TIM-94B UNIVERSAL INPUT DIGITAL INDICATOR (BIG DISPLAY)

Primus User Manual

TECHNICAL SPECIFICATION (คุณสมบัติทางด้านเทคนิค)

Model		TIM-94B2	TIM-94B4
Power supply		100 - 250 VAC 50/60 Hz	
		24 VAC/VDC ±15%	
Power consumption		16VA	
Display		7 Segment, 5 Digit, Size 2.3 Inch, 1 Raws	7 Segment, 5 Digit, Size 4 Inch, 1 Raws
		3 LED (Show Alarm Relay)	
		1 LED (Show Communication)	
		1 LED (Show PV Peak)	
		2 LED (Show Unit)	
Input	Thermocouple	Type K, J, R, T, N, S, E	
	PTC	PT100, PTC 1kOhm	
	Current	0-20mA, 4-20mA	
	Voltage	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	
	Accuracy	± 0.25 % of Measurement range at 25 °C	
	Sampling time	0.25 Sec.	
Output	Alarm relay	3 Alarm 5A 250VAC	
	Transfer current	4 - 20 mA	
	Transfer voltage	0 - 10 VDC	
	Output Impedance	Load 500 Ω for 4 - 20 mA Output Load 1 kΩ for 0 - 10 VDC Output	
	Accuracy	± 0.25 % of Output Range	
Communication	Protocol	Modbus RTU	
	Address	1 - 127	
	Baud rate	4800, 9600, 19200, 38400, 57600 bps	
	Parity	None, odd, Even	
	Data Bit	8 bit	
	Stop Bit	1, 2	
	Support device node	recommend less than 32	
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	IP50	
Installation		Wall Mounting, Top Cabinet	
Material		Aluminum	
Size		150 x 300 x 100 mm.	200 x 550 x 100 mm.
Weight		1860 g.	2230 g.

DIMENSION CUTTING AND INSTALLATION (ขนาดรูปร่างและการติดตั้ง)

TIM-94B2

TIM-94B4

DESCRIPTION (คุณสมบัติ)

- อุปกรณ์วัดและแสดงผลค่าสัญญาณอะนาล็อกมาตราฐาน, ค่าอุณหภูมิ, ความชื้น, Pressure และ Process ต่างๆ
- มี Alarm relay สำหรับกำหนดเงื่อนไขการใช้งานได้
- รับสัญญาณอินพุตประเภท
  - Thermocouple
  - RTD (PT100), PTC 1kOhm
  - Current Analog : 0-20mA, 4-20mA
  - Voltage Analog : Technical Specification
- แสดงผลโดย 7-Segment ขนาด 2.3 นิ้ว และ 4 นิ้ว จำนวน 5 หลัก
- สื่อสารผ่าน Computer โดย RS485 Modbus RTU Protocol
- LED แสดงการทำงานของ Alarm และ Communication
- มี Option Transfer Output 4-20mA / 0-10VDC ได้ทั้งแบบ Direct และ Inverse
- มี Lock Function ป้องกันการเปลี่ยนค่า Settiing ผ่านหน้าจอ
- มี Function Peak Hold แสดงค่าสูงสุดของ Pocess ต่างๆได้ และสามารถ Reset ค่า Peak Hold ในหน้าแสดงค่า Peak Hold โดยกดปุ่ม ขึ้น และลง ค้างไว้ 3 วินาที
- Manual Transfer Output Function สามารถสั่งให้จ่ายสัญญาณมากน้อยได้ตามต้องการ
- Absolute Input Function แสดงค่าบวกตลอดเวลา ไม่ว่าจะต่อขั้ว +/-
- แสดงสัญลักษณ์ชี้ดบนและล่าง เมื่อสัญญาณของ Input ที่เข้ามาสูงกว่าหรือต่ำกว่า Setting Range Of Input
- ดูหมายเลข Symbol ของ Input ให้ตรงกับใน Manual

OPERATION (ลักษณะการทำงาน)

TIM-94B เป็นอุปกรณ์วัดและแสดงผลแบบดิจิตอล โดยวัดและแสดงผลค่าสัญญาณอะนาล็อกมาตรฐาน และค่าอุณหภูมิและ Process ต่างๆ พร้อม Alarm Output โดยรับสัญญาณอินพุทประเภท Thermocouple PT100, Current Analog (0-20 mA, 4-20 mA) และ Voltage Analog (ตามตาราง Technical Specification) มี Alarm Relay Output สูงสุด 3 Alarm, 18 Alarm function ในการตั้งค่าสำหรับตัดต่อ Load ได้ตามต้องการและ Analog Transfer Output สำหรับต่อร่วมเข้ากับอุปกรณ์อื่นๆได้ สามารถตั้ง Range High-Low Limit สำหรับ Input ต่างๆ ได้ตาม Table 1.

