



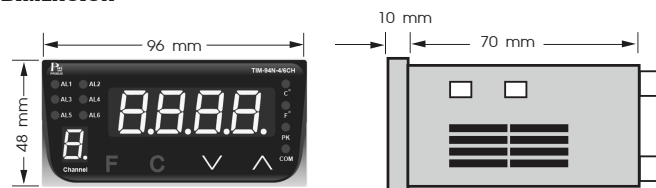
4 CHANNELS DIGITAL INDICATOR

Primus
User Manual

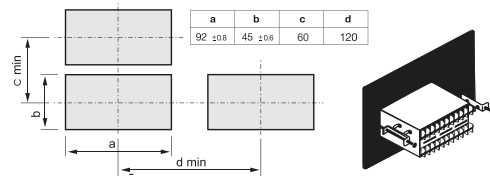
TECHNICAL SPECIFICATION

Power Supply		90-250 VAC 50/60Hz
		24 VAC/VDC ±15%
Power Consumption		3VA
Display		7-Segment, 4 Digit, Size 0.56 Inch
(Show Channel Input)		7-Segment, 1Digit, Size 0.39 Inch
		4 LED (Show Alarm output)
Input	Channel Input	Isolate 4 Channel Input
	Thermocouple	K, J, R, T, N, S, E
	RTD	PT100, PTC(1K), 5Kohm(±1% FS)
	Voltage	0-75 mV, 0-150 mV, 0-1 VDC, 0-5 VDC,
		0-10 VDC, ±0-75 mVDC, ±0-150 mVDC,
	Current	±0-1 VDC, ±0-5 VDC, ±0-10 VDC,
		0-20mA, 4-20mA
	Range	Please see detail in Table1
	Accuracy	±0.25 % of Full Scale @ Room Temperature (25 °C)
	Sampling Time	500 mSec
Communication	Protocol	MODBUS RTU
	Baud Rate	4800, 9600, 19200, 38400, 57600 bps
	Parity	None
	Stop Bits	1
	Data Bits	8
	Support Device Node	255
Output	Relay Alarm	4 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		Panel Mounting
Material		ABS-V0
Size		48 x 96 x 70 mm.
Weight		240 g.

DIMENSION

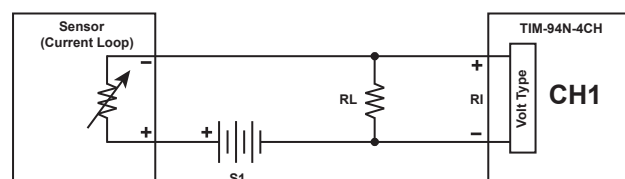


CUTTING PANEL



Connecting the Input in Current Loop

1. Set the Input to 0-5V or 0-10V
2. Connect a 100-500 Ω load resistor (depending on the Sensor) to the Input Channel that will be used for the Current Loop.
3. Measure the total impedance of the Input Channel connected to the resistor (ensure that only the Channel to be measured is turned on).
4. Once the impedance value is obtained, substitute it into the formula.



Formula for setting the Input Scale to enable Current Loop operation when R_L = Resistor Load for the Sensor Current Loop, to prevent the sensor from shutting down while the indicator switches to read another channel.

R_I = Input impedance. The internal resistance of the device can be measured when the device is set to On for only the channel being measured.

