RATE METERS

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Innovative Control Solutions

QUICK Specs

Rate Meters

	INDICATION			CONTROL
	DT8	**PAXLR**	**PAXLPT**	**CUB5**
				
Description	Rate Indicator	1/8 DIN Rate Indicator	1/8 DIN Process Time Indicator	Counter/Rate Meter with Output Option Card Capability
Dimensions (Height) x (Width)	39 mm (H) x 75mm (W)	50 mm (H) x 97mm (W)	50 mm (H) x 97mm (W)	39 mm (H) x 75mm (W)
Display	5 Digit, .6" (15mm) Reflective, Green and Red Backlight LCD	6 Digit, .56" (14mm) LED	6 Digit, .56" (14mm) LED Decimal and Chronometer Modes	6 Digit, .46" (12mm) Reflective, Green and Red Backlight LCD
Measurement Format	Selectable Time Base Range 4 msec to 32 sec.	Adjustable Time Interval	Adjustable Time Interval	Adjustable Time Interval
Max. Input Frequency	10,000 Counts/Sec.	25,000 Counts/Sec.	25,000 Counts/Sec.	20,000 Counts/Sec.
Decimal Points	No	Yes	Yes	Yes
Sensor Power	No Yes, with Micro Line Power Supply	9 to 17.5 VDC @ 100 mA	9 to 17.5 VDC @ 100 mA	No Yes, with Micro Line Power Supply
Setpoint Capability	No	No	No	Single Form C Relay Dual Sinking
Communications	No	No	No	RS485
Power Source	3 Volt Lithium Battery, Backlighting 9 - 28 VDC @ 35 mA	115/230 VAC 10 to 16 VDC	115/230 VAC 10 to 16 VDC	9 to 28 VDC
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QUICK Specs

Rate Meters

CONTROL

	PAXLCR	PAXR	PAXI	PAX2D
				
Description	1/8 DIN Counter/Rate Meter with Setpoint Capability	1/8 DIN Rate Meter with Setpoint Card Capability	1/8 DIN Counter/Rate Meter with Output Option Card Capability	1/8 DIN Dual Line Counter/Dual Counter, Rate/Dual Rate Meter With Output Option Card Capability
Dimensions (Height) x (Width)	50 mm (H) x 97mm (W)	50 mm (H) x 97mm (W)	50 mm (H) x 97mm (W)	50 mm (H) x 97mm (W)
Display	6 Digit, .56" (14mm) Red LED	5 Digit, .56" (14mm) Standard Green or Sunlight Readable Red LED, Adjustable Intensity	6 Digit, .56" (14mm) Standard Green or Sunlight Readable Red LED, Adjustable Intensity	Top Line: 6 Digit, .7" (18mm) Tri-color backlight Bottom Line: 9 Digit, .35" (9mm) Green backlight
Measurement Format	Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch	Adjustable Time Interval	Adjustable Time Interval	Uni-Directional Up/Down Inhibit Add/Subtract Add/Add Quadrature Batch
Max. Input Frequency	20,000 Counts/Sec. Program Dependent	34,000 Counts/Sec.	34,000 Counts/Sec.	50,000 Counts/Sec. Program Dependent
Decimal Points	Yes	Yes	Yes	Yes
Sensor Power	24 VDC @ 100 mA, over 50 V 24 VDC @ 50 mA, under 50 V	12 VDC @ 100 mA	12 VDC @ 100 mA	18 VDC @ 60 mA
Setpoint Capability	Dual Form C Relays	Dual Form C Quad Form A Quad Sinking Quad Sourcing	Dual Form C Quad Form A Quad Sinking Quad Sourcing	Dual Form C Quad Form A Quad Sinking Quad Sourcing
Communications	No	No	RS232 RS485 Modbus DeviceNet Profibus Ethernet w/ICM8	RS232 or RS485 Modbus DeviceNet Profibus
Power Source	50 to 250 VAC 21.6 to 250 VDC	85 to 250 VAC 11 to 36 VDC 24 VAC	85 to 250 VAC 11 to 36 VDC 24 VAC	50 to 250 VAC 21.6 to 250 VDC
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*See website for product information.

C

QUICK Specs

Rate Meters

	INDICATION	CONTROL
	GEM52	**MDC**
		
Description	Dual Rate Meter with Math Functions	Motor Drive Controller
Dimensions (Height) x (Width)	69 mm (H) x 133 mm (W)	75 mm (H) x 75 mm (W)
Display	6 Digit, .56" (14mm) LED	2 x 8 Digit, .3" (7mm) Red Backlight LCD
Measurement Format	Adjustable Time Interval Ratio (A/B), Difference (A-B), Draw [(A-B)/B] or Dual Rate	Master & Follower Modes Loop Response: 10 msec (Master) 20 msec (Follower)
Max. Input Frequency	10,000 Counts/Sec.	20,000 Counts/Sec.
Decimal Points	Yes	Yes
Sensor Power	12 VDC @ 100 mA	12 VDC @ 100 mA
Setpoint Capability	Single or Dual Form C Current Sinking	3 Current Sinking 0 to 15 VDC
Communications	20 mA Current Loop	No
Power Source	115/230 VAC 11 to 14 VDC	115/230 VAC
Page Number	*	*

*See website for product information.

REPLACEMENT Guide

WHAT YOU'RE USING NOW		CURRENT PRODUCT	
MODEL NUMBER	**FEATURES**	**MODEL NUMBER**	**FEATURES**
 **DT5**	■ Display: 4 Digit, .35" (9 mm) Reflective LCD ■ Power Source: 2 "N" Alkaline Batteries ■ Measurement Format: Fixed One Second	 **DT8**	■ Display: 5 Digit, .6" (15 mm) Reflective and Backlight LCD ■ Power Source: Internal Battery ■ Measurement Format: Time Base
 **DT6**	■ Display: 4 Digit, .35" (9 mm) Reflective LCD ■ Power Source: 2 "N" Alkaline Batteries or 5 to 24 VDC ■ Measurement Format: Time Base	 **DT8**	■ Display: 5 Digit, .6" (15 mm) Reflective and Backlight LCD ■ Power Source: Internal Battery ■ Measurement Format: Time Base
 **DT7**	■ Display: 5 Digit, .6" (15 mm) Reflective and Backlight LCD ■ Power Source: Internal Battery ■ Measurement Format: Time Base	 **DT8**	■ Display: 5 Digit, .6" (15 mm) Reflective and Backlight LCD ■ Power Source: Internal Battery ■ Measurement Format: Time Base
 **DT9**	■ Display: 5 Digit, .46" (12 mm) Reflective and Backlight LCD ■ Power Source: Internal Battery ■ Measurement Format: Time Base	 **DT8**	■ Display: 5 Digit, .6" (15 mm) Reflective and Backlight LCD ■ Power Source: Internal Battery ■ Measurement Format: Time Base
 **DT3A**	■ Display: 4 Digit, .43" (11 mm) Red LED ■ Power Source: 115/230 VAC ■ Measurement Format: Fixed One Second	 **PAXLR**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC, 10 to 16 VDC ■ Measurement Format: Programmable Scaling and Update ■ Use PMKA1 Panel **Panel Cut-Out Dimension Differences**
 **DT3D**	■ Display: 4 Digit, .43" (11 mm) Red LED ■ Power Source: 115/230 VAC, 12 VDC ■ Measurement Format: Time Base	 **PAXLR**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC, 10 to 16 VDC ■ Measurement Format: Programmable Scaling and Update ■ Use PMKA1 Panel **Panel Cut-Out Dimension Differences**
 **APLR & APLRI**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Construction: Metal Front Bezel ■ Power Source: 115/230 VAC, 11 to 14 VDC ■ Measurement Format: Time Base	 **PAXLR**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC, 10 to 16 VDC ■ Measurement Format: Programmable Scaling and Update **Panel Cut-Out Dimension Differences**
 **APLPT**	■ Display: 4 or 5 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC, 11 to 14 VDC ■ Measurement Format: Process Time	 **PAXLPT**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC, 10 to 16 VDC ■ Measurement Format: Programmable Scaling and Update **Panel Cut-Out Dimension Differences**
 **IMI**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC ■ Count Speed: 50 KHz Max.	 **PAXI**	■ Display: 6 Digit, .56" (14 mm) Red LED ■ Power Source: 115/230 VAC, 11 to 36 VDC ■ Count Speed: 34 KHz Max. ■ Requires Appropriate Option Card

Note: Refer to the current product literature, as some differences may exist.

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DITAK 8 - ADJUSTABLE TIMEBASE 5-DIGIT RATE INDICATOR

- *LCD, POSITIVE REFLECTIVE OR NEGATIVE TRANSMISSIVE WITH YELLOW/GREEN OR RED BACKLIGHTING*
- *0.6 INCH (15.2 mm) HIGH DIGITS*
- *ADJUSTABLE TIMEBASE FROM 4 MSEC TO 63 SEC*
- *INTERNAL LITHIUM BATTERY PROVIDES OVER 5 YEARS OF CONTINUOUS OPERATION*
- *NEMA 4X/IP65 SEALED FRONT PANEL BEZEL*
- *ACCEPTS MAGNETIC OR LOGIC TYPE SIGNAL INPUTS*
- *WIRE CONNECTIONS MADE VIA SCREW CLAMP TYPE TERMINALS*

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DESCRIPTION

The Ditak 8 is a self-powered rate indicator which features selectable Timebase Increments by setting the appropriate DIP switches on the rear of the unit. The internal 3.6 VDC lithium battery will operate continuously for at least 5 years. It has a 5-digit LCD display with 0.6 inch (15.2 mm) high digits. The displays are available in positive image reflective (black digits, reflective background) or negative image transmissive (illuminated digits, dark background) with red or yellow/green backlighting. Backlight version units require power from an external 9 to 28 VDC supply.

The unit is constructed of a lightweight, high impact plastic case with a clear viewing window. The sealed front panel meets NEMA 4X/IP65 specifications for wash-down and/or dusty environments, when properly installed.

The optional Micro Line/Sensor Power Supply (MLPS1000) is designed to attach to the rear of an installed Ditak 8. The optional supply can be powered from 85 to 250 VAC, and can provide power for the backlighting of a unit and most sensors.

SAFETY SUMMARY

All safety related regulations, local codes and instructions that appear in the manual or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

SPECIFICATIONS

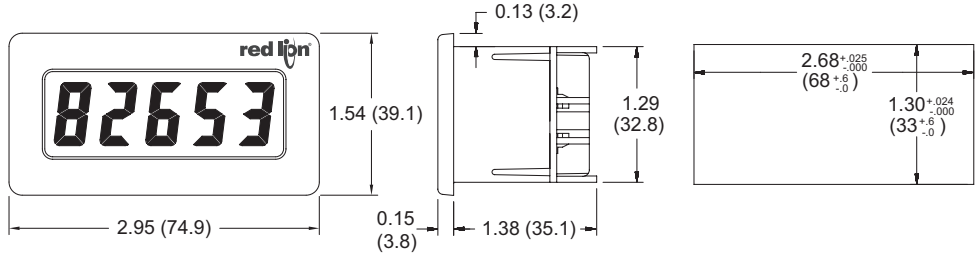
1. **DISPLAY**: 5-Digit LCD, 0.6" (15.2 mm) high digits.
2. **POWER SOURCE**: Internal 3.6 V lithium battery provides over 5 years of continuous service (battery life is dependent upon usage).
3. **BACKLIGHT POWER REQUIREMENTS**: 9 to 28 VDC @ 35 mA. Above 26 VDC, derate operating temperature to 50 °C. Must use the MLPS1 or an NEC Class 2 or Limited Power Source (LPS) rated power supply.
4. **SIGNAL INPUT**: 0 to 10 KHz from a magnetic or bi-polar output (with a 50% duty cycle). Min. input sensitivity is 0.9 V. Max. input = 28 VDC.
5. **TIMEBASE**: Adjustable in 1/256 sec (3.906 msec) increments via DIP switches located at the rear of the unit. Timebase ranges from 3.906 msec to 63.99 sec; 0.01% ±1 digit accuracy.
6. **ENVIRONMENTAL CONDITIONS**: Operating Temperature: 0 to 60 °C (Above 50 °C derate backlight operating voltage to 26 VDC max.)
   Storage Temperature: -40 to 80 °C
   Operating and Storage Humidity: 85% max. (non-condensing) from 0 °C to 60 °C.
   Vibration According to IEC 68-2-6: Operational 5 to 500 Hz, in X, Y, Z direction for 1.5 hours, 5 g's.
   Shock According to IEC 68-2-27: Operational 30 g's, 11 msec in 3 directions.
   Altitude: Up to 2000 meters
7. **CONSTRUCTION**: High impact plastic case with clear viewing window (Panel gasket and mounting clip included). Installation Category I, Pollution Degree 2.