TIM-94B series เหมาะสำหรับติดตั้งในเครื่องจักรเพื่อ แสดงค่าของ Process ต่างๆ

Table 1. Select input sensors and input setting range limit. (ตารางอินพุต)

Symbol	Input Type	Setting range/Display range	
		Minimum	Maximum
00	Thermocouple type K	-200 °C	1372 °C
		-328 °F	2501 °F
01	Thermocouple type J	-200 °C	1200 °C
		-328 °F	2192 °F
02	Thermocouple type R	-50 °C	1768 °C
		-58 °F	3214 °F
03	Thermocouple type T	-200 °C	400 °C
		-328 °F	752 °F
04	Thermocouple type N	-200 °C	1300 °C
		-328 °F	2372 °F
05	Thermocouple type S	-50 °C	1768 °C
		-58 °F	3214 °F
06	Thermocouple type E	-200 °C	1000 °C
		-328 °F	1832 °F
07	PT100	-200 °C	850 °C
		-328 °F	1562 °F
10	0-20 mADC	0.00	20.00
11	4-20 mADC	4.00	20.00
20	0-75 mVDC	0.00	75.00
21	0-150 mVDC	0.00	150.00
22	0-1 VDC	0.00	1.00
23	0-5 VDC	0.00	5.00
24	0-10 VDC	0.00	10.00
25	±75 mVDC	-75.00	75.00
26	±150 mVDC	-150.00	150.00
27	±1 VDC	-10.00	10.00
28	±5 VDC	-5.00	5.00
29	±10 VDC	-10.00	10.00
40	PTC 1K	-40 °C	150 °C
		-40 °F	302 °F

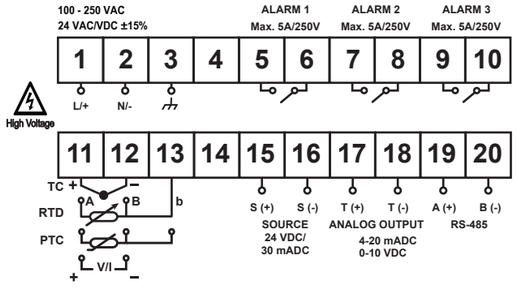
Table 2. Analog Input scaling setting range.

Symbol	Input Type	Setting range/Display range	
		Non-Decimal Point	Decimal Point
00	Thermocouple type K	-200 - 1372 °C	-200.0 - 1372.0 °C
		-328 - 2501 °F	-328.0 - 2501.0 °F
01	Thermocouple type J	-200 - 1200 °C	-200.0 - 1200.0 °C
		-328 - 2192 °F	-328.0 - 2192.0 °F
02	Thermocouple type R	-50 - 1768 °C	-50.0 - 1769.0 °C
		-58 - 3214 °F	-58.0 - 3214.0 °F
03	Thermocouple type T	-200 - 400 °C	-200.0 - 400.0 °C
		-328 - 752 °F	-328.0 - 752.0 °F
04	Thermocouple type N	-200 - 1300 °C	-200.0 - 1300.0 °C
		-328 - 2372 °F	-328.0 - 2372.0 °F
05	Thermocouple type S	-50 - 1768 °C	-50.0 - 1768.0 °C
		-58 - 3214 °F	-58.0 - 3214.0 °F
06	Thermocouple type E	-200 - 1000 °C	-200.0 - 1000.0 °C
		-328 - 1832 °F	-328.0 - 1832.0 °F
07	PT100	-200 - 850 °C	-200.0 - 850.0 °C
		-328 - 1562 °F	-328.0 - 1562.0 °F
10	DC 0-20 mA	-19999 - 19999	-1999.9 - 1999.9
11	DC 4-20 mA		-199.99 - 199.99
20	DC 0-75 mV		-19.999 - 19.999
21	DC 0-150 mV		-1.9999 - 1.9999
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	-40 - 150 °C	-40.0 - 150.0 °C
		-40 - 302 °F	-40.0 - 302.0 °F

Table 3. Transfer output setting range.