S_1 = Power supply that provides voltage for the sensor to operate

InH = High limit setting in the analog input limiter

InL = Low limit setting in the analog input limiter

$RT = R_L // R_I$, obtained from measuring the R_I location

Formula

$$InH = RT \times 20mA$$

$$InL = RT \times 4mA$$

so $InH = 240\Omega \times 20mA$

set $InH = 4.8V \#$

$$InL = 240\Omega \times 4mA$$

set $InL = 0.96V \#$

5. Set the output scale as required.

DESCRIPTION

- Device for measuring and displaying standard analog signals, temperature values, and various process parameters, with 4 channels.
- Universal Input can accept all types of inputs in a single device by selecting the type via the keypad.
 - Thermocouple : K, J, R, T, N, S, E
 - RTD : PT100, PTC 1K, 5Kohm(±1% FS)
 - Current Analog : 0-20 mA, 4-20 mA
 - Voltage Analog : 0-75 mV, 0-150 mV, 0-1 VDC, 0-5 VDC, 0-10 VDC, ±75 mV, ±150 mV, ±1 VDC, ±5 VDC, ±10 VDC
- Can receive 4 inputs in a single device, with each input isolated from the others.
- Displays a 4-digit, 0.56-inch 7-segment display in a single row for clear visibility, and a 1-digit, 0.39-inch 7-segment display to indicate the active input channel.
- 4 alarm outputs and 4 alarm functions, which can be assigned to operate based on Input Channels 1, 2, 3, or 4, or based on the difference between Channels 1 and 2, and Channels 3 and 4, to control the alarm operation.
- Each channel can be configured with a different input type.
- Peak Hold Function.
- LEDs indicating the status of each alarm and the Peak Hold function.
- Connects to a computer via RS485 using the MODBUS RTU protocol.
- Auto/Manual display mode.

OPERATION

The TIM-94N-4CH is a digital measuring and display device that can receive 4 inputs in a single unit, saving space, and features 4 alarm outputs for connection to other devices.

The operation of each alarm can be configured as follows:

- Each alarm can be assigned to operate with any channel and can be set to one of 4 function modes, with a delay time before activation, as shown in Figure 1.
- Alarm can be set to operate based on the difference between Channels 1 and 2 or Channels 3 and 4. For example, if Channels 1 and 2 receive input from two pressure transmitters, the TIM-94N-4CH will compare the two pressure values. If the difference exceeds the preset value, the alarm output will activate, allowing it to function as a differential pressure alarm.