ORDERING INFORMATION

MODEL NO.	DESCRIPTION	PART NUMBER
DT8	Adjustable Timebase Tachometer	DT800000
	Adjustable Timebase Tachometer with Yellow/ Green Backlighting	DT800010
	Adjustable Timebase Tachometer with Red Backlighting	DT800020
MLPS	Micro Line Sensor/Power Supply	MLPS1000

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.15" (54.6) H x 3.0" (76.2) W.



SPECIFICATIONS (Cont'd)

8. **CERTIFICATIONS AND COMPLIANCES**:

SAFETY

IEC 1010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
IP65 Enclosure rating (Face only), IEC 529
Type 4X Enclosure rating (Face only), UL50

ELECTROMAGNETIC COMPATIBILITY

Emissions and Immunity to EN 61326: 2006: Electrical Equipment for Measurement, Control and Laboratory use.
Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m (80 MHz to 1 GHz) 3 V/m (1.4 GHz to 2 GHz) 1 V/m (2 GHz to 2.7 GHz)
Fast transients (burst)	EN 61000-4-4	Criterion A power 2 kV I/O signal 1 kV
Surge	EN 61000-4-5	Criterion A power 1 kV L to L, 2 kV L to G
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms
Power frequency magnetic fields	EN 61000-4-8	Criterion A 30 A/m
AC power	EN 61000-4-11	Criterion A
Voltage dip		0% during 1 cycle 40% during 10/12 cycle 70% during 25/30 cycle
Short interruptions		Criterion B 0% during 250/300 cycles

Emissions:

Emissions	EN 55011	Class B

Notes:

1. Criterion A: Normal operation within specified limits.
2. Criterion B: Temporary loss of performance from which the unit self-recovers.

Refer to the EMC Installation Guidelines section of this bulletin for additional information.

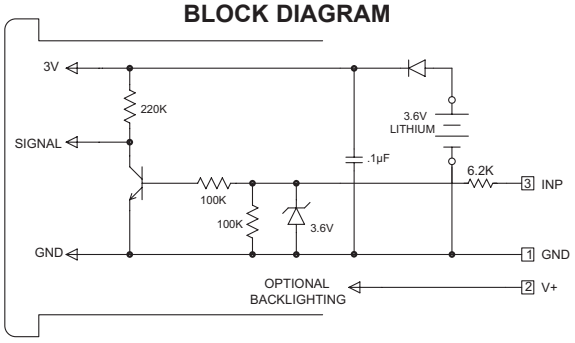
9. **WEIGHT:** 3.4 oz (96.4 g)

EMC INSTALLATION GUIDELINES

Although this unit is designed with a high degree of immunity to ElectroMagnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the unit may be different for various installations. In extremely high EMI environments, additional measures may be needed. Cable length, routing and shield termination are very important and can mean the difference between a successful or a troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the unit and leave the other end of the shield unconnected and insulated from earth ground.
2. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.
3. Signal or Control cables within an enclosure should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.
4. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
   Fair-Rite # 0443167251 (RLC #FCOR0000)
   TDK # ZCAT3035-1330A
   Steward #28B2029-0A0
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC #LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom #1VR3
   Note: *Reference manufacturer's instructions when installing a line filter.*
5. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.

BLOCK DIAGRAM

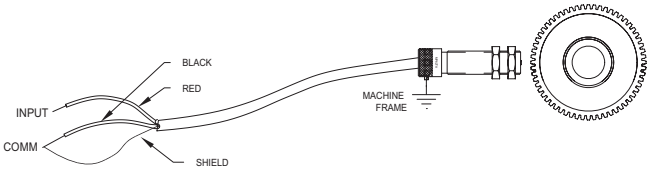


WIRING CONNECTIONS

The electrical connections are made via rear screw-clamp terminals located on the back of the unit. All conductors should meet voltage and current ratings for each terminal. Also cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that power supplied to the unit (AC or DC) be protected by a fuse or circuit breaker. When wiring the unit, use the label to identify the wire position with the proper function. Strip the wire, leaving approximately 1/4" bare wire exposed (stranded wires should be tinned with solder). Insert the wire into the screw-clamp terminal and tighten the screw until the wire is clamped tightly. Each terminal can accept up to two #14 AWG wires.

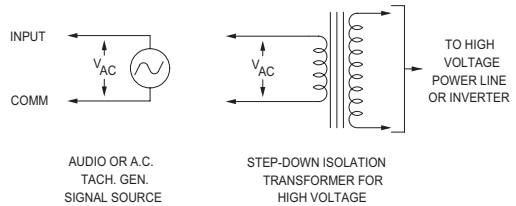
The backlighting for a backlight version unit is powered between Terminal 2 (V+) and Terminal 1 (GND).

Variable Frequency AC Inputs, Signal Source Powered

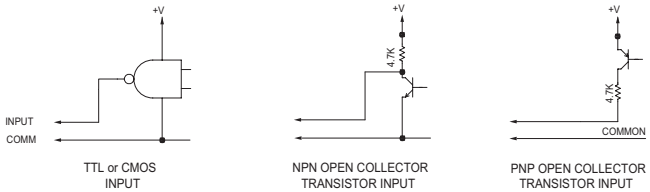


Variable Frequency AC Inputs, Signal Source Powered

Minimum V_{AC} for operation is 0.9 V peak.

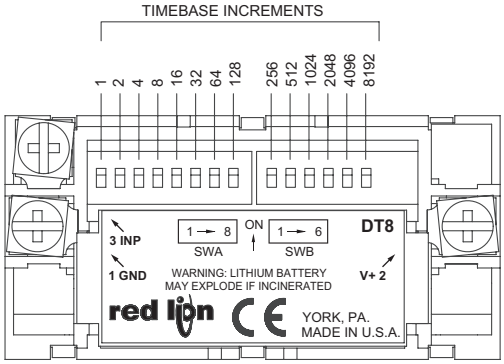


Logic Pulse Inputs From Other Circuits & Sensors



REAR PANEL DIP SWITCHES

When viewing the Ditak 8 from the rear, there are two banks of DIP switches located along the top edge of the PC board. The bank of eight switches to the left is labeled SWA and the bank of six switches to the right is labeled SWB. All of the switches are used to select the desired Timebase.



***WARNING**: Lithium battery may explode if incinerated.*

TIMEBASE SELECTION

The Ditak 8 has a Timebase selection range from 3.906 msec to 63.99 sec. SWA 1 is set to the "ON" position for the minimum Timebase setting. SWA 1 through SWB 6 are set to the "ON" position for the maximum Timebase setting. A specific Timebase setting is achieved by adding the appropriate individual Timebase increments.

SWITCH	TIMEBASE INCREMENTS
SWA 1	1
SWA 2	2
SWA 3	4
SWA 4	8
SWA 5	16
SWA 6	32
SWA 7	64
SWA 8	128

SWITCH	TIMEBASE INCREMENTS
SWB 1	256
SWB 2	512
SWB 3	1024
SWB 4	2048
SWB 5	4096
SWB 6	8192

The Timebase increment total is computed according to the following formula:

$$\text{TIMEBASE INCREMENT TOTAL (TBIT)} = \frac{\text{DR x 15,361}}{\text{RPM x PPR}}$$

WHERE:

DR	=	Desired Reading
RPM	=	Revolutions Per Minute
PPR	=	Pulses Per Revolution

Example: Find the appropriate Timebase DIP switch setting for desired parameters.

Desired Readout (DR)	=	2500
Revolutions Per Minute (RPM)	=	1250
Pulses Per Revolution (PPR)	=	50

$$\text{TIMEBASE INCREMENT TOTAL (TBIT)} = \frac{\text{2500 x 15,361}}{\text{1250 x 50}}$$

TBIT = 614.44

TBIT = 614 {round to the nearest whole number}

TBIT = 614

DIP SWB 2	-	512		
		102	-	Needed
DIP SWA 7	-	64		
		38	-	Needed
DIP SWA 6	-	32		
		6	-	Needed
DIP SWA 3	-	4		
		2	-	Needed
DIP SWA 2	-	2		
		0	-	Needed

Note: If no timebase switches are turned on, the Ditak 8 will default to 3.906 msec timebase.

DIP switches SWA 2, 3, 6, 7, and SWB 2 are all set to the "ON" position for a Timebase Increment Total of 614. If it is desired to know what the approximate Timebase is in seconds, use the following formula:

TBIT x 0.003906	=	Time in seconds
614 x 0.003906	=	2.398 sec.

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TYPICAL APPLICATION

CONVEYOR BELT SPEED INDICATOR

It is desired to display the rate of a conveyor belt used to carry PC Boards through an infrared soldering chamber that is variable from 0 to 10 feet per minute. The rate must be adjusted depending on the size of the boards being soldered. The display of the rate indicator must read in feet per minute. The shaft of the variable speed motor contains a keyway. A speed of 100 RPM will produce a belt speed of 10 ft/min. A proximity sensor is used to monitor the speed of the shaft. The Ditak 8 can be used to display the belt speed in this application. The output signal of the sensor is connected to the Ditak 8 Terminal 3 (INP). The sensor common and shield are connected to the Ditak 8 Terminal 1 (GND). The Timebase setting is to be determined by using the formula.

$$\text{TIMEBASE INCREMENT TOTAL (TBIT)} = \frac{\text{DR x 15,361}}{\text{RPM x PPR}} = \frac{\text{10 x 15,361}}{\text{100 x 1}}$$

Desired Reading	=	10
MAX RPM Of Shaft	=	100
Pulses Per Revolution	=	1

TBIT = 1536.1

TBIT = 1536 {round to the nearest whole number}

TBIT = 1536

DIP SWB 3	-	1024		
		512	-	Needed
DIP SWB 2	-	512		
		0	-	Needed

INSTALLATION ENVIRONMENT

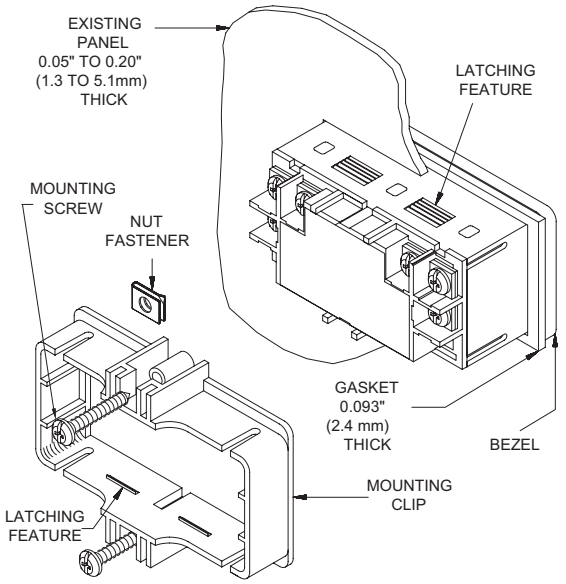
The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation.Placing the unit near devices that generate excessive heat should be avoided. The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents.Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

INSTALLATION

The Ditak 8 meets NEMA4X/IP65 requirements for indoor use, when properly installed. The units are intended to be mounted into an enclosed panel. A sponge rubber gasket, mounting clip, two screws, and nut fasteners are provided to install and seal the unit in the panel cut-out.