Symbol	Output Type	Setting range / Display range	
		Minimum	Maximum
G	Transfer 0-10VDC	0.00	10.00
I	Transfer 4-20mA	4.00	20.00

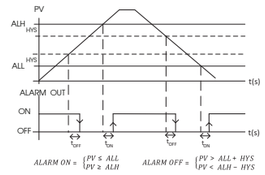
WIRING DIAGRAM (วงจรการต่อใช้งาน)



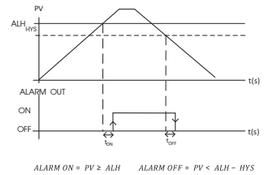
ALARM OUTPUT : Process value (PV) to be used as Alarm Output.

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.

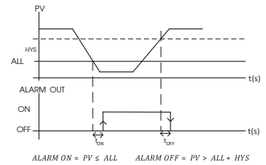
1. Absolute value High Low Band Alarm (ALF = X1)



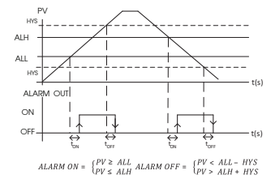
2. Absolute value High Alarm (ALF = X2)



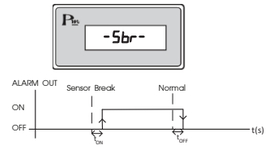
3. Absolute value Low Alarm (ALF = X3)



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



5. Sensor Break (ALF = 05)

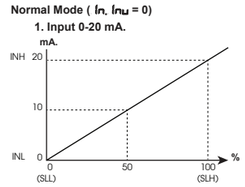


Sensor Break เกิดขึ้นได้จาก 2 กรณีคือ กรณีของ Thermocouple Input ไม่ได้ต่อลายเซ็นเซอร์ หรือ ลายเซ็นเซอร์ขาด และกรณีของ Analog Input จะเกิดเมื่อค่า Input ที่เข้ามาเกิน จนอุปกรณ์ไม่สามารถอ่านค่าได้

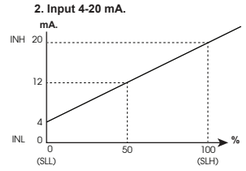
DISPLAY SCALING FOR ANALOG

Normal Mode (In, InU = 0)

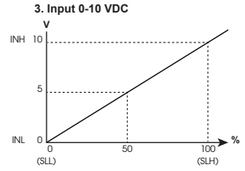
1. Input 0-20 mA.



2. Input 4-20 mA.

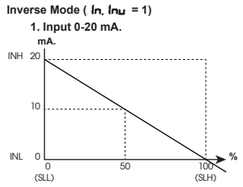


3. Input 0-10 VDC

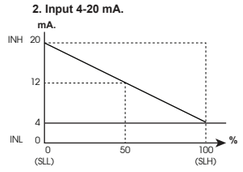


Inverse Mode (In, InU = 1)

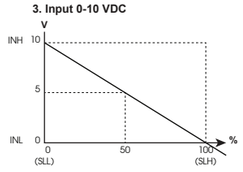
1. Input 0-20 mA.



2. Input 4-20 mA.



3. Input 0-10 VDC



ORDERING CODE (การติดต่อสั่งซื้อ)

TIM-94B □ - A □ □ - □ □ - □

SIZE	
2	150 x 300 x 100 mm.
4	200 x 550 x 100 mm.

ALARM OUTPUT	
B	2 Alarm
C	3 Alarm

TRANSEER OUTPUT	
NONE	NONE
G	0-10VDC
I	4-20mA

COMMUNICATION	
NONE	NONE
M	RS-485

POWER SUPPLY	
220	100 - 250VAC
24	24 VAC/VDC ±15%

TIM-94B UNIVERSAL INPUT DIGITAL INDICATOR (BIG DISPLAY)

PRIMUS

Primus User Manual

OPERATION SETTING

• Power On
- 88888 — Blink for 4 Seconds. For Initial Harware.

• Show Version
- rE4.00 — Show last Version

• Show Input Type
- inP 00 — Show last Input Setting.

• Operation Mode Display
- 500.0 — Process Value Display.

