PRIMUS

TIM-94N

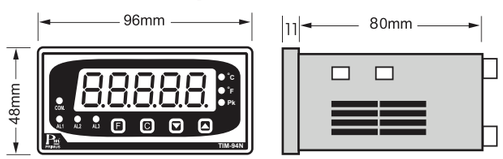
UNIVERSAL INPUT DIGITAL INDICATOR WITH ALARMUNIT

Primus
User Manual

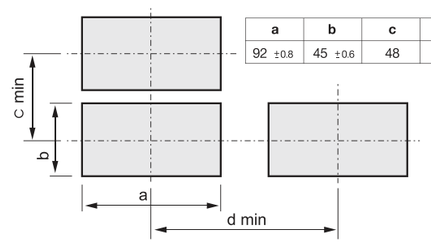
TECHNICAL SPECIFICATION (คุณสมบัติทางด้านเทคนิค)

Power supply		100 - 250 VAC 50/60 Hz
		24 VAC/VDC ±15%
Power consumption		3 VA
Display		7-Segment, Size 0.56 Inch, 5 Digit
		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,
	RTD	PT100
	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
	Tranfer current	4 - 20 mA
	Tranfer 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	2400, 4800, 9600, 19200, 38400, 57600 bps
	Parity	None, even, odd
	Data Bit	8 bit
	Stop Bit	1, 2
	Support device node	255
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		96 x 80 x 48 mm.
Weight		205 g.

DIMENSION (ขนาดและรูปร่าง)

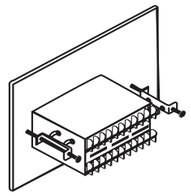


CUTTING PANEL (การเจาะติดตั้ง)



a	b	c	d
92 ±0.8	45 ±0.6	48	120

INSTALLATION (การติดตั้ง)



DESCRIPTION (คุณสมบัติ)

- อุปกรณ์วัดและแสดงผลค่าสัญญาณอะนาล็อกมาตราฐาน, ค่าอุณหภูมิ, ความชื้น, Pressure และ Process ต่างๆ
- มี Alarm relay สำหรับกำหนดเงื่อนไขการใช้งานได้
- รับสัญญาณอินพุตประเภท
  - Thermocouple
  - RTD (PT100)
  - Current Analog : 0-20mA, 4-20mA
  - Voltage Analog : Technical Specification
- แสดงผลโดย 7-Segment ขนาด 0.56 นิ้ว จำนวน 5 หลัก
- สื่อสารผ่าน Computer โดย RS-485 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 Process ต่างๆได้
- Manual Transfer Output Function สามารถสั่งให้จ่ายสัญญาณมากน้อยได้ตามต้องการด้วยปุ่มกด
- Absolute Input Function แสดงค่าบวกตลอดเวลา ไม่ว่าจะต่อขั้ว +/-
- แสดงสัญลักษณ์ขีดบนและล่าง เมื่อสัญญาณของ Input ที่เข้ามาสูงกว่าหรือต่ำกว่า Setting Range Of Input
- ดูหมายเลข Symbol ของ Input ให้ตรงกับใน Manual

OPERATION (ลักษณะการทำงาน)

TIM-94N 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-94N series เหมาะสำหรับติดตั้งในเครื่องจักรเพื่อ แสดงค่าของ Process ต่างๆ

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

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	-
		-58 - 3214 °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	-
		-58 - 3214 °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		
20	DC 0-75 mV		
21	DC 0-150 mV		-199.99 - 199.99
22	DC 0-1 VDC		
23	DC 0-5 VDC		
24	DC 0-10 VDC		
25	±75 mV		-19.999 - 19.999
26	±150 mV		
27	±1 VDC		-1.9999 - 1.9999
28	±5 VDC		
29	±10 VDC		

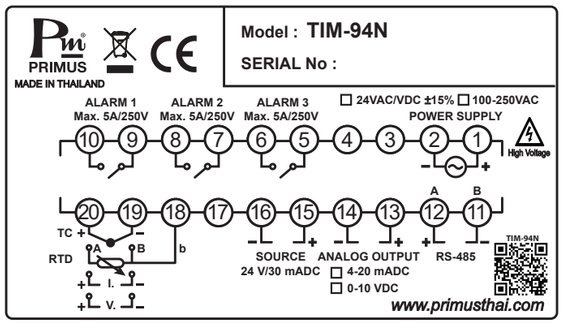
Table 2. Analog Input setting range.

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

Table 3. Analog output setting range.