The following procedure assures proper installation:

1. Cut panel opening to specified dimensions. Remove burrs and clean panel opening.
2. Slide the panel gasket over the rear of the unit to the back of the bezel.
3. Slide nut fastener into slot on mounting clip and then insert mounting screw through nut on both sides of mounting clip. Tip of mounting screw should NOTproject through hole on clip.
4. Install Ditak unit through panel cut-out.
5. Slide mounting clip over rear of unit until clip is against back of panel. The mounting clip and Ditak housing have a latching feature to hold the unit in place until tightened.
   Note: Hold the Ditak front bezel in place when sliding the mounting clip into position.
6. Alternately tighten each mounting screw to ensure uniform gasket pressure. Visually inspect the gasket for proper seal. The gasket should be compressed approximately 75 to 80% of its original thickness.



7. If the gasket is not adequately compressed and the mounting screws cannot be tightened any further, loosen mounting screws and insure that the clip is latched as close as possible to the panel.
8. Repeat step #6 for tightening the mounting screws.

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TROUBLESHOOTING

For further technical assistance, contact technical support at the appropriate company numbers listed.

MODEL CUB5 - MINIATURE ELECTRONIC 8-DIGIT DUAL COUNTER AND RATE INDICATOR

This is a brief overview of the CUB5. For complete specifications and programming information, see the **CUB5 Bulletin** starting on **page 35.**

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- *LCD, REFLECTIVE OR GREEN/RED LED BACKLIGHTING*
- *0.46" (11.7 mm) HIGH DIGITS*
- *OPTIONAL RELAY OUTPUT MODULE*
- *OPTIONAL COMMS OUTPUT MODULES*
- *COUNT SPEEDS UP TO 20 KHZ*
- *OPERATES FROM 9 TO 28 VDC POWER SOURCE*
- *PROGRAMMABLE SCALING FOR COUNT AND RATE*
- *BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL*
- *QUADRATURE SENSING (UP TO 4 TIMES RESOLUTION)*
- *ANTI-COINCIDENCE COUNTING (ADD/ADD & ADD/SUB)*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*

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SPECIFICATIONS

COUNTER DISPLAYS:
Counter A: 8-digits, enabled in all count modes
Display Range: -9999999 to 99999999
Overflow Indication: Display flashes "CntOVEr"
Counter B: 7-digits, enabled in Dual Counter mode only
Display Designator: "b" to the left side of the display
Display Range: 0 to 9999999 (positive count only)
Overflow Indication: Display flashes "bCntOVEr"
Maximum Count Rates: 50% duty cycle
Without setpoint option card: 20 KHz (all count modes)
With setpoint option card: 20 KHz for any count mode except Quadrature x4 (18 KHz) and Dual Counter (17 KHz)

RATE DISPLAY: 6-digits, may be enabled or disabled in any mode
Display Designator: "R" to the left side of the display
Display Range: 0 to 999999
Over Range Display: "R OLOLOL"
Maximum Frequency: 20 KHz
Minimum Frequency: 0.01 Hz
Accuracy: ±0.01%

COUNT/RATE SIGNAL INPUTS (INP A and INP B):
Input A: DIP switch selectable to accept pulses from a variety of sources. See Section 2.0 Setting the DIP Switches for Input A specifications.
Input B: Logic signals only
Trigger levels: V_{IL} = 1.0 V max; V_{IH} = 2.4 V min; V_{MAX} = 28 VDC
Current sinking: Internal 10KΩ pull-up resistor to +9 to 28 VDC
Filter (LO Freq.): Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec min.

MODEL PAXLR - PAX® LITE RATE METER

- *RATE INDICATION*
- *6-DIGIT, 0.56" (14.2 mm) HIGH RED LED DISPLAYS*
- *INPUT RATES UP TO 25 KHZ*
- *ACCEPTS A WIDE VARIETY OF SENSORS*
- *PROGRAMMABLE SCALING*
- *PROGRAMMABLE UPDATE TIME*
- *PROGRAMMABLE DECIMAL POINTS*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*

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51EB

GENERAL DESCRIPTION

The PAX® Lite Rate Meter, Model PAXLR, provides the versatility and flexibility needed to accommodate virtually any rate measuring application. The meter has the ability to scale for direct readout in terms of the units being measured. Whether a machine produces bottles, cloth, wire, or beverage mix, operation is enhanced when the rate readout is expressed directly in bottles/min., feet/min., gallons/min., or whatever units are needed in plant applications.

The PAXLR can accommodate magnetic pickups, logic sensors, and NPN open collector sensors. The pulses are received and scaled, so the desired display can be achieved. The meter is programmed through both the front panel buttons and DIP switches. Once the programming is complete, the front panel buttons can be disabled by a DIP switch setting.

The meter has been specifically designed for harsh industrial environments. With NEMA 4X/IP65 sealed bezel and extensive testing to meet CE requirements, the meter provides a tough, yet reliable application solution.

SAFETY SUMMARY

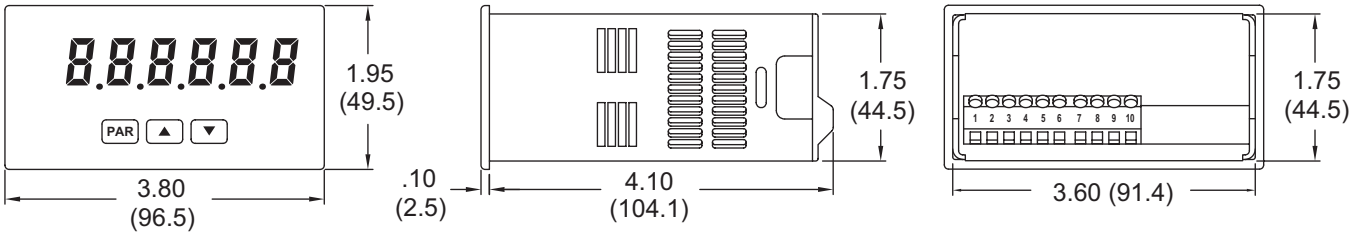
All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.4) H x 5" (127) W.



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Ordering Information

Meter Part Numbers

PAXL	R0	0	0

R0 - 6 Digit Rate Meter

General Meter Specifications

1. **DISPLAY**: 6-digit, 0.56" (14.2 mm), 7-segment red LED.
   Decimal points are programmed by front panel keys.
2. **POWER**:
   AC Power: 115/230 VAC, switch selectable. Allowable power line variation ±10%, 50/60 Hz, 6 VA
   Isolation: 2300 Vrms for 1 min. to input and DC Out/In.
   DC Power: 10 to 16 VDC @ 0.1 A max.
3. **SENSOR POWER**: 9 to 17.5 VDC @ 100 mA max.
4. **KEYPAD**: 3 programming keys, the ▼ (Down Arrow) key can also function as the front panel reset button.
5. **INPUT**: (DIP switch selectable)
   Accepts pulses from a variety of sources including NPN-OC, PNP-OC, TTL Outputs, Magnetic Pickups and all standard Red Lion sensors.
   Logic: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V min.
   Current Sinking: Internal 7.8 KΩ pull-up to +12 VDC, I_{MAX} = 1.9 mA
   Current Sourcing: Internal 3.9 KΩ pull-down, 8 mA max. @ 30 VDC max.
   MAGNETIC PICK-UP:
   Sensitivity: 200 mV peak
   Hysteresis: 100 mV
   Input impedance: 3.9KΩ @ 60 Hz
   Maximum input voltage: ±40 V peak, 30 Vrms
6. **INPUT FREQUENCY RANGE**:
   Max Frequency: 25 KHz
   Min Frequency: 0.01 Hz
   Accuracy: ±0.01%
7. **MEMORY**: Nonvolatile E^2PROM retains all programmable parameters and display values.
8. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature: 0° to 60 °C
   Storage Temperature: -40° to 60 °C
   Operating and Storage Humidity: 0 to 85% max. relative humidity (non-condensing)
   Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g.
   Shock According to IEC 68-2-27: Operational 30 g, 11 msec in 3 directions.
   Altitude: Up to 2000 meters
9. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   UL Recognized Component, File # E179259, UL61010A-1, CSA C22.2 No. 61010-1
   Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.
   UL Listed, File # E137808, UL508, CSA C22.2 No. 14-M95
   LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   Type 4X Enclosure rating (Face only), UL50
   IECEE CB Scheme Test Report # 04ME11209-20041018
   Issued by Underwriters Laboratories, Inc.
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   IP65 Enclosure rating (Face only), IEC 529
   IP20 Enclosure rating (Rear of unit), IEC 529

ELECTROMAGNETIC COMPATIBILITY

Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A [2] 2 kV power 2 kV signal
Surge	EN 61000-4-5	Criterion A [2] 1 kV L-L, 2 kV L&N-E power 1 kV signal
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms
Power frequency magnetic fields	EN 61000-4-8	Criterion A 30 A/m
Voltage dip/interruptions	EN 61000-4-11	Criterion A 0.5 cycle

Emissions:

Emissions	EN 55011	Class B

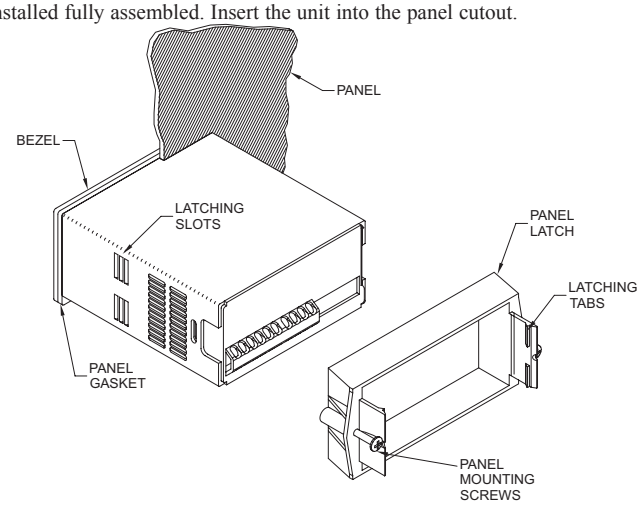
Notes:
1. Criterion A: Normal operation within specified limits.
2. EMI filter placed on the DC power supply, when DC powered: Corcom #1VB3 or Schaffner #FN610-1/07 (RLC #LFIL0000).