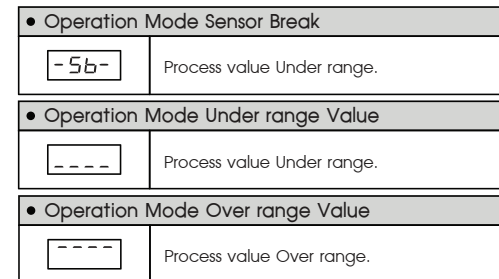
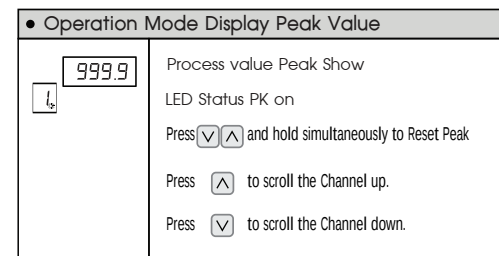
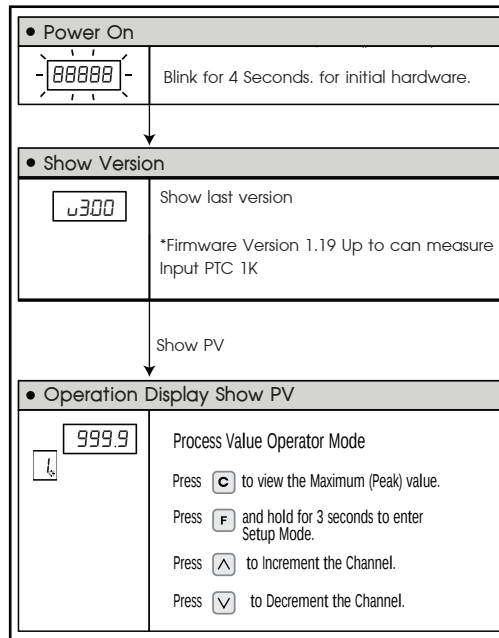
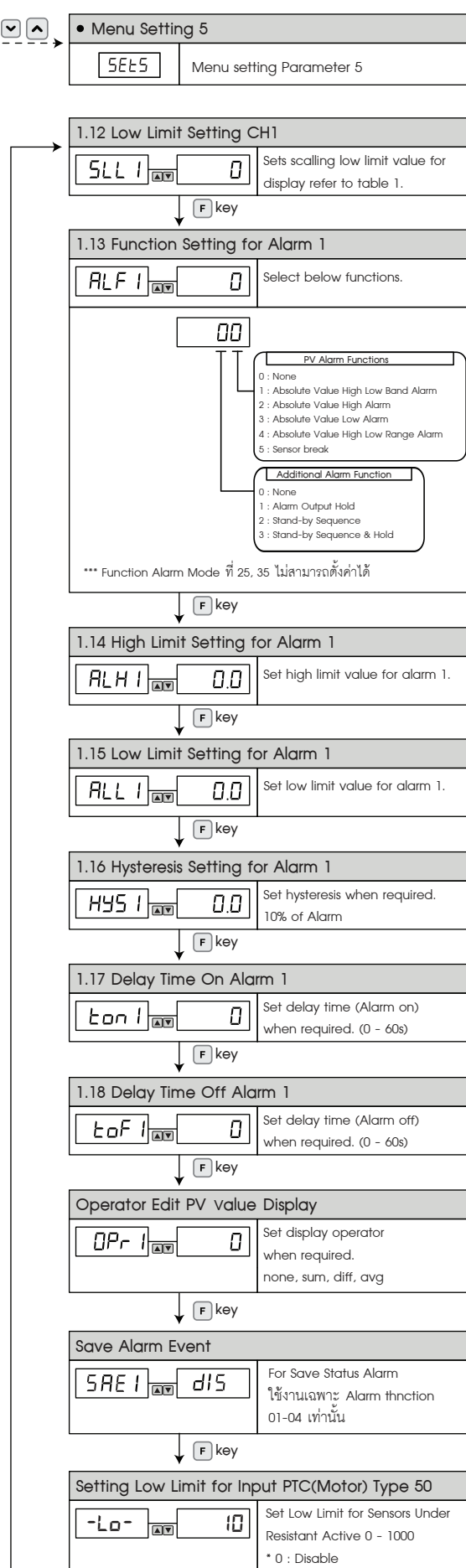
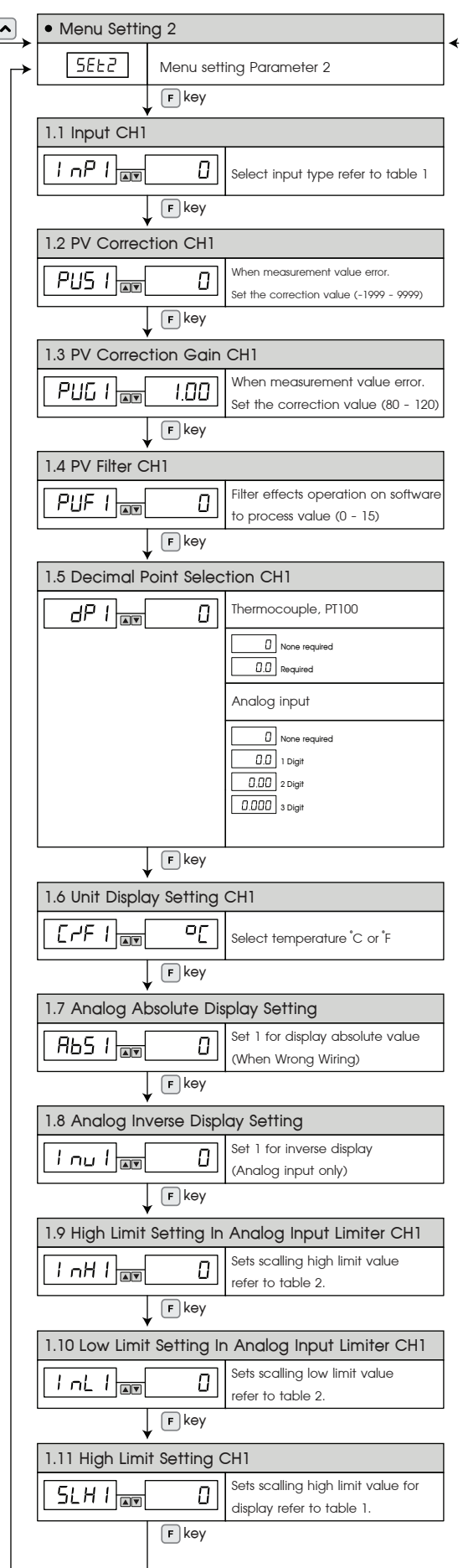
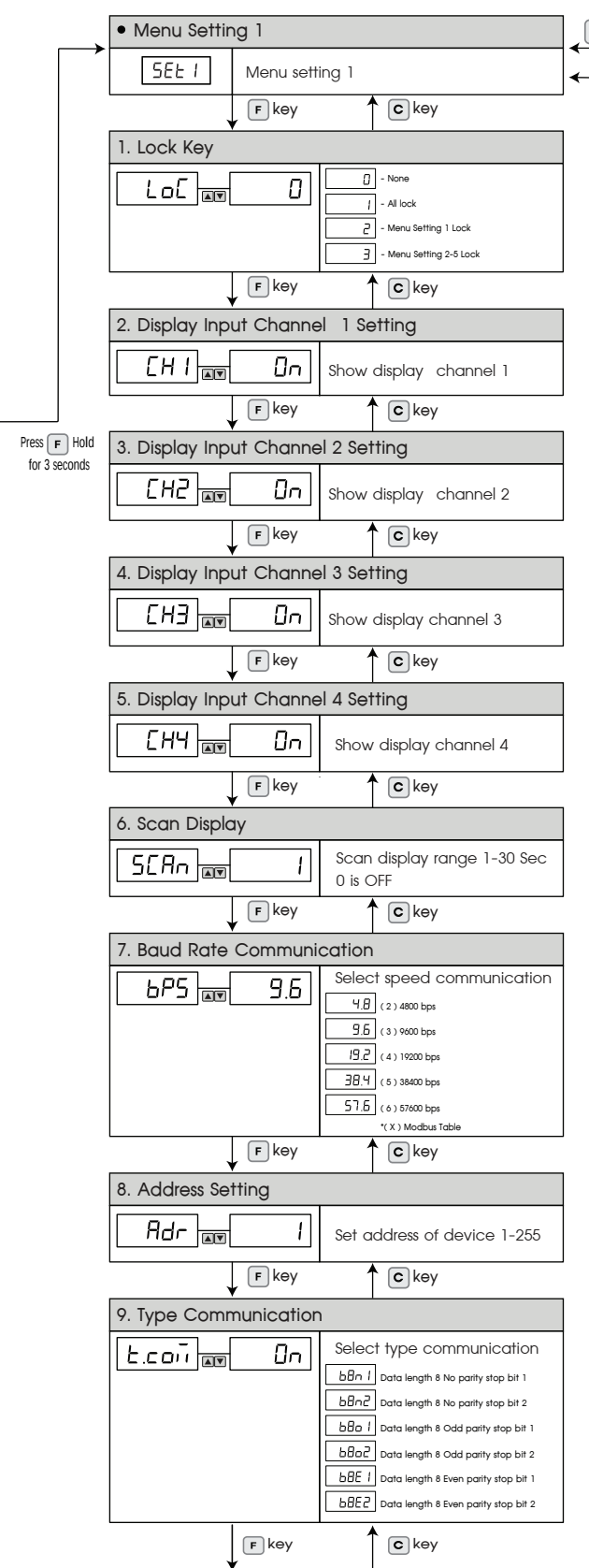
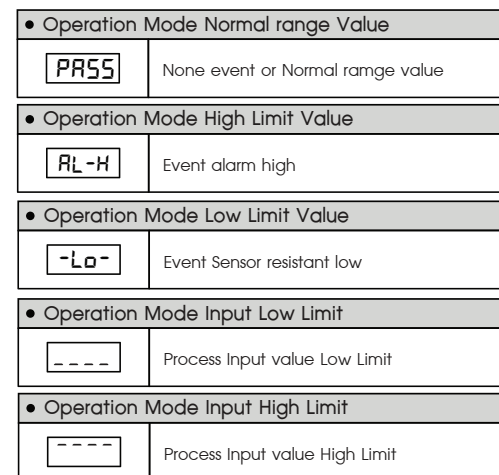
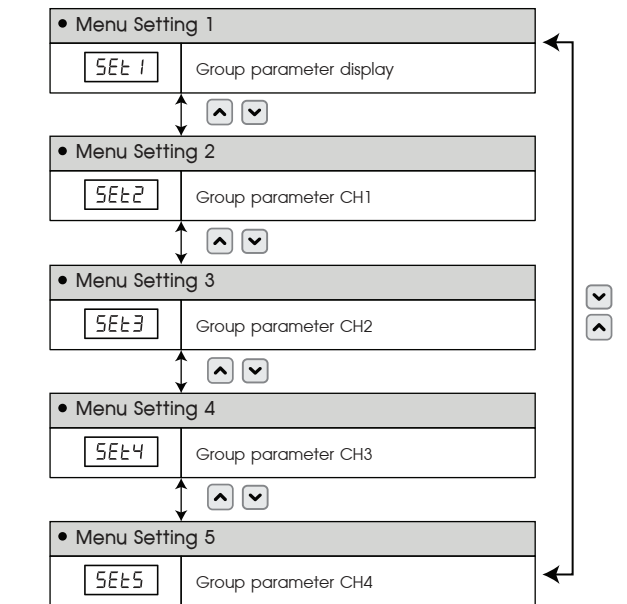
The display can be set to show each input either manually, by pressing a button to select the desired channel, or automatically, with the TIM-94N-4CH cycling through each input continuously. This application is suitable for plastic machinery, food processing equipment, electronic instruments, and more.