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

WIRING DIAGRAM (วงจรการต่อใช้งาน)



การแสดงผลของปุ่มด้านหน้า และสถานะของ LED

- AL1 ● ไฟว์การทำงานของ Alarm 1
- AL2 ● ไฟว์การทำงานของ Alarm 2
- AL3 ● ไฟว์การทำงานของ Alarm 3
- COM ● ไฟว์สถานะของการสื่อสาร
- °C ● ไฟว์หน่วยวัดองศา °C
- °F ● ไฟว์หน่วยวัดองศา °F
- Pk ● ไฟว์หน่วยวัด PV Peak

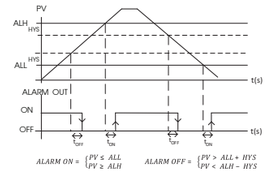
- F กดเพื่อเข้าโปรแกรม
- C กดเพื่อดูค่า Peak
- ▼ กดเพื่อลดค่า หรือ เลือกค่าโปรแกรม
- ▼ กดเพื่อลดค่า หรือ เลือกค่าโปรแกรม

WARNING
- Make sure the correct wiring connection before turning on electricity. Mis-wiring may cause malfunction of the unit and fire.
- Never modify the unit to prevent damage or incident such as malfunction and fire etc.

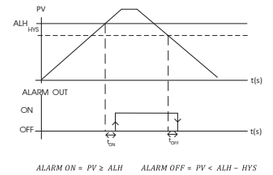
ALARM OUTPUT : Process value (PV) to be used as Alarm Output.

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.

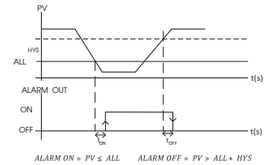
1. Absolute value High Low Band Alarm (ALF = X1)



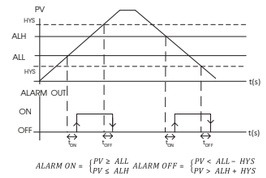
2. Absolute value High Alarm (ALF = X2)



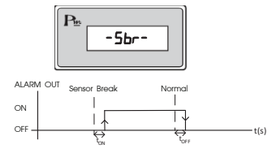
3. Absolute value Low Alarm (ALF = X3)



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



5. Sensor Break (ALF = X5)

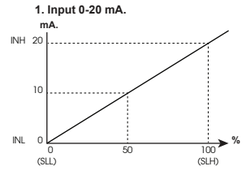


Sensor Break เกิดขึ้นได้จาก 2 กรณีคือ กรณีของ Thermocouple Input ไม่ได้ต่อสายเซ็นเซอร์ หรือ สายเซ็นเซอร์ขาด และกรณีของ Analog Input จะเกิดเมื่อค่า Input ที่เข้ามาเกิน จนอุปกรณ์ไม่สามารถอ่านค่าได้

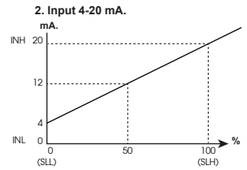
DISPLAY SCALING FOR ANALOG

Normal Mode (*dI nu* = 0)

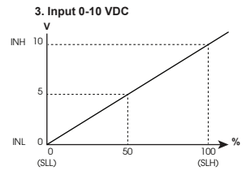
1. Input 0-20 mA.



2. Input 4-20 mA.

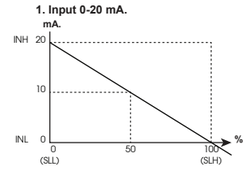


3. Input 0-10 VDC

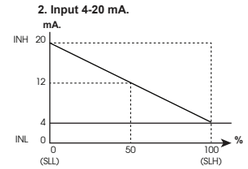


Inverse Mode (*dI nu* = 1)

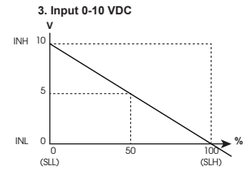
1. Input 0-20 mA.



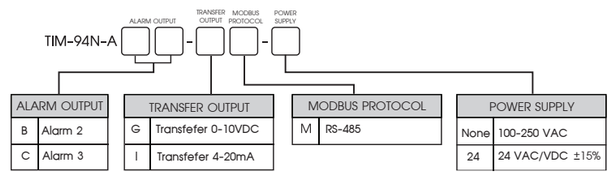
2. Input 4-20 mA.



3. Input 0-10 VDC



ORDERING CODE (การติดต่อสั่งซื้อ)



TIM-94N UNIVERSAL INPUT DIGITAL INDICATOR WITH ALARMUNIT

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User Manual

OPERATION SETTING

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

• Show Version
- rEu3.0 — Show last Version

Press F — more then 2 seconds

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

• Operation Mode Display
- 500.0 — Process Value Display.