10. **CONNECTIONS**: High compression cage-clamp terminal block
    Wire Strip Length: 0.3" (7.5 mm)
    Wire Gage Capacity: 30-14 AWG copper wire.
    Torque: 4.5 inch-lbs (0.51 N-m) max.
11. **CONSTRUCTION**: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.
12. **WEIGHT**: 12 oz (340 g)

1.0 Installing the Meter

Installation

The PAX meets NEMA 4X/IP65 requirements when properly installed. The unit is intended to be mounted into an enclosed panel. Prepare the panel cutout to the dimensions shown. Remove the panel latch from the unit. Slide the panel gasket over the rear of the unit to the back of the bezel. The unit should be installed fully assembled. Insert the unit into the panel cutout.



While holding the unit in place, push the panel latch over the rear of the unit so that the tabs of the panel latch engage in the slots on the case. The panel latch should be engaged in the farthest forward slot possible. To achieve a proper seal, tighten the latch screws evenly until the unit is snug in the panel (Torque to approximately 7 in-lbs [79N-cm]). Do not over-tighten the screws.

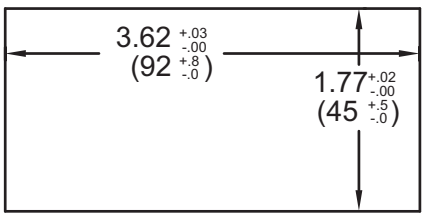
Installation Environment

The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation. Placing the unit near devices that generate excessive heat should be avoided.

The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents. Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.

PANEL CUT-OUT



2.0 Setting the Switches

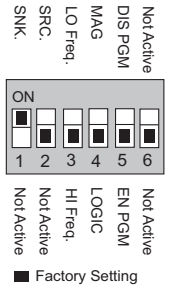
The meter has switches that must be checked and/or changed prior to applying power. To access the power switch, remove the meter base from the case by firmly squeezing and pulling back on the side rear finger tabs. This should lower the latch below the case slot (which is located just in front of the finger tabs). It is recommended to release the latch on one side, then start the other side latch.

Power Selection Switch

Caution: Insure the AC power selection switch is set for the proper voltage before powering-up the meter. The meter is shipped from the factory in the 230 VAC position.

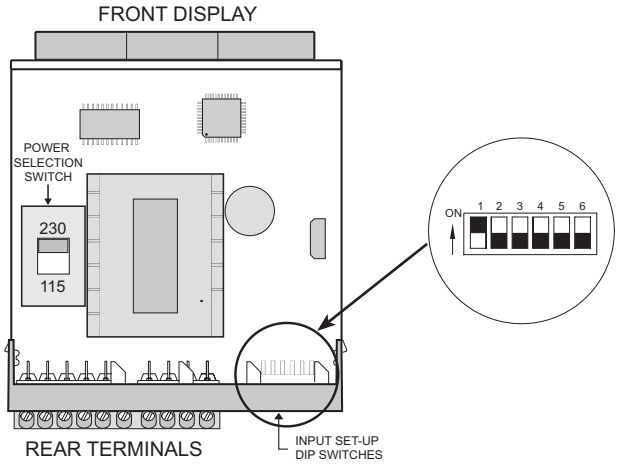
Set-Up DIP Switches

A DIP switch is located at the rear of the meter, and is fully accessible when the unit is in the case. It is used for the selection of the input parameters and program disable.



SWITCH 1
SNK.: Adds internal 7.8 KΩ pull-up resistor to + 12 VDC, I_{MAX} = 1.9 mA.
SWITCH 2
SRC.: Adds internal 3.9 KΩ pull-down resistor, 8 mA max. @ 30 VDC max.

SWITCH 3
HI Frequency: Removes damping capacitor and allows max. frequency.
LO Frequency: Limits input frequency to 50 Hz and input pulse widths to 10 msec.
SWITCH 4
LOGIC: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V max.
MAG: 200 mV peak input (must have SRC on).
SWITCH 5
Enable Programming: Enables programming through the front panel buttons.
Disables Programming: Disables the front panel buttons from any programming changes.
SWITCH 6
Not Active for the Rate Meter



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3.0 Wiring the Meter

WIRING OVERVIEW

Electrical connections are made via screw-clamp terminals located on the back of the meter. All conductors should conform to the meter's voltage and current ratings. All cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that the power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker.

When wiring the meter, compare the numbers embossed on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.3" (7.5 mm) bare lead exposed (stranded wires should be tinned with solder.) Insert the lead under the correct screw-clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.)

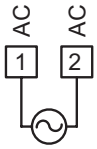
EMC INSTALLATION GUIDELINES

Although this meter is designed with a high degree of immunity to Electro-Magnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the meter may be different for various installations. The meter becomes more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be mounted in a metal enclosure, which is properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be ran in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.
4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.
5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
   Fair-Rite # 0443167251 (RLC# FCOR0000)
   TDK # ZCAT3035-1330A
   Steward # 28B2029-0A0
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC# LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom # 1 VR3
   Note: Reference manufacturer's instructions when installing a line filter.
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
   Snubber: RLC# SNUB0000.

3.1 POWER WIRING

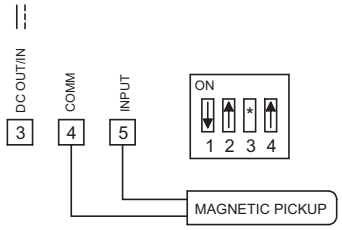
AC Power
Terminal 1: VAC
Terminal 2: VAC



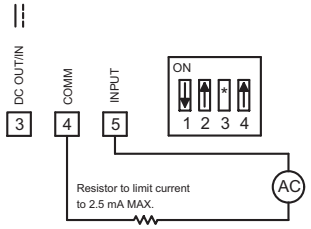
DC Power
Terminal 3: +VDC
Terminal 4: COMM

3.2 INPUT WIRING

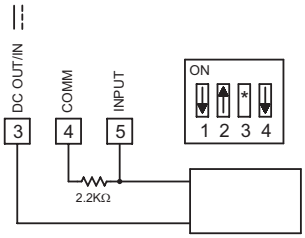
Magnetic Pickup



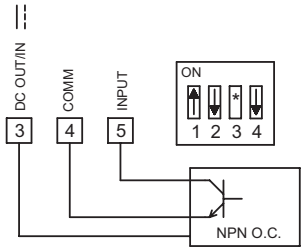
AC Inputs From Tach Generators, Etc.



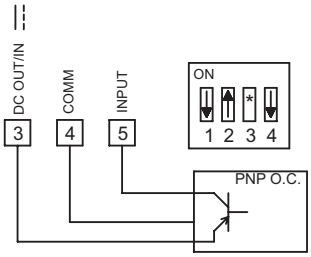
Two Wire Proximity, Current Source



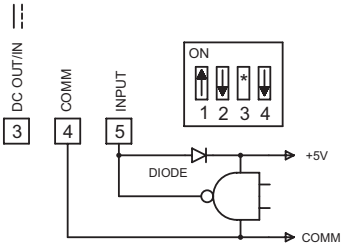
Current Sinking Output



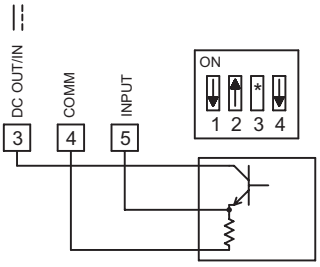
Current Sourcing Output



Interfacing With TTL

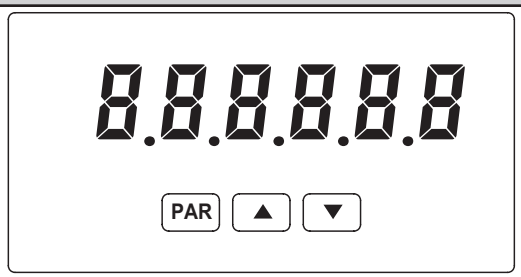


Emitter Follower; Current Source



*Switch position is application dependent.

4.0 Reviewing the Front Buttons and Display



KEY	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
▲	No Function	Increment selected digit of parameter value
▼	No Function	Select digit position in parameter value

C

5.0 Scaling the Meter

RATE SCALING

To scale the Rate, enter a Scaling Display value with a corresponding Scaling Input value. These values are internally plotted to a Display value of 0 and Input value of 0 Hz. A linear relationship is formed between these points to yield a rate display value that corresponds to the incoming input signal rate. The location of the scaling point should be near the process end limit for the best possible accuracy. The PAXLR is capable of showing a rate display value for any linear process.

SCALING CALCULATION

If a display value versus input signal (in pulses per second) is known, then those values can be entered into Scaling Display (rt-dSP) and Scaling Input (rt-INP). No further calculations are needed.

If only the number of pulses per 'single' unit (i.e. # of pulses per foot) is known, then it can be entered as the Scaling Input value and the Scaling Display value will be entered as the following:

RATE PER	DISPLAY (rt-dSP)	INPUT (rt-INP)
Second	1	# of pulses per unit
Minute	60	# of pulses per unit
Hour	3600	# of pulses per unit

NOTES:

1. If # of pulses per unit is less than 10, then multiply both Input and Display values by 10.
2. If # of pulses per unit is less than 1, then multiply both Input and Display values by 100.
3. If the Display value is raised or lowered, then Input value must be raised or lowered by the same proportion (i.e. Display value for per hour is entered by a third less (1200) then Input value is a third less of # of pulses per unit). The same is true if the Input value is raised or lowered, then Display value must be raised or lowered by the same proportion.
4. Both values must be greater than 0.0.

EXAMPLE:

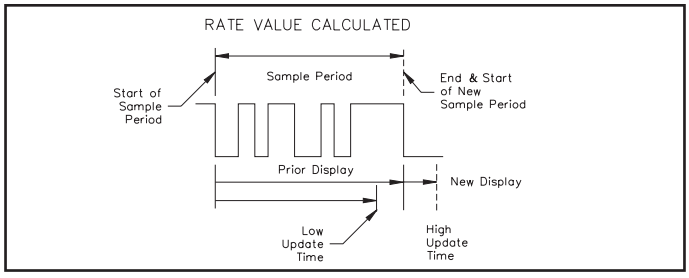
1. With 15.1 pulses per foot, show feet per minute in tenths.
   Scaling Display = 60.0 Scaling Input = 15.1
2. With 0.25 pulses per gallon, show whole gallons per hour. (To have greater accuracy, multiply both Input and Display values by 10.)
   Scaling Display = 36000 Scaling Input = 2.5

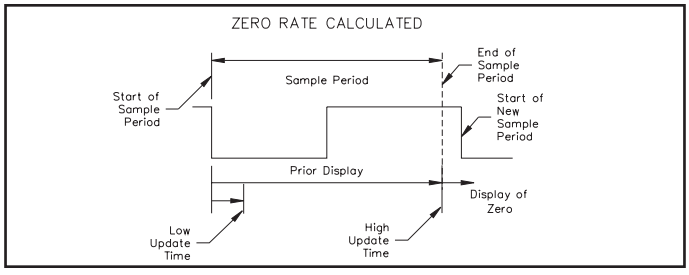
RATE DISPLAY OVERFLOW

The rate of the input signal along with the programmed scaling values can cause the calculated rate display to exceed the meter's 6-digit capacity. If this occurs, the display will show "OLOLOL" to indicate an overflow condition.