Table 1. Select input sensors and setting range.

Symbol	Input Type	Setting range	Display range
		Non-Decimal Point	Decimal Point
00	Thermocouple type K	-200 - 1372 °C -328 - 2501 °F	-199.9 - 999.9 °C -199.9 - 999.9 °F
01	Thermocouple type J	-200 - 1200 °C -328 - 2192 °F	-199.9 - 999.9 °C -199.9 - 999.9 °F
02	Thermocouple type R	0 - 1768 °C 32 - 3214 °F	- -
03	Thermocouple type T	-200 - 400 °C -328 - 752 °F	-199.9 - 400.0 °C -199.9 - 752.0 °F
04	Thermocouple type N	0 - 1300 °C 32 - 2372 °F	0.0 - 999.9 °C 32.0 - 999.9 °F
05	Thermocouple type S	0 - 1768 °C 32 - 3214 °F	- -
06	Thermocouple type E	-200 - 1000 °C -328 - 1832 °F	-199.9 - 999.9 °C -199.9 - 999.9 °F
07	PT100	-200 - 850 °C -328 - 1562 °F	-199.9 - 850.0 °C -199.9 - 999.9 °F
10	DC 0-20 mA	-1999 - 9999	-199.9 - 999.9 -19.99 - 99.99 -1.999 - 9.999
11	DC 4-20 mA		
20	DC 0-75 mV		
21	DC 0-150 mV		
22	DC 0-1 VDC		
23	DC 0-5 VDC		
24	DC 0-10 VDC		
25	±75 mV		
26	±150 mV		
27	±1 VDC		
28	±5 VDC		
29	±10 VDC		
40	PTC 1k *Version 1.19 Up to	-40 - 150 °C -40 - 302 °F	-40.0 - 150.0 °C -40.0 - 302.0 °F
50	PTC (Motor) *Version 3.00 Up to	1 - 5000 Ohm	-

Table 2. Analog Input setting range.