▲ ▼

• SV Value
- Su 0.0 — Set SV Value (0.0 - 100.0%)

Press F more then 3 seconds

1. Input Type Setting
- inP 00 — Select input type Refer to table 1

F

2. Decimal Point Selection
- dP 0.0

Thermocouple, PT100
- 0 None required
- 0.0 Required

Analog input
- 0 None required
- 0.0 1 Digit
- 0.00 2 Digits
- 0.000 3 Digits
- 0.0000 4 Digits

F

3. PV Correction Gain
- PuG 100 — When measurement value error. set the correction value (80 - 120 Percent)

F

4. PV Correction
- PuS 0.0 — When measurement value error. set the correction value (Addition -19999 - 19999)

F

5. PV Filter
- PuF 0 — Filter effects operational to process value(PV) (0 - 15)

F

6. SV/PV Display
- CrF °C — Select temperature unit (°C or °F)

F

7. Analog Absolute Display Setting
- in.AbS 0 — Set 1 for Display Absolute Value (When Wrong Wiring)

F

8. Analog Inverse Display Setting
- in. inu 0 — Set 1 for Inverse Display (Analog Input Only)

F

9. High Limit Setting in Analog Input Limiter
- inH 0 — Sets scalling high limit value Refer to Table 1.

F

10. Low Limit Setting in Analog Input Limiter
- inL 0 — Sets scaling low limit value Refer to Table 1.

F

11. High Limit Setting
- SLH 100.0 — Sets scaling high limit value for Display Refer to Table 2.

12. Low Limit Setting
- SLL 0.0 — Sets scaling low limit value for Display Refer to Table 2.

F

13. Transfer Output Setting
- trO Pu — Change by PV or SV

F

14. High Limit Setting for Transfer Output
- trH 20.00 — Set scaling high limit value for transfer output. Refer to Table 3.

F

15. Low Limit Setting for Transfer Output
- trL 4.00 — Set scaling low limit value for transfer output. Refer to Table 3.

F

16. Transfer Output Polarity
- trP 0 — Set 1 for Inverse Transfer Output Value.

F

17. Function Setting for Alarm 1
- ALF1 00 — Select below functions.

00

PV Alarm Functions
- 0 : None
- 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 : Sensor break*

Additional Alarm Function
- 0 : None
- 1 : Stand-by Sequence
- 2 : Hold Alarm (Reset by power off)
- 3 : Stand-by Sequence & Hold

*Sensor break = 05 Only

F

18. High Limit Setting for Alarm 1
- ALH1 0.0 — Set high limit value for alarm 1. (-19999 - 19999)

F

19. Low Limit Setting for Alarm 1
- ALL1 0.0 — Set low limit value for alarm 1. (-19999 - 19999)

F

20. Hysteresis Setting for Alarm 1
- HYS1 0.0 — Set Hysteresis when required. (-19999 - 19999)

F

21. Delay Time on Alarm 1
- ton1 0 — Set delay time (Alarm on) when required. (0 - 10.0 Sec)

F

22. Delay Time off Alarm 1
- toF1 0 — Set delay time (Alarm off) when required. (0 - 10.0 Sec)

23. Function Setting for Alarm 2
- ALF2 00 — Select Refer to menu 17.

F

24. High Limit Setting for Alarm 2
- ALH2 0.0 — Set high limit value for alarm 2. (-19999 - 19999)

F

25. Low Limit Setting for Alarm 2
- ALL2 0.0 — Set low limit value for alarm 2. (-19999 - 19999)

F

26. Hysteresis Setting for Alarm 2
- HYS2 0.0 — Set Hysteresis when required. (-19999 - 19999)

F

27. Delay Time on Alarm 2
- ton2 0 — Set delay time (Alarm on) when required. (0 - 10.0 Sec)

F

28. Delay Time off Alarm 2
- toF2 0 — Set delay time (Alarm off) when required. (0 - 10.0 Sec)

F

29. Function Setting for Alarm 3
- ALF3 00 — Select Refer to menu 17.

F

30. High Limit Setting for Alarm 3
- ALH3 0.0 — Set high limit value for alarm 3. (-19999 - 19999)

F

31. Low Limit Setting for Alarm 3
- ALL3 0.0 — Set low limit value for alarm 3. (-19999 - 19999)

F

32. Hysteresis Setting for Alarm 3
- HYS3 0.0 — Set Hysteresis when required. (-19999 - 19999)

F

33. Delay Time on Alarm 3
- ton3 0 — Set delay time (Alarm on) when required. (0 - 10.0 Sec)

F

34. Delay Time off Alarm 3
- toF3 0 — Set delay time (Alarm off) when required. (0 - 10.0 Sec)

F

35. Address Setting
- Addr 1 — Set Address of Device 1-127

36. Baud Rate Setting
- bPS 9.6 — Select speed of communication

4.8	4800 bps	38.4	38400 bps
9.6	9600 bps	57.6	57600 bps
19.2	19200 bps		

F

37. Communication Setting
- Comm 8n1 — Select Stop bit / Parity bit

8n1

Parity bit
- n : None
- o : Odd
- E : Even

Stop bit
- 1 : 1 Stop bit
- 2 : 2 Stop bit

F

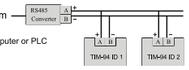
38. Key Lock Setting
- LoC 0 — Select below function.