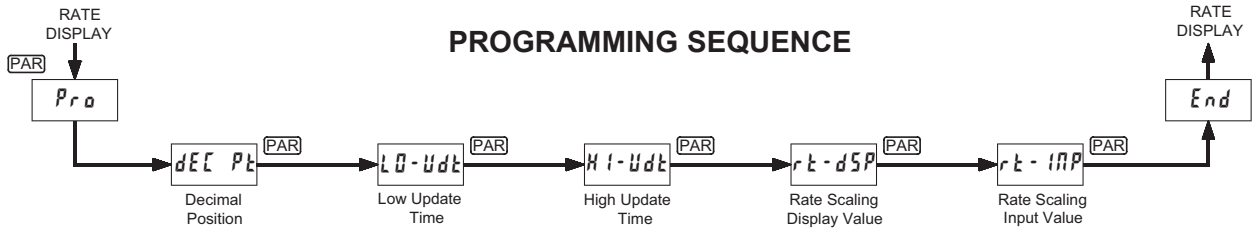
INPUT FREQUENCY CALCULATION

The meter determines the input frequency by summing the number of falling edges received during a sample period of time. The sample period begins on the first falling edge. At this falling edge, the meter starts accumulating time towards Low Update and High Update values. Also, the meter starts accumulating the number of falling edges. When the time reaches the Low Update Time value, the meter looks for one more falling edge to end the sample period. If a falling edge occurs (before the High Update Time value is reached), the Rate display will update to the new value and the next sample period will start on the same edge. If the High Update Time value is reached (without receiving a falling edge after reaching Low Update Time), then the sample period will end but the Rate display will be forced to zero. The High Update Time value must be greater than the Low Update Time value. Both values must be greater than 0.0. The input frequency calculated during the sample period, is then shown as a Rate value determined by either scaling method.





6.0 PROGRAMMING THE METER



The Rate Indicator has five programmable parameters which are entered in the sequence shown above, using the front panel push buttons.

Before programming, refer to the section on Scaling the Meter to determine the Rate Scaling Display Value and Rate Scaling Input Value to use for the specific application.

Note: Programming mode can be locked out with the Program Disable DIP switch. With the switch in the Disabled (up) position the meter will not enter programming mode. Refer to the section on DIP switch setup.

C

PROGRAMMING MODE ENTRY

Press the **PAR** key to enter Programming Mode. The meter briefly displays `Pro` followed by the first programming parameter described below.

PROGRAMMING PARAMETERS

In programming mode, the display alternates between the parameter and the current selection or value for that parameter. The dual display with arrows is used below to illustrate the alternating display. The selection choices or value range for each parameter is shown to the right of the alternating display.

DECIMAL POSITION

`dEC Pt` / `0`

`0` `0.0` `0.00` `0.000` `0.0000` `0.00000`

This parameter selects the decimal point position on the display. The selection does not affect scaling calculations.

Press the arrow keys (▲ or ▼) to sequence through the selection list until the desired selection is shown. Press the **PAR** key to save the displayed selection and advance to the next parameter.

ENTERING NUMERICAL VALUES

The parameters which follow are displayed as a multi-digit numerical values with one selected digit flashing (initially the far left digit). Press the ▲ (up arrow) key to increment the value of the selected (flashing) digit. Holding the ▲ key automatically scrolls the value of the selected digit.

Press the ▼ (down arrow) key to select the next digit position to the right. Use the ▲ key to increment the value of this digit to the desired number. Press the ▼ key again to select the next digit to be changed. Holding the ▼ key automatically scrolls through each digit position.

Repeat the "select and set" sequence until all digits are displaying the desired numerical value. Press the **PAR** key to save the displayed value and advance to the next parameter.

LOW UPDATE TIME (DISPLAY UPDATE)

`LO-Udt` / `1.0` — `0.1` to `99.9` seconds

The Low Update Time is the minimum amount of time between display updates. The factory setting of 1.0 allows a minimum of one second between updates. Low values below 0.3 seconds will update the display correctly, but may cause the display to appear unsteady.

For more details on display updating, refer to Input Frequency Calculation.

HIGH UPDATE TIME (DISPLAY ZERO)

`HI-Udt` / `2.0` — `0.2` to `99.9` seconds

The High Update Time is the maximum amount of time before the display is forced to zero. The High Update Time **must** be higher than the Low Update Time and also higher than the desired slowest readable speed (one divided by pulses per second). The factory setting of 2.0 will force the display to zero for speeds below 0.5 Hz or one pulse every 2 seconds.

For more details on display updating, refer to Input Frequency Calculation.

RATE SCALING DISPLAY VALUE

`rt-dSP` / `1000` — `0` to `999999`

Enter the desired Rate Display value to be shown for the corresponding Rate Input value entered below. For more explanation, refer to Rate Scaling.

If a decimal point was selected in the Decimal Position (`dEC Pt`) parameter, it will be displayed at the same position for this parameter value.

RATE SCALING INPUT VALUE

`rt-INP` / `1000.0` — `0` to `99999.9`

Enter the Rate Input value that corresponds to the Rate Display value entered above. This value is always in pulses per second (Hz). For more explanation, refer to Rate Scaling.

PROGRAMMING MODE EXIT

The meter exits Programming Mode when the **PAR** key is pressed to save the Rate Scaling Input Value. The meter briefly displays `End` upon exiting Programming Mode. All programmed selections are now transferred to the non-volatile memory and the meter returns to the Rate display.

(If power loss occurs during programming mode, verify parameter changes and reprogram, if necessary, when power is restored.)

PROGRAMMING MODE TIME OUT

The Programming Mode has an automatic time out feature. If no keypad activity is detected for approximately 60 seconds, the meter automatically exits Programming Mode. The meter briefly displays `End` and returns to the Rate display. When automatic timeout occurs, any changes that were made to the parameter currently being programmed, will not be saved.

FACTORY SETTINGS

The factory settings for the programming parameters are shown above in the alternating display illustrations. The factory settings can be easily restored by removing power from the meter, and then pressing and holding the **PAR** key while power is reapplied. The meter displays `rESEt` until the **PAR** key is released. The normal power-up sequence then resumes, with the factory settings loaded and saved in non-volatile memory.

Note: The Program Disable DIP switch must be in the Enabled (down) position to allow loading factory settings. See section on DIP switch setup.

MODEL PAXLCR - 1/8 DIN PAX LITE DUAL COUNTER AND RATE METER

This is a brief overview of the PAXLCR. For complete specifications and programming information, see the **PAX Lite Dual Counter and Rate Meter Bulletin** starting on **page 57**.

- *6 DIGIT, 0.56" HIGH RED LED DISPLAY*
- *PROGRAMMABLE SCALING FOR COUNT AND RATE*
- *BI-DIRECTIONAL COUNTING, UP/DOWN CONTROL*
- *QUADRATURE SENSING (UP TO 4 TIMES RESOLUTION)*
- *BUILT-IN BATCH COUNTING CAPABILITY*
- *PROGRAMMABLE USER INPUT*
- *DUAL 5 AMP FORM C RELAYS*
- *UNIVERSALLY POWERED*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*

C

ANNUNCIATORS:
A - Counter A value
B - Counter B value (dual count or batch)
- Rate value is displayed with no designator
SP1 - Indicates setpoint 1 output status
SP2 - Indicates setpoint 2 output status

COUNTER DISPLAYS:
Counter A: 6-digits, enabled in all count modes
Display Designator: "A" to the left side of the display
Display Range: -99999 to 999999
Counter B: 6-digits, enabled in Dual Count mode or Batch Counter
Display Designator: "B" to the left side of the display
Display Range: 0 to 999999 (positive count only)
Overflow Indication: Display "OLOL" alternates with overflowed count value
Maximum Count Rates: 50% duty cycle, count mode dependent.
With setpoints disabled: 25 KHz, all modes except Quadrature x4 (23 KHz).
With setpoint(s) enabled: 20 KHz, all modes except Dual Counter (14 KHz), Quadrature x2 (13 KHz) and Quadrature x4 (12 KHz).

RATE DISPLAY: 6-digits, may be enabled or disabled in any count mode
Display Range: 0 to 999999
Over Range Display: "OLOL"
Maximum Frequency: 25 KHz
Minimum Frequency: 0.01 Hz
Accuracy: ±0.01%

COUNT/RATE SIGNAL INPUTS (INPUT A and INPUT B):
See Section 2.0 Setting the DIP Switches for complete Input specifications. DIP switch selectable inputs accept pulses from a variety of sources. Both inputs allow selectable active low or active high logic, and selectable input filtering for low frequency signals or switch contact debounce.
Input A: Logic level or magnetic pickup signals.
Trigger levels: V_{IL} = 1.25 V max; V_{IH} = 2.75 V min; V_{MAX} = 28 VDC
Mag. pickup sensitivity: 200 mV peak, 100 mV hysteresis, 40 V peak max.
Input B: Logic level signals only
Trigger levels: V_{IL} = 1.0 V max; V_{IH} = 2.4 V min; V_{MAX} = 28 VDC

Model PAXR - 1/8 DIN Rate Meter

This is a brief overview of the PAXR. For complete specifications and programming information, see the **PAX Digital Input Panel Meters Bulletin** starting on **page 68**.

- *5-DIGIT 0.56" RED SUNLIGHT READABLE OR STANDARD GREEN DISPLAY*
- *RATE INDICATION*
- *MINIMUM/MAXIMUM RATE DISPLAYS*
- *FOUR SETPOINT ALARM OUTPUTS (W/Plug-in card)*
- *VARIABLE INTENSITY DISPLAY*

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PAXR SPECIFICATIONS

ANNUNCIATORS:
- r - Rate
- H - Maximum (High) Rate
- L - Minimum (Low) Rate
- SP1 - setpoint 1 output state
- SP2 - setpoint 2 output state
- SP3 - setpoint 3 output state
- SP4 - setpoint 4 output state

RATE DISPLAY:
Accuracy: ±0.01%
Minimum Frequency: 0.01 Hz
Maximum Frequency: 34 KHz
Maximum Display: 5 Digits: 99999
Adjustable Display (low) Update: 0.1 to 99.9 seconds
Over Range Display: "r OLOL"

INPUT A:
DIP switch selectable to accept pulses from a variety of sources including TTL outputs, magnetic pickups and all standard RLC sensors.
LOGIC: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V min.
Current sinking: Internal 7.8 KΩ pull-up to +12 VDC, I_{MAX} = 1.9 mA.
Current sourcing: Internal 3.9 KΩ pull-down, 7.3 mA max. @ 28 VDC, V_{MAX} = 30 VDC.
MAGNETIC PICKUP:
Sensitivity: 200 mV peak
Hysteresis: 100 mV
Input impedance: 3.9 KΩ @ 60 Hz
Maximum input voltage: ±40 V peak, 30 Vrms

Model PAXI - 1/8 DIN Dual Counter/Rate Meter

This is a brief overview of the PAXI. For complete specifications and programming information, see the **PAX Digital Input Panel Meters Bulletin** starting on **page 68**.

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- *COUNTER, DUAL COUNTER, RATE AND SLAVE DISPLAY*
- *6-DIGIT 0.56" RED SUNLIGHT READABLE OR STANDARD GREEN DISPLAY*
- *VARIABLE INTENSITY DISPLAY*
- *10 POINT SCALING (FOR NON-LINEAR PROCESSES)*
- *FOUR SETPOINT ALARM OUTPUTS (W/OPTION CARD)*
- *RETRANSMITTED ANALOG OUTPUT (W/OPTION CARD)*
- *COMMUNICATION AND BUS CAPABILITIES (W/OPTION CARD)*
- *BUS CAPABILITIES; DEVICENET, MODBUS, AND PROFIBUS-DP*
- *CRIMSON PROGRAMMING SOFTWARE*

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PAXI SPECIFICATIONS

MAXIMUM SIGNAL FREQUENCIES TABLE

To determine the maximum frequency for the input(s), first answer the questions with a yes (Y) or no (N). Next determine the Count Mode to be used for the counter(s). If dual counters are used with different Count Modes, then the lowest frequency applies to both counters.

