YEAR 2000 COMPLIANT

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User's Guide

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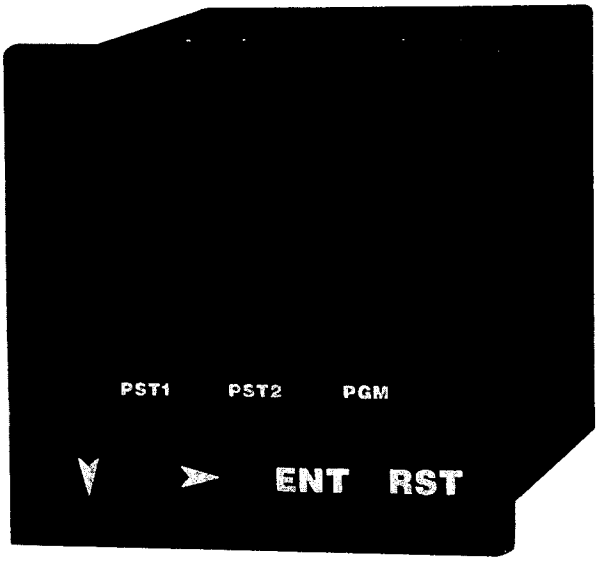

DPC-23 SERIES
1/16 DIN Preset Counters

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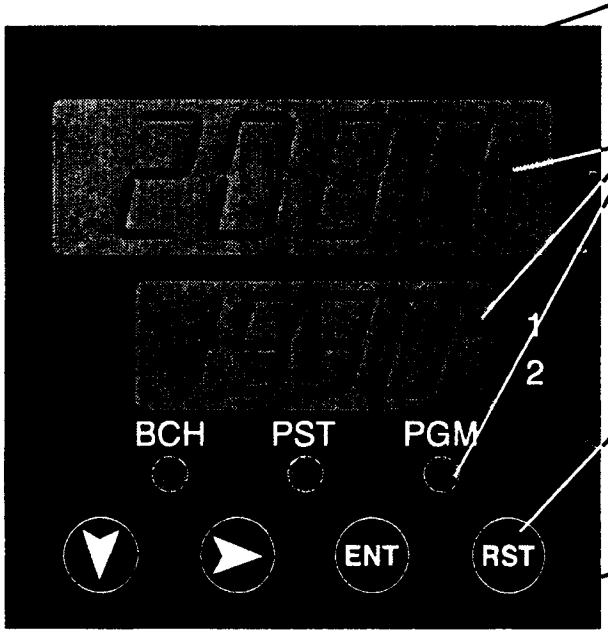
OVERVIEW

CONSTRUCTION



Compact Design

Uses only 48mm of panel space. 110mm behind-panel depth.

Dual Four-character Display

Simultaneous display of Count and Preset data. Red LED display. Annunciators show input, display and output status.