▲ ▼

• SV Value
- Su 0. — Set SV Value

1. Input Type Setting
- inP 0 — Select input type. Refer to table 1

F

2. PV Correction Gain
- PuG 0. — When measurement value error. set the correction value (Percent)

F

3. PV Correction
- PUS 0. — When measurement value error. set the correction value (Addition)

F

4. Filter Input
- PuF 0 — Filter effects operational on software to process value(PV)

F

5. Decimal Point Selection
- dP 0. — Thermocouple, PT100
  - 0 None required
  - 0. Required
- Analog input
  - 0 None required
  - 0. 1 Digit
  - 0. 0 2 Digits
  - 0. 00 3 Digits
  - 0. 000 4 Digits

F

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

F

7. Key Lock Setting
- LoC 0 — Select below function.
  - 0 None
  - 1 All Lock
  - 2 Operation mode lock only
  - 3 Except operation mode

F

8. Analog Absolute Display Setting
- dAbS 0 — Set 1 for Display Absolute Value (When Wrong Wiring)

F

9. Analog Inverse Display Setting
- di nu 0 — Set 1 for Inverse Display (Analog Input Only)

F

10. High Limit Setting in Analog Input Limiter
- inH 0 — Sets scalling high limit value. Refer to Table 2.

11. Low Limit Setting in Analog Input Limiter
- inL 0 — Sets scaling low limit value. Refer to Table 2.

F

12. High Limit Setting
- SLH 1000 — Sets scaling high limit value for Display Refer to Table 1.

F

13. Low Limit Setting
- SLL 0 — Sets scaling low limit value for Display Refer to Table 1.

F

14. Transfer Output Setting
- tro Pu — Change by PV or SV

F

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

F

16. High Limit Setting for Transfer Output
- trH 0 — Set scaling high limit value for transfer output. Refer to Table 1.

F

17. Low Limit Setting for Transfer Output
- trL 0 — Set scaling low limit value for transfer output. Refer to Table 1.

F

18. Function Setting for Alarm 1
- ALF1 0 — 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 : Alarm Output Hold
      - 2 : Stand-by Sequence
      - 3 : Stand-by Sequence & Hold

F

19. High Limit Setting for Alarm 1
- ALH1 0. — Set high limit value for alarm 1.

F

20. Low Limit Setting for Alarm 1
- ALL1 0. — Set low limit value for alarm 1.

F

21. Hysteresis Setting for Alarm 1
- HYS1 0. — Set Hysteresis when required.

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

F

23. Delay Time off Alarm 1
- toFF1 0 — Set delay time (Alarm off) when required.

F

24. Function Setting for Alarm 2
- ALF2 0 — 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 : Alarm Output Hold
      - 2 : Stand-by Sequence
      - 3 : Stand-by Sequence & Hold

F

25. High Limit Setting for Alarm 2
- ALH2 0. — Set high limit value for alarm 2.

F

26. Low Limit Setting for Alarm 2
- ALL2 0. — Set low limit value for alarm 2.

F

27. Hysteresis Setting for Alarm 2
- HYS2 0. — Set Hysteresis when required.

F

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

F

29. Delay Time off Alarm 2
- toFF2 0 — Set delay time (Alarm off) when required.

F

30. Function Setting for Alarm 3
- ALF3 0 — 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 : Alarm Output Hold
      - 2 : Stand-by Sequence
      - 3 : Stand-by Sequence & Hold

F

31. High Limit Setting for Alarm 3
- ALH3 0. — Set high limit value for alarm 3.

32. Low Limit Setting for Alarm 3
- ALL3 0. — Set low limit value for alarm 3.

F

33. Hysteresis Setting for Alarm 3
- HYS3 0. — Set Hysteresis when required.

F

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

F

35. Delay Time off Alarm 3
- toFF3 0 — Set delay time (Alarm off) when required.

F

36. Speed Setting
- bPS 9.6 — Select speed of communication

2.4	2400 bps	19.2	19200 bps
4.8	4800 bps	38.4	38400 bps
9.6	9600 bps	57.6	57600 bps

F

37. Communication Setting
- Comm 8n1 — Select Stop bit / Parity bit
  - 8n1
    - Parity bit
      - n : None
      - E : Even
      - o : Odd
    - Stop bit
      - 1 : 1 Stop bit
      - 2 : 2 Stop bit

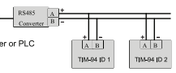
F

38. Address Setting
- Adr 1 — Set Address of Device 1-127

SERIAL COMMUNICATIONS

The TIM-94 are equipped with a RS485 serial 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 255 node.

Wiring diagram



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

22.Speed setting
The format is MODBUS RTU
UART data can selected refer **23.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		

Modbus RTU Table TIM-94

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

*** สามารถใช้ตาราง Modbus ของ TIM-94N รุ่นเก่าได้

Modbus Function codes

Function code	Operation	Brodcast
03	Read Multiple Registers	No
04	Read Multiple Registers	No
06	Preset Single Register	Yes
08	Loop Back Diagnostic	No

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.

TIM-94N

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