FUNCTION QUESTIONS	**Single**: Counter A or B (with/without rate) or Rate only								**Dual**: Counter A & B or Rate not assigned to active single counter							
Are any setpoints used?	N	N	N	N	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y
Is Prescaler Output used?	N	N	Y	Y	N	N	Y	Y	N	N	Y	Y	N	N	Y	Y
Is Counter C used?	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y
COUNT MODE	(Values are in KHz)				(Values are in KHz)				(Values are in KHz)				(Values are in KHz)			
Count x1	34	25	21	17	18	15	13	11	13	12	13	11	9	7.5	9	7
Count x2	17	13	16	12	9	7	8	7	9 *	7 *	9 *	7 *	5 *	4 *	5 *	4 *
Quadrature x1	22	19	20	17	12	10	11	10	7 *	6 *	6 *	5 *	4 *	3.5 *	3.5 *	3 *
Quadrature x2	17	13	16	12	9	7	8	6	7 *	6 *	6 *	5 *	4 *	3.5 *	3.5 *	3 *
Quadrature x4	8	6	8	6	4	3	4	3								
Rate Only	34	N/A	21	N/A	34	N/A	21	N/A								

ANNUNCIATORS:
A - Counter A
B - Counter B
C - Counter C
r - Rate
H - Maximum (High) Rate
L - Minimum (Low) Rate
OF - Upper significant digit display of counter
SP1 - setpoint 1 output state
SP2 - setpoint 2 output state
SP3 - setpoint 3 output state
SP4 - setpoint 4 output state

RATE DISPLAY:
Accuracy: ±0.01%
Minimum Frequency: 0.01 Hz
Maximum Frequency: see Max Signal Frequencies Table.
Maximum Display: 5 Digits: 99999
Adjustable Display (low) Update: 0.1 to 99.9 seconds
Over Range Display: "r OLOL"

COUNTER DISPLAYS:
Maximum display: 8 digits: ± 99999999 (greater than 6 digits display Alternates between high order and low order.)

INPUTS A and B:
DIP switch selectable to accept pulses from a variety of sources including switch contacts, TTL outputs, magnetic pickups and all standard RLC sensors.
LOGIC: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V min.
Current sinking: Internal 7.8 KΩ pull-up to +12 VDC, I_{MAX} = 1.9 mA.
Current sourcing: Internal 3.9 KΩ pull-down, 7.3 mA max. @ 28 VDC, V_{MAX} = 30 VDC.
Filter: Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec. minimum.
MAGNETIC PICKUP:
Sensitivity: 200 mV peak
Hysteresis: 100 mV
Input impedance: 3.9 KΩ @ 60 Hz
Maximum input voltage: ±40 V peak, 30 Vrms
DUAL COUNT MODES:
When any dual count mode is used, then User Inputs 1 and/or 2 will accept the second signal of each signal pair. The user inputs do not have the Logic/Mag, HI/LO Freq, and Sink/Source input setup switches. The user inputs are inherently a logic input with no low frequency filtering. Any mechanical contacts used for these inputs in a dual count mode must be debounced externally. The user input may only be selected for sink/source by the User Jumper placement.

PRESCALER OUTPUT:
NPN Open Collector: I_{SNK} = 100 mA max. @ V_{OL} = 1 VDC max.
V_{OH} = 30 VDC max. With duty cycle of 25% min. and 50 % max.

MODEL PAX2D - 1/8 DIN DIGITAL INPUT PANEL METER

This is a brief overview of the PAX2D. For complete specifications and programming information, see the **PAX2D Digital Input Panel Meter Bulletin** starting on **page 98**.

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PROCESS CONTROL EQUIPMENT

- *COUNT, DUAL COUNTER WITH MATH FUNCTIONS*
- *RATE, DUAL RATE WITH MATH FUNCTIONS*
- *SLAVE DISPLAY*
- *UNIVERSAL AC/DC POWER SUPPLY*
- *6 / 9 DIGIT DUAL LINE/TRI-COLOR DISPLAY WITH 0.71" & 0.35" DIGITS*
- *10 POINT RATE SCALING FOR NON-LINEAR PROCESSES*
- *PROGRAMMABLE UNITS DISPLAY*
- *BUS CAPABILITIES; DEVICENET, Modbus, AND PROFIBUS-DP*
- *BUILT-IN USB PROGRAMMING PORT ENABLING UNIT CONFIGURATION WITH CRIMSON PROGRAMMING SOFTWARE*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*

SPECIFICATIONS

POWER:
AC Power: 40 to 250 VAC, 50/60 Hz, 20 VA
DC Power: 21.6 to 250 VDC, 8 W
Isolation: 2300 Vrms for 1 min. to all inputs and outputs.

INPUTS A and B:
DIP switch selectable to accept pulses from a variety of sources including switch contacts, TTL outputs, magnetic pickups and all standard RLC sensors.
LOGIC: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V min.
Current sinking: Internal 7.8 KΩ pull-up to +5 VDC, I_{MAX} = 0.7 mA.
Current sourcing: Internal 3.9 KΩ pull-down, 7.3 mA max. @ 28 VDC, V_{MAX} = 30 VDC.
Filter: Damping capacitor provided for switch contact bounce. Limits input frequency to 50 Hz and input pulse widths to 10 msec. minimum.
MAGNETIC PICKUP:
Sensitivity: 200 mV peak
Hysteresis: 100 mV
Input impedance: 3.9 KΩ @ 60 Hz; Must also have SRC switch ON. (Not recommended with counting applications.)
Maximum input voltage: ±40 V peak, 28 Vrms
DUAL COUNT MODES:
When any dual count mode is used, then User Inputs 1 and/or 2 will accept the second signal of each signal pair. The user inputs do not have the Logic/Mag, HI/LO Freq, and Sink/Source input setup switches. The user inputs are inherently a logic input with no low frequency filtering. Any mechanical contacts used for these inputs in a dual count mode must be debounced externally. The user input may only be selected for sink/source by the User Jumper placement.

SENSOR POWER:
+18 VDC, ± 5% @ 60 mA max.; short circuit protected

USER INPUTS: Three programmable user inputs
Max. Continuous Input: 30 VDC
Isolation To Sensor Input Common: Not isolated.

PRESCALER OUTPUT:
NPN Open Collector: I_{SNK} = 100 mA max. @ V_{OL} = 1 VDC max. V_{OH} = 30 VDC max. Duty cycle 25% min. and 50 % max.

ENVIRONMENTAL CONDITIONS:
Operating Temperature Range: 0 to 50 °C
Storage Temperature Range: -40 to 60 °C
Vibration to IEC 68-2-6: Operational 5-150 Hz, 2 g
Shock to IEC 68-2-27: Operational 25 g (10 g relay)
Operating and Storage Humidity: 0 to 85% max. RH non-condensing
Altitude: Up to 2000 meters

CERTIFICATIONS AND COMPLIANCES:
CE Approved
EN 61326-1 Immunity to Industrial Locations
Emission CISPR 11 Class A
IEC/EN 61010-1
RoHS Compliant
UL Listed: File #E179259
Type 4X Indoor Enclosure rating (Face only)
IP65 Enclosure rating (Face only)
IP20 Enclosure rating (Rear of unit)

CONNECTIONS: High compression cage-clamp terminal block
Wire Strip Length: 0.3" (7.5 mm)
Wire Gauge Capacity: One 14 AWG (2.55 mm) solid, two 18 AWG (1.02 mm) or four 20 AWG (0.61 mm)

CONSTRUCTION: This unit is rated NEMA 4X/IP65 for indoor use only. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/ case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.

WEIGHT: 8 oz. (226.8 g)

MODEL PAXLPT - PAX® LITE PROCESS TIME METER

- *PROCESS TIME INDICATION*
- *6-DIGIT, 0.56" (14.2 mm) HIGH RED LED DISPLAYS*
- *DISPLAY MODES 999999 OR 999-59*
- *INPUT RATES UP TO 25 KHZ*
- *ACCEPTS A WIDE VARIETY OF SENSORS*
- *PROGRAMMABLE SCALING*
- *PROGRAMMABLE DECIMAL POINTS*
- *NEMA 4X/IP65 SEALED FRONT BEZEL*

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GENERAL DESCRIPTION

The PAX® Lite Process Time Meter, Model PAXLPT, displays a value representing the time between a beginning and end point of a process, such as a conveyor oven.

The PAXLPT's display will update inversely in relation to the input signal frequency. As input frequency increases (representing speed), the PAXLPT time display will decrease indicating a reduction in the duration of process time. For example, the bake time through an oven will decrease the faster the conveyor runs.

The display can be programmed for two operating modes. Operating in the 6 digit mode, the PAXLPT can readout in any whole value, such as seconds, minutes, or hours. This mode also provides capability for decimal points. The 5 digit mode functions as a chronometer, which has a maximum display value of 999-59. This formats the display to allow the meter to readout in hours and minutes, minutes and seconds, etc.

The PAX Lite Process Time Indicator also has a feature called *"moving window average"*. This allows one time disturbances, or irregularly spaced items to be averaged over eight inputs, thus keeping display fluctuations to a minimum while still updating the display on every pulse. This feature can be enabled or disabled by a rear DIP switch.

The PAXLPT can accept many different types of sensors including magnetic pickups, logic sensors, and NPN open collector sensors, as well as switch contact closure sensors.

The meter has been specifically designed for harsh industrial environments. With a NEMA 4X/IP65 sealed bezel and extensive testing to meet CE requirements, the meter provides a tough yet reliable application solution.

SAFETY SUMMARY

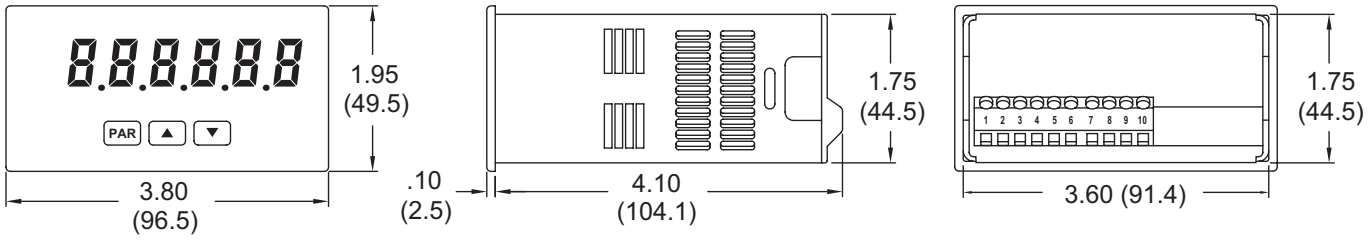
All safety related regulations, local codes and instructions that appear in the literature or on equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

CAUTION: Risk of Danger.
Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

DIMENSIONS In inches (mm)

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.4) H x 5" (127) W.