0	None
1	Lock all parameter
2	Input parameter
3	Output parameter

SERIAL COMMUNICATIONS

The TIM-94N are equipped with a RS-485 serail communications interface to allow connection to computers or PLCs. MODBUS protocal is provided as standard communication. The user can connect TIM-94 as network up to 127 node.

Wiring diagram



MODBUS PROTOCOL

This MODBUS Protocol has been implement in accordance with MOSBUS.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 menu 36

Communication setting

Data is considered to be half duplex using 2 wire.

Modbus Exception code

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).

Modbus RTU Table TIM-94N

Address Decimal	Address Hex	Contents	Format	Word	Access
512	0x200	PV	int	1	R
513	0x201	Status of Alarm*	int	1	R
514	0x202	PV Peak Hold	int	1	R
515	0x203	SV	int	1	R/W
516	0x204	Input Type	int	1	R/W
517	0x205	PV Gain	int	1	R/W
518	0x206	PV Adjust	int	1	R/W
519	0x207	PV Filter	int	1	R/W
520	0x208	Decimal Point	int	1	R/W
521	0x209	Unit (C/F)	int	1	R/W
522	0x20A	Lock Key	int	1	R/W
523	0x20B	Analog Input Absolute	int	1	R/W
524	0x20C	Analog Input Inverse	int	1	R/W
525	0x20D	Analog Input High Limit	int	1	R/W
526	0x20E	Analog Input Low Limit	int	1	R/W
527	0x20F	Setting Limit High	int	1	R/W
528	0x210	Setting Limit Low	int	1	R/W
529	0x211	Analog Output	int	1	R/W
530	0x212	Analog Output Inverse	int	1	R/W
531	0x213	Analog Output High Limit	int	1	R/W
532	0x214	Analog Output Low Limit	int	1	R/W
533	0x215	Function Alarm 1	int	1	R/W
534	0x216	High Alarm 1	int	1	R/W
535	0x217	Low Alarm 1	int	1	R/W
536	0x218	Hysterisis Alarm 1	int	1	R/W
537	0x219	Delay On Alarm 1	int	1	R/W
538	0x21A	Delay Off Alarm 1	int	1	R/W
539	0x21B	Function Alarm 2	int	1	R/W
540	0x21C	High Alarm 2	int	1	R/W
541	0x21D	Low Alarm 2	int	1	R/W
542	0x21E	Hysterisis Alarm 2	int	1	R/W
543	0x21F	Delay On Alarm 2	int	1	R/W
544	0x220	Delay Off Alarm 2	int	1	R/W
545	0x221	Function Alarm 3	int	1	R/W
547	0x222	High Alarm 3	int	1	R/W
547	0x223	Low Alarm 3	int	1	R/W
548	0x224	Hysterisis Alarm 3	int	1	R/W
549	0x225	Delay On Alarm 3	int	1	R/W
550	0x226	Delay Off Alarm 3	int	1	R/W

*** สามารถใช้ตาราง Modbus ของ TIM-94B รุ่นเก่าได้

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		

Modbus Function codes

Function code	Operation	Brodcast
03	Read Holding Register	YES
04	Read Input Register	YES
06	Write Single Register	YES

Here is an example of a request to write input register 2 to 00 08 hex:
(Function code 06)

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Slave Address	01	Slave Address	01
Function	06	Function	06
Register Address Hi	00	Register Address Hi	00
Register Address Lo	01	Register Address Lo	00
Register Value Hi	00	Register Value Hi	00
Register Value Lo	08	Register Value Lo	08
CRC Hi	D9	CRC Hi	D9
CRC Lo	CC	CRC Lo	CC

Here is an example of a request to read input register 1:
(Function code 04)

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
Slave Address	01	Slave Address	01
Function	04	Function	04
Starting Address Hi	00	Byte Count	02
Starting Address Lo	00	Input Reg. 1 Hi	00
Quantity of Input Reg. Hi	00	Input Reg. 1 Lo	19
Quantity of Input Reg. Lo	01	CRC Hi	78
CRC Hi	31	CRC Lo	FA
CRC Lo	CA		

The contents of input register 1 are shown as the 2 bytes values of 00 9 hex, or 25 decimal.

*Status of Alarm
- AL1 = 1
- AL2 = 2
- AL3 = 4

Ex. AL1 ON, AL2 ON = 1+2 = 3

TIM-94B

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