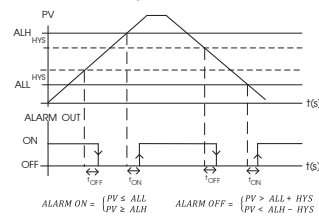
Symbol	Input Type	Setting range	Display range
		Minimum	Maximum
10	DC 0-20 mA	0.00	20.00
11	DC 4-20 mA	4.00	20.00
20	DC 0-75 mV	0.0	75.0
21	DC 0-150 mV	0.0	150.0
22	DC 0-1 VDC	0.000	1.000
23	DC 0-5 VDC	0.00	5.00
24	DC 0-10 VDC	0.00	10.00
25	±75 mV	-75.0	75.0
26	±150 mV	-150.0	150.0
27	±1 VDC	-1.000	1.000
28	±5 VDC	-5.00	5.00
29	±10 VDC	-10.00	10.00

■ **Display for PTC(Motor) type 50**■ **GROUP DISPLAY**

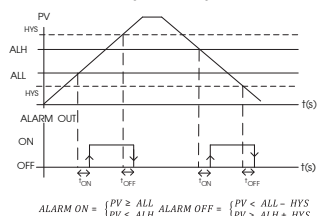
ALARM OUTPUT : Process value (PV) to be used as Alarm Output.

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.

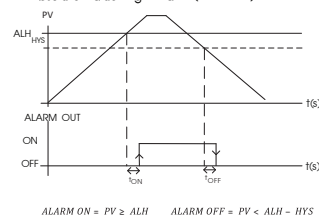
1. Absolute value High Low Band Alarm (ALF = X1)



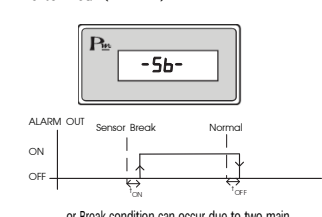
4. Absolute value High Low Range Alarm (ALF = X4)



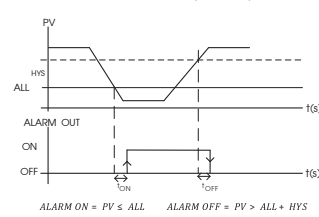
2. Absolute value High Alarm (ALF = X2)



5. Sensor Break (ALF = X5)

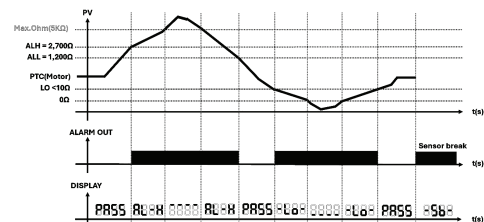


3. Absolute value Low Alarm (ALF = X3)

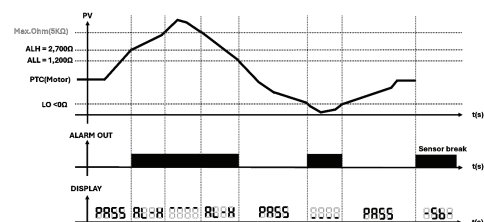


Output Control for PTC(Motor) type 50

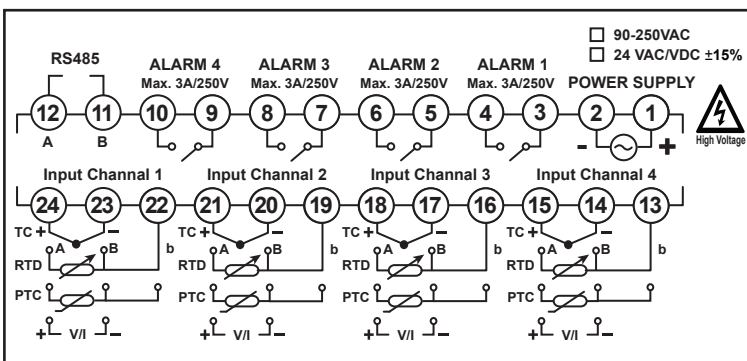
In case set Lo = 10



In case set Lo = 0

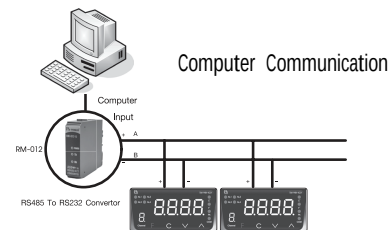


WIRING DIAGRAM



SERIAL COMMUNICATIONS

The TIM-94N-4CH are equipped with a RS485 serial communications interface to allow connection to computers or PLCs. MODBUS protocol is provide as stabbard communication. The user can connect TIM-94N-4CH as network up 255 meters.