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Ordering Information

C

Meter Part Numbers

PAXL	PT	0	0

PT - 6 Digit Process Time Meter

General Meter Specifications

1. **DISPLAY**: 6-digit, 0.56" (14.2 mm), 7-segment red LED.
   Decimal points are programmed by front panel keys (6 digit mode only)
2. **POWER**:
   AC Power: 115/230 VAC, switch selectable. Allowable power line variation ±10%, 50/60 Hz, 6 VA.
   Isolation: 2300 Vrms for 1 min. to input and DC Out/In.
   DC Power: 10 to 16 VDC @ 0.1 A max.
3. **SENSOR POWER**: 9 to 17.5 VDC @ 100 mA max.
4. **KEYPAD**: 3 programming keys
5. **INPUT**: (DIP switch selectable)
   Accepts pulses from a variety of sources including NPN-OC, PNP-OC, TTL Outputs, Magnetic Pickups and all standard Red Lion® sensors.
   Logic State: Active Low
   Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V min.
   Current Sinking: Internal 7.8 KΩ pull-up to +12 VDC, I_{MAX} = 1.9 mA
   Current Sourcing: Internal 3.9 KΩ pull-down, 8 mA max. @ 30 VDC max.
   MAGNETIC PICK-UP:
   Sensitivity: 200 mV peak
   Hysteresis: 100 mV
   Input impedance: 3.9KΩ @ 60 Hz
   Maximum input voltage: ±40 V peak, 30 Vrms
6. **INPUT FREQUENCY RANGE**:
   Max Frequency: 25 KHz
   Min Frequency: 0.05 Hz
   Accuracy: ±0.02%
   Note: When the input pulse rate is 3 Hz or lower, the unit will utilize, if enabled, a technique known as a "moving window average." (This continually averages the last eight input pulses.)
7. **MEMORY**: Nonvolatile E^2PROM retains all programmable parameters.
8. **ENVIRONMENTAL CONDITIONS**:
   Operating Temperature: 0 ° to 60 °C
   Storage Temperature: -40 ° to 60 °C
   Operating and Storage Humidity: 0 to 85% max. relative humidity (non-condensing)
   Vibration According to IEC 68-2-6: Operational 5 to 150 Hz, in X, Y, Z direction for 1.5 hours, 2 g's.
   Shock According to IEC 68-2-27: Operational 30 g's, 11 msec in 3 directions.
   Altitude: Up to 2000 meters
9. **CERTIFICATIONS AND COMPLIANCES**:
   SAFETY
   UL Recognized Component, File # E179259, UL61010A-1, CSA C22.2 No. 61010-1
   Recognized to U.S. and Canadian requirements under the Component Recognition Program of Underwriters Laboratories, Inc.
   UL Listed, File # E137808, UL508, CSA C22.2 No. 14-M95
   LISTED by Und. Lab. Inc. to U.S. and Canadian safety standards
   Type 4X Enclosure rating (Face only), UL50
   IECEE CB Scheme Test Report # 04ME11209-20041018
   Issued by Underwriters Laboratories, Inc.
   IEC 61010-1, EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1.
   IP65 Enclosure rating (Face only), IEC 529
   IP20 Enclosure rating (Rear of unit), IEC 529

ELECTROMAGNETIC COMPATIBILITY

Emissions and Immunity to EN 61326: Electrical Equipment for Measurement, Control and Laboratory use.

Immunity to Industrial Locations:

Electrostatic discharge	EN 61000-4-2	Criterion A 4 kV contact discharge 8 kV air discharge
Electromagnetic RF fields	EN 61000-4-3	Criterion A 10 V/m
Fast transients (burst)	EN 61000-4-4	Criterion A [2] 2 kV power 2 kV signal
Surge	EN 61000-4-5	Criterion A [2] 1 kV L-L, 2 kV L&N-E power 1 kV signal
RF conducted interference	EN 61000-4-6	Criterion A 3 V/rms
Power frequency magnetic fields	EN 61000-4-8	Criterion A 30 A/m
Voltage dip/interruptions	EN 61000-4-11	Criterion A 0.5 cycle

Emissions:

Emissions	EN 55011	Class B

Notes:
1. Criterion A: Normal operation within specified limits.
2. EMI filter placed on the DC power supply, when DC powered: Corcom #1VB3 or Schaffner #FN610-1/07 (RLC #LFIL0000).

10. **CONNECTIONS**: High compression cage-clamp terminal block
    Wire Strip Length: 0.3" (7.5 mm)
    Wire Gage Capacity: 30-14 AWG copper wire.
    Torque: 4.5 inch-lbs (0.51 N-m) max.
11. **CONSTRUCTION**: This unit is rated for NEMA 4X/IP65 outdoor use. IP20 Touch safe. Installation Category II, Pollution Degree 2. One piece bezel/case. Flame resistant. Synthetic rubber keypad. Panel gasket and mounting clip included.
12. **WEIGHT**: 12 oz (340 g)

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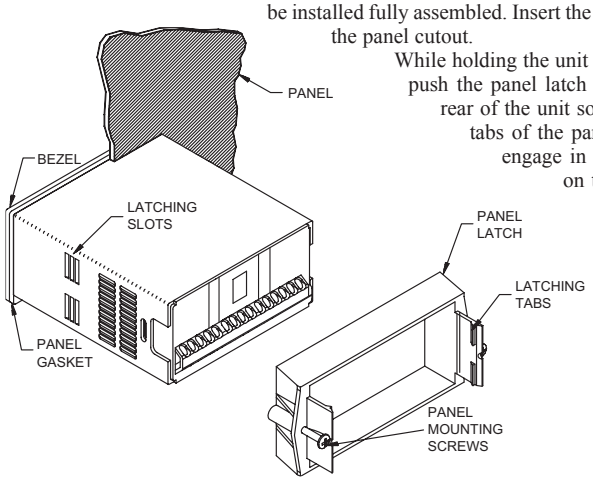
1.0 Installing the Meter

Installation

The PAX Lite meets NEMA 4X/IP65 requirements when properly installed. The unit is intended to be mounted into an enclosed panel. Prepare the panel cutout to the dimensions shown. Remove the panel latch from the unit. Slide the panel gasket over the rear of the unit to the back of the bezel. The unit should be installed fully assembled. Insert the unit into the panel cutout.

While holding the unit in place, push the panel latch over the rear of the unit so that the tabs of the panel latch engage in the slots on the case.



The panel latch should be engaged in the farthest forward slot possible. To achieve a proper seal, tighten the latch screws evenly until the unit is snug in the panel (Torque to approximately 7 in-lbs [79N-cm]). Do not over-tighten the screws.

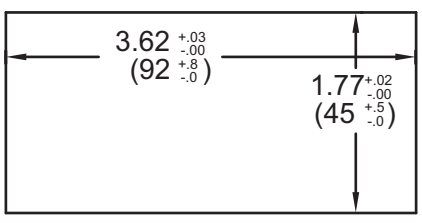
Installation Environment

The unit should be installed in a location that does not exceed the maximum operating temperature and provides good air circulation. Placing the unit near devices that generate excessive heat should be avoided.

The bezel should be cleaned only with a soft cloth and neutral soap product. Do NOT use solvents. Continuous exposure to direct sunlight may accelerate the aging process of the bezel.

Do not use tools of any kind (screwdrivers, pens, pencils, etc.) to operate the keypad of the unit.

PANEL CUT-OUT



2.0 Setting the Jumper and Switches

The meter has a jumper and switches, which must be checked and/or changed prior to applying power. To access the power switch and the jumper, remove the meter base from the case by firmly squeezing and pulling back on the side rear finger tabs. This should lower the latch below the case slot (which is located just in front of the finger tabs). It is recommended to release the latch on one side, then start the other side latch.

Power Selection Switch

Caution: Insure the AC power selection switch is set for the proper voltage before powering-up the meter. The meter is shipped from the factory in the 230 VAC position.

Mode Selection Jumper

Inside the meter is also the Mode Selection Jumper, located near the display board. This jumper will select operation in the 6 digit mode or 5 digit (chronometer) mode. When the jumper is positioned toward the display board, the unit will be in the 6 digit mode of operation. With the jumper positioned away from the display board, the meter is in the 5 digit (chronometer) mode. This unit ships from the factory in the 6 digit mode.

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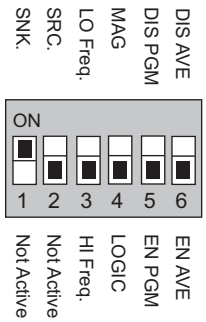
Set-Up DIP Switches

A DIP switch is located at the rear of the meter, and is fully accessible when the unit is in the case. It is used for the selection of the input parameters and program disable. For the correct input setup, refer to 3.2 Input Wiring.



SWITCH 1
SNK.: Adds internal 7.8 KΩ pull-up resistor to + 12 VDC, I_{MAX} = 1.9 mA

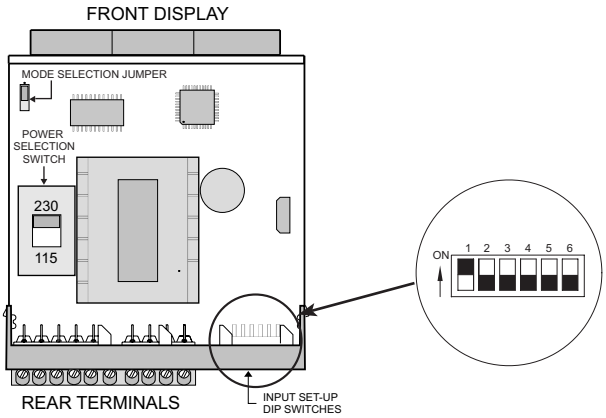
SWITCH 2
SRC.: Adds internal 3.9 KΩ pull-down resistor, 8 mA max. @ 30 VDC max.

SWITCH 3
HI Frequency: Removes damping capacitor and allows max. frequency.
LO Frequency: Limits input frequency to 50 Hz and input pulse widths to 10 msec.

SWITCH 4
LOGIC: Input trigger levels V_{IL} = 1.5 V max.; V_{IH} = 3.75 V max.
MAG: 200 mV peak input (must have SRC on)

SWITCH 5
Enable Programming: Enables programming through the front panel buttons
Disables Programming: Disables the front panel buttons from any programming changes

SWITCH 6
Enable Averaging: Enables moving windows averaging feature.
Disable Averaging: Disables moving windows averaging feature.



3.0 Wiring the Meter

WIRING OVERVIEW

Electrical connections are made via screw-clamp terminals located on the back of the meter. All conductors should conform to the meter's voltage and current ratings. All cabling should conform to appropriate standards of good installation, local codes and regulations. It is recommended that the power supplied to the meter (DC or AC) be protected by a fuse or circuit breaker.

When wiring the meter, compare the numbers embossed on the back of the meter case against those shown in wiring drawings for proper wire position. Strip the wire, leaving approximately 0.3" (7.5 mm) bare lead exposed (stranded wires should be tinned with solder.) Insert the lead under the correct screw-clamp terminal and tighten until the wire is secure. (Pull wire to verify tightness.)

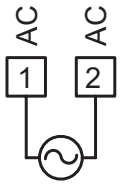
EMC INSTALLATION GUIDELINES

Although this meter is designed with a high degree of immunity to Electro-Magnetic Interference (EMI), proper installation and wiring methods must be followed to ensure compatibility in each application. The type of the electrical noise, source or coupling method into the meter may be different for various installations. The meter becomes more immune to EMI with fewer I/O connections. Cable length, routing, and shield termination are very important and can mean the difference between a successful or troublesome installation. Listed below are some EMC guidelines for successful installation in an industrial environment.

