. Decimal point selection

dP → **0**

Use to set the display to show decimal point or not. the user can choose by

- 0 Shows temperature 4 digits no decimal point.
- 0.0 Shows temperature 4 digits 1 decimal point.
- 0.00 Shows temperature 4 digits 2 decimal point.
- 0.000 Shows temperature 4 digits 3 decimal point.

5. Key lock setting

LoC → **0**

Use to lock the Key operation. If made user can't use key is able to choose 4 type are

- 0 No lock key (None)
- 1 has lock key every parameter (all lock)
- 2 has lock key at Operate parameter only (Operation mode lock only)
- 3 has lock key at Setting parameter only (except operation mode)

6. SV/PV low limit setting

SLL → **0**

Low limit setting

7. SV/PV high limit setting

SLH → **500**

High limit setting

8. Start Time

St → **0001**

Start time use to delay the operation of Main Relay and Option Relay while start turn on. It can set 00.01 to 99.59 Min

9. Relay Function Setting

rL → **10**

use to set the operation Main Relay and Alarm Relay. It is able to choose by

- Alarm relay
0 : None
1 : Alarm
- Main relay
1 : Alarm
2 : Control

10. Control Setting

Con → **10**

Control mode
0 : Hysteresis
1 : Time

Control type
0 : Cooling
1 : Heating

If the user choose Control mode is Hysteresis mode. User can set Parameter **Hy1**, **Hy2**, and if user choose Control mode in Time. The user can set Parameter **dt1** **dt2**.

11. Hysteresis 1 for Output Control

Hy1 → **0**

is the value for setting ON point of Relay
When user choose Control Mode is Hysteresis for control PV follow as require by set it since 0 to 999.9

12. Hysteresis 2 for Output Control

Hy2 → **0**

is the value for setting OFF point of Relay
When user choose Control Mode is Hysteresis for control PV as require by setting since -199.9 to 999.9

13. Time delay on output

dt1 → **0**

is Timer value use to delay ON time of Relay when choose Control Mode is Time by setting since 00.00 to 99.59 Min

14. Time delay off output

dt2 → **0**

is Timer value use to delay OFF time of Relay when choose Control Mode is Time by setting since 00.00 to 99.59 Min

15. Function Alarm use by Main Relay

Fu1 → **00**

use to choose Function Alarm for Main Relay it will be used when Main Relay operate as Alarm lock detail at Parameter **rL** for Main Relay can choose Absolute type only.

- PV Alarm functions
1 to 4 can not use in Main Relay
1 : Absolute value High Low Band Alarm
2 : Absolute value High Alarm
3 : Absolute value Low Alarm
4 : Absolute value High Low Range Alarm
- Additional Alarm functions
0 : None
1 : Stand-by sequence

16. Alarm high limite setting use by Main Relay

H11 → **0**

use to calculate high limit for alarm operate by can set max-min follow phase of measure Input Type value see detail at Table1

17. Alarm low limite setting use by Main Relay

Lo1 → **0**

use to calculate low limit for alarm operate by can set max-min follow phase of measured Input Type value see detail at Table1

18. Hysteresis Alarm use by main Relay

HS1 → **0**

use for calculate Alarm point by setting since 0 to 10 or 0.0 to 10.0

19. Function Alarm use by Alarm Relay

Fu2 → **00**

use for choose Function Alarm to Alarm Relay setting Main Relay operate as Alarm by Alarm Relay will choose only Absolute type but if choose Main Relay is Control will choose the operation both Deviation and Absolute type

PV Alarm functions
1 : Absolute value High Low Band Alarm
2 : Absolute value High Alarm
3 : Absolute value Low Alarm
4 : Absolute value High Low Range Alarm
5 : Deviation High Low Alarm
6 : Deviation High Alarm
7 : Deviation Low Alarm
8 : Deviation High Low Range Alarm

Additional Alarm functions
0 : None
1 : Stand-by sequence

20. Alarm high limite setting use by Alarm Relay

H12 → **0**

For Alarm Relay use to calculate high limit for alarm operation by setting max-min follow phase of measured Input Type value see detail at Table1

21. Alarm low limite setting use by Alarm Relay

Lo2 → **0**

For Alarm Relay use to calculate low limit for alarm operate by setting max-min follow phase of measured Input Type value see detail at table1

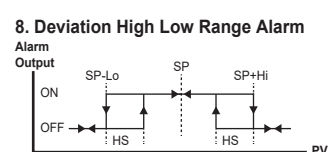
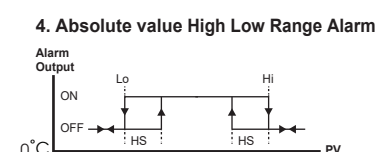
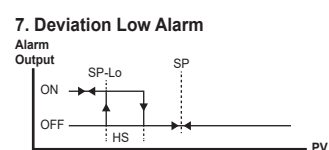
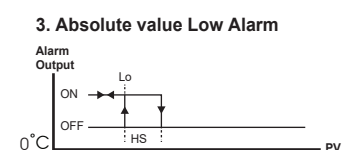
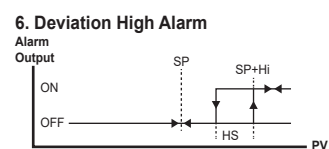
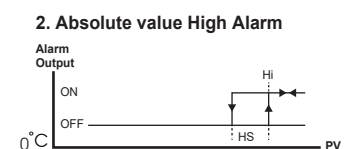
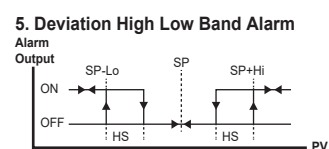
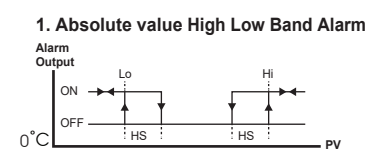
22. Hysteresis Alarm use by Alarm Relay

HS2 → **0**

For calculate Alarm operation point by set since 0 to 10 or 0.0 to 10.0

■ ALARM OUTPUT : Process value (PV) to be used as Alarm Output.

Stand-by sequence : After starting operation of step, alarm output does not turn on unless the process value reach the value of OFF position of alarm output.



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