MODBUS PROTOCOL

- This MODBUS protocol has been implement in accordance with MODBUS.ORG MODBUS application.
- Protocol specification V1.1 with the following conditions applying.
- The following conditions apply.
- Baudrate can selected refer [Speed setting](#)
- The format is MODBUS RTU
- UART data can selected refer [Communication setting](#)
- Data is considered to be half duplex using 2 wire

Modbus Exception codes

Code	Name	Meaning
01	ILLEGAL FUNCTION	The function code received in the query is not an allowable action for the server (or slave).
02	ILLEGAL DATA ADDRESS	The data address received in the query is not an allowable address for the server (or slave)
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave).

Example of a client request and server exception response

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Slave Address	01	Slave Address	01
Function	04	Function	84
Starting Address Hi	00	Exception Code	02
Starting Address Lo	00	CRC Hi	C2
Quantity of Input Reg. Hi	00	CRC Lo	C1
Quantity of Input Reg. Lo	1E		
CRC Hi	70		
CRC Lo	02		

Register Calculation

Mode Decimal Point dp 1(0.0) calculation	Mode Decimal Point dp 0(0.0) calculation
Temperature = PV/10	Temperature = PV
PV reading value = 300	PV = 30
Temperature = 30.0°C	Temperature = 30 °C

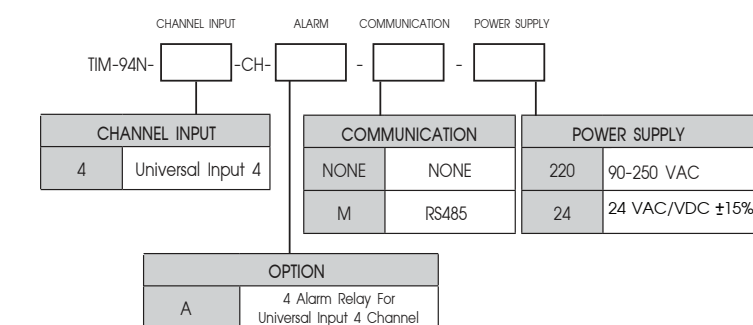
MODBUS TABLE (ตารางการสื่อสาร)