1. The meter should be mounted in a metal enclosure, which is properly connected to protective earth.
2. Use shielded (screened) cables for all Signal and Control inputs. The shield (screen) pigtail connection should be made as short as possible. The connection point for the shield depends somewhat upon the application. Listed below are the recommended methods of connecting the shield, in order of their effectiveness.
   a. Connect the shield only at the panel where the unit is mounted to earth ground (protective earth).
   b. Connect the shield to earth ground at both ends of the cable, usually when the noise source frequency is above 1 MHz.
   c. Connect the shield to common of the meter and leave the other end of the shield unconnected and insulated from earth ground.
3. Never run Signal or Control cables in the same conduit or raceway with AC power lines, conductors feeding motors, solenoids, SCR controls, and heaters, etc. The cables should be run in metal conduit that is properly grounded. This is especially useful in applications where cable runs are long and portable two-way radios are used in close proximity or if the installation is near a commercial radio transmitter.
4. Signal or Control cables within an enclosure should be routed as far as possible from contactors, control relays, transformers, and other noisy components.
5. In extremely high EMI environments, the use of external EMI suppression devices, such as ferrite suppression cores, is effective. Install them on Signal and Control cables as close to the unit as possible. Loop the cable through the core several times or use multiple cores on each cable for additional protection. Install line filters on the power input cable to the unit to suppress power line interference. Install them near the power entry point of the enclosure. The following EMI suppression devices (or equivalent) are recommended:
   Ferrite Suppression Cores for signal and control cables:
   Fair-Rite # 0443167251 (RLC# FCOR0000)
   TDK # ZCAT3035-1330A
   Steward # 28B2029-0A0
   Line Filters for input power cables:
   Schaffner # FN610-1/07 (RLC# LFIL0000)
   Schaffner # FN670-1.8/07
   Corcom # 1 VR3
   Note: Reference manufacturer's instructions when installing a line filter.
6. Long cable runs are more susceptible to EMI pickup than short cable runs. Therefore, keep cable runs as short as possible.
7. Switching of inductive loads produces high EMI. Use of snubbers across inductive loads suppresses EMI.
   Snubber: RLC# SNUB0000.

3.1 POWER WIRING

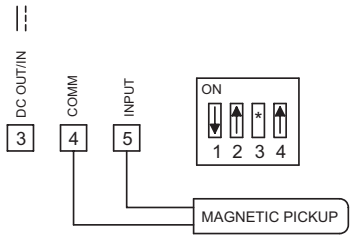
AC Power
Terminal 1: VAC
Terminal 2: VAC



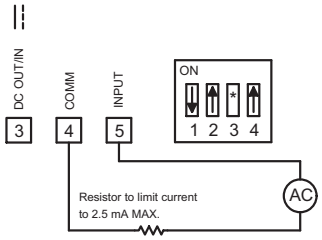
DC Power
Terminal 3: +VDC
Terminal 4: COMM

3.2 INPUT WIRING

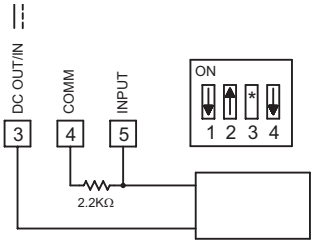
Magnetic Pickup



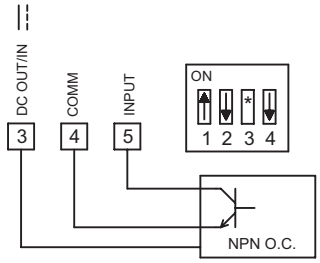
AC Inputs From Tach Generators, Etc.



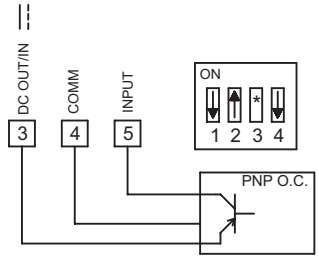
Two Wire Proximity, Current Source



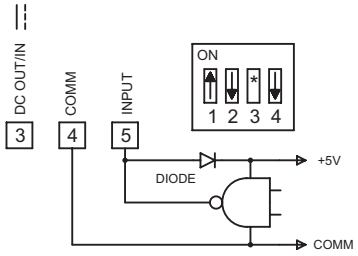
Current Sinking Output



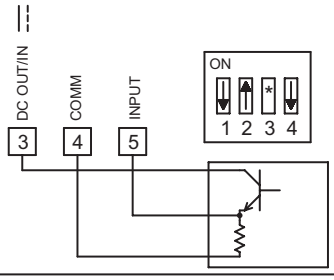
Current Sourcing Output



Interfacing With TTL



Emitter Follower; Current Source



*Switch position is application dependent.

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4.0 Reviewing the Front Buttons and Display

KEY	DISPLAY MODE OPERATION	PROGRAMMING MODE OPERATION
PAR	Access Programming Mode	Store selected parameter and index to next parameter
▲	No Function	Increment selected digit of parameter value
▼	No Function	Select digit position in parameter value

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5.0 Scaling the Meter

In many industrial applications, a meter is required to display the process time of an operation or event. The pulses from a sensor are received by the PAXLPT, and then scaled to produce just such a readout. The following formula will help provide the scaling values to achieve the desired readout.

SF = DR x PPS

WHERE:

SF = Scale Factor
DR = Desired Readout*
PPS = Pulses per Second

To calculate the PPS multiply the RPM (Revolutions per Minute) by the PPR (Pulses per Revolution) and divide by 60.

$$\frac{\text{RPM x PPR}}{60}$$

**For applications requiring a decimal point, select and program the appropriate decimal point. When calculating the Scale Factor, use the whole value of the number to be displayed, for example, 50.0 minutes, the Desired Readout in this case is 500. Do not use decimal points in the Desired Readout when calculating the scale factor.*

For calculated SF values less than 59,999

If the Scale Factor is a value less than 59,999, it can be entered directly into the meter as the Scale Factor and the Scale Multiplier can be left at 1.

For calculated SF values greater than 59,999

If the Scale Factor is a value over 59,999 (maximum value), the Scale Multiplier must be used to reduce the calculated Scale Factor value until it is less than 59,999. The Scale Multiplier divides the calculated Scale Factor value by 1, 10, 100 and 1000, thus reducing the calculated value accordingly. Select the appropriate Scale Multiplier value that allows the Scale Factor to be a value under 59,999. Both the Scale Factor and Scale Multiplier can then be entered into the meter.

Example 1 (6 Digit):

DR = 150 minutes

$$\text{PPS} = \frac{\text{450 RPM x 60 PPR}}{60}$$

PPS = 450

SF = DR x PPS

SF = 150 x 450

SF = 67,500

Since the SF value is greater than 59,999, the SM will be needed to reduce the calculated value to value less than 59,999. Using the SM of 10, the 67,500 value is divide by 10, reducing the SF to a value of 6750. The meter can be programmed for a SF of 6750 and a SM of 10.

Example 2 (5 Digit):

DR = 2 hours and 23 minutes (2-23)

$$\text{PPS} = \frac{\text{138 RPM x 100 PPR}}{60}$$

PPS = 230

To calculate the Scale Factor for a 5 Digit application, first convert the DR to its base units.

DR = 2 (hours) x 60 + 23

DR = 120 + 23

DR = 143 minutes

SF = DR x PPS

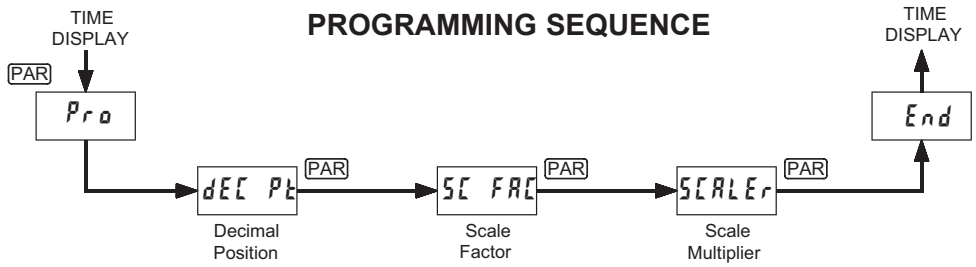
SF = 143 x 230

SF = 32,890

Since the SF value is less than 59,999, it can be entered directly as the SF and the SM will be 1. *Note: When programmed for the 5 Digit mode, the meter will convert the D.R. back to the hours and minutes format.*

6.0 PROGRAMMING THE METER

PROGRAMMING SEQUENCE



The Process Time Indicator has three programmable parameters which are entered in the sequence shown above, using the front panel push buttons.

Before programming, please refer to the section on Scaling the Meter to determine the Decimal Position, Scale Factor and Scale Multiplier to use for the specific application.

Note: Programming mode can be locked out with the Program Disable DIP switch. With the switch in the Disabled (up) position the meter will not enter programming mode. Refer to the section on DIP switch setup.

PROGRAMMING MODE ENTRY

Press the **PAR** key to enter Programming Mode. The meter briefly displays `Pro` followed by the first programming parameter described below.

PROGRAMMING PARAMETERS

In programming mode, the display alternates between the parameter and the current selection or value for that parameter. The dual display with arrows is used below to illustrate the alternating display. The selection choices or value range for each parameter is shown to the right of the alternating display.

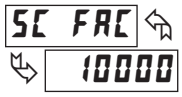
DECIMAL POSITION (6-digit version only)

`0` `0.0` `0.00` `0.000`

This parameter selects the decimal point position on the display. The selection is used when calculating the Scale Factor. This parameter only appears when the meter is configured for the conventional (6-digit) display.

Press the arrow keys (▲ or ▼) to sequence through the selection list until the desired selection is shown. Press the **PAR** key to save the displayed selection and advance to the next parameter.

SCALE FACTOR



`0001` to `59999`

The Scale Factor is used in combination with the Scale Multiplier to obtain the desired process time readout. (See details on Scaling the Meter.)

The Scale Factor is displayed as a five-digit value with one selected digit flashing (initially digit 5). Press the ▲ (up arrow) key to increment the value of the selected (flashing) digit. Holding the ▲ key automatically scrolls the value of the selected digit.

Press the ▼ (down arrow) key to select the next digit position to the right. Use the ▲ key to increment the value of this digit to the desired number. Press the ▼ key again to select the next digit to be changed. Repeat the "select and set" sequence until all digits are displaying the desired Scale Factor value. Press the **PAR** key to save the displayed value and advance to the next parameter. Holding the ▼ key automatically scrolls through each digit position.

SCALE MULTIPLIER

`1` `10` `100` `1000`

The Scale Multiplier is used in combination with the Scale Factor to obtain the desired process time readout. (See details on Scaling the Meter.)

Press the arrow keys (▲ or ▼) to sequence through the selection list until the desired selection is displayed. Press the **PAR** key to save the selection and exit programming mode.

PROGRAMMING MODE EXIT

The meter exits Programming Mode when the **PAR** key is pressed to save the Scale Multiplier selection. The meter briefly displays `End` upon exiting Programming Mode. All programmed selections are now transferred to the non-volatile memory and the meter returns to the Process Time display.

(If power loss occurs during programming mode, verify parameter changes and reprogram, if necessary, when power is restored.)

PROGRAMMING MODE TIME OUT

The Programming Mode has an automatic time out feature. If no keypad activity is detected for approximately 60 seconds, the meter automatically exits Programming Mode. The meter briefly displays `End` and returns to the Process Time display. When automatic timeout occurs, any changes that were made to the parameter currently being programmed, will not be saved.

FACTORY SETTINGS

The factory settings for the programming parameters are shown above in the alternating display illustrations. The factory settings can be easily restored by removing power from the meter, and then pressing and holding the **PAR** key while power is reapplied. The meter displays `rESEt` until the **PAR** key is released. The normal power-up sequence then resumes, with the factory settings loaded and saved in non-volatile memory.

Note: The Program Disable DIP switch must be in the Enabled (down) position to allow loading factory settings. See section on DIP switch setup.

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