Decimal	Hex	Contents	Format	Word	Access
0	0X00	PV1	int	1	Read Only
1	0X01	PV2	int	1	Read Only
2	0X02	PV3	int	1	Read Only
3	0X03	PV4	int	1	Read Only
-	-	-	-	-	-
6	0X06	LOC	int	1	Read/Write
7	0X07	CH1	int	1	Read/Write
8	0X08	CH2	int	1	Read/Write
9	0X09	CH3	int	1	Read/Write
10	0X0A	CH4	int	1	Read/Write
-	-	-	-	-	-
13	0X0D	SCAN	int	1	Read/Write
14	0X0E	BAUDRATE	int	1	Read/Write
15	0X0F	ADDRESS	int	1	Read/Write
16	0X10	TYPECOM	int	1	Read/Write
17	0X11	INPUT - 1	int	1	Read/Write
18	0X12	PVS - 1	int	1	Read/Write
19	0X13	PVG - 1	int	1	Read/Write
20	0X14	PVF - 1	int	1	Read/Write
21	0X15	DP - 1	int	1	Read/Write
22	0X16	C/F - 1	int	1	Read/Write
23	0X17	ABS - 1	int	1	Read/Write
24	0X18	INV - 1	int	1	Read/Write
25	0X19	INH - 1	int	1	Read/Write
26	0X1A	INL - 1	int	1	Read/Write
27	0X1B	SLH - 1	int	1	Read/Write
28	0X1C	SLL - 1	int	1	Read/Write
29	0X1D	ALF - 1	int	1	Read/Write
30	0X1E	ALH - 1	int	1	Read/Write
31	0X1F	ALL - 1	int	1	Read/Write
32	0X20	HYS - 1	int	1	Read/Write
33	0X21	TON - 1	int	1	Read/Write
34	0X22	TOFF - 1	int	1	Read/Write
35	0X23	OPR - 1	int	1	Read/Write
36	0X24	INPUT - 2	int	1	Read/Write
37	0X25	PVS - 2	int	1	Read/Write
38	0X26	PVG - 2	int	1	Read/Write
39	0X27	PVF - 2	int	1	Read/Write
40	0X28	DP - 2	int	1	Read/Write
41	0X29	C/F - 2	int	1	Read/Write
42	0X2A	ABS - 2	int	1	Read/Write
43	0X2B	INV - 2	int	1	Read/Write
44	0X2C	INH - 2	int	1	Read/Write
45	0X2D	INL - 2	int	1	Read/Write
46	0X2E	SLH - 2	int	1	Read/Write
47	0X2F	SLL - 2	int	1	Read/Write
48	0X30	ALF - 2	int	1	Read/Write
49	0X31	ALH - 2	int	1	Read/Write
50	0X32	ALL - 2	int	1	Read/Write
51	0X33	HYS - 2	int	1	Read/Write
52	0X34	TON - 2	int	1	Read/Write
53	0X35	TOFF - 2	int	1	Read/Write
54	0X36	OPR - 2	int	1	Read/Write
55	0X37	INPUT - 3	int	1	Read/Write
56	0X38	PVS-3	int	1	Read/Write
57	0X39	PVG-3	int	1	Read/Write
58	0X3A	PVF-3	int	1	Read/Write
59	0X3B	DP-3	int	1	Read/Write
60	0X3C	C/F - 3	int	1	Read/Write

61	0X3D	ABS - 3	int	1	Read/Write
62	0X3E	INV - 3	int	1	Read/Write
63	0X3F	INH - 3	int	1	Read/Write
64	0X40	INL - 3	int	1	Read/Write
65	0X41	SLH - 3	int	1	Read/Write
66	0X42	SLL - 3	int	1	Read/Write
67	0X43	ALF - 3	int	1	Read/Write
68	0X44	ALH - 3	int	1	Read/Write
69	0X45	ALL - 3	int	1	Read/Write
70	0X46	HYS - 3	int	1	Read/Write
71	0X47	TON - 3	int	1	Read/Write
72	0X48	TOFF - 3	int	1	Read/Write
73	0X49	OPR - 3	int	1	Read/Write
74	0X4A	INPUT - 4	int	1	Read/Write
75	0X4B	PVS - 4	int	1	Read/Write
76	0X4C	PVG - 4	int	1	Read/Write
77	0X4D	PVF - 4	int	1	Read/Write
78	0X4E	DP - 4	int	1	Read/Write
79	0X4F	C/F - 4	int	1	Read/Write
80	0X50	ABS - 4	int	1	Read/Write
81	0X51	INV - 4	int	1	Read/Write
82	0X52	INH - 4	int	1	Read/Write
83	0X53	INL - 4	int	1	Read/Write
84	0X54	SLH - 4	int	1	Read/Write
85	0X55	SLL - 4	int	1	Read/Write
86	0X56	ALF - 4	int	1	Read/Write
87	0X57	ALH - 4	int	1	Read/Write
88	0X58	ALL - 4	int	1	Read/Write
89	0X59	HYS - 4	int	1	Read/Write
90	0X5A	TON - 4	int	1	Read/Write
91	0X5B	TOFF - 4	int	1	Read/Write
92	0X5C	OPR - 4	int	1	Read/Write

768	0X300	SAE - 1	int	1	Read/Write
769	0X301	SAE - 2	int	1	Read/Write
770	0X302	SAE - 3	int	1	Read/Write
771	0X303	SAE - 4	int	1	Read/Write
772	0X304	LO - 1	int	1	Read/Write
773	0X305	LO - 2	int	1	Read/Write
774	0X306	LO - 3	int	1	Read/Write
775	0X307	LO - 4	int	1	Read/Write

ORDERING CODE



TIM-94N-4CH

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