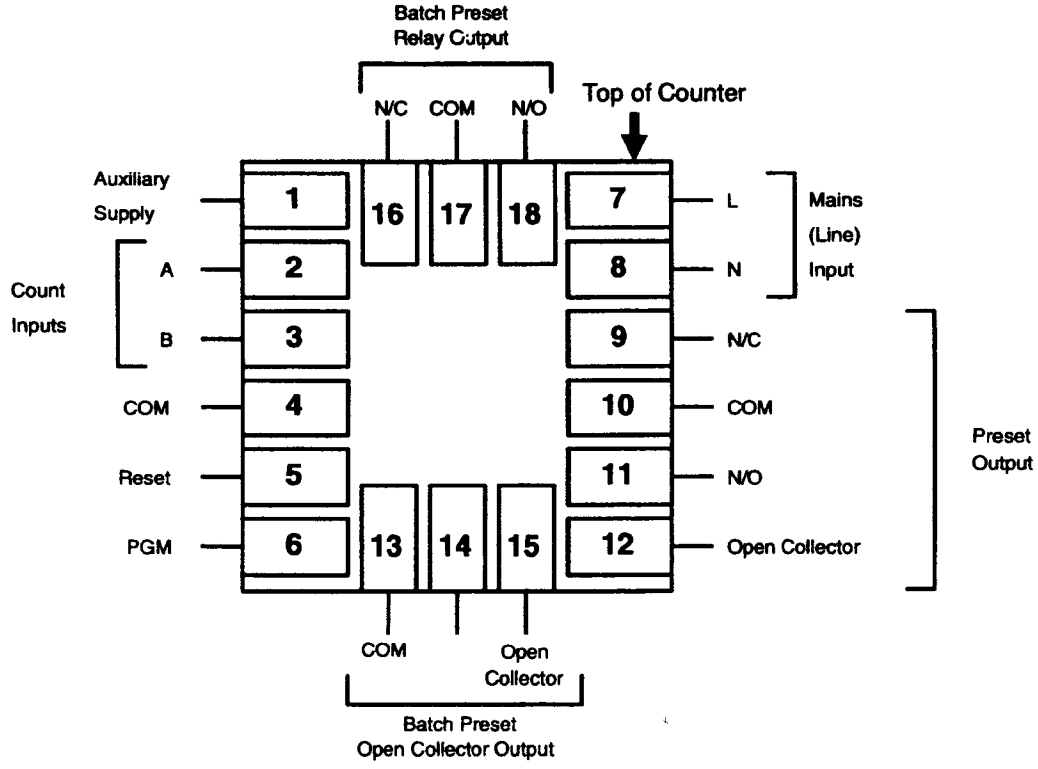
Ergonomic Keypad

Simple key sequences to view and edit Presets.
Front Panel Reset key can be disabled.

Front Panel Seal

NEMA 4/IP65-rated when installed with panel mount gasket supplied.

Rear Terminal Connections



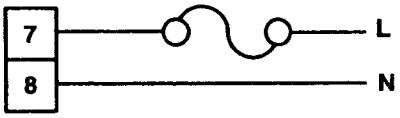
INSTALLATION

WIRING

IMPORTANT: In severe electrical noise environments, shielded cable is recommended for inputs and outputs. Connect the shield only to the building earth (ground).

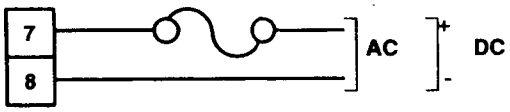
AC Power Input

Connect AC power to Terminal 7 (Line) via a 1A slow-blow fuse and to Terminal 8 (Neutral) - see below. AC power should be from a separate branch circuit which is noise-free and does not feed heavy loads.



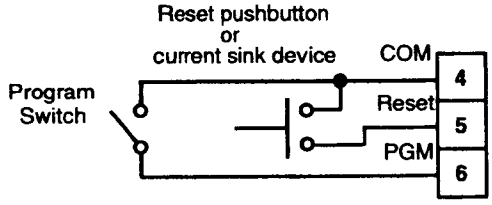
DC/Low Voltage AC Power Input

Connect DC/low voltage AC power to Terminal 7 (+) via a 0.5A slow-blow fuse and to Terminal 8 (–) - see below. DC power should have low ripple and be noise-free.



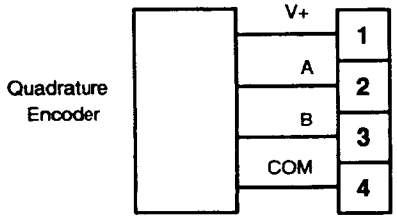
Reset and Program Inputs

Connect Reset pushbutton or current sink device to Reset (Terminal 5) and COM (Terminal 4). Connect Program switch or jumper to PGM (Terminal 6) and COM (Terminal 4).



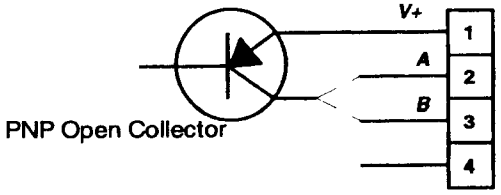
Bi-directional Quadrature Inputs

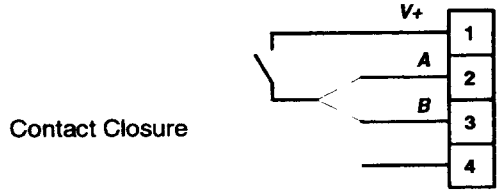
Connect Quadrature Encoder to V+ (Terminal 1), A input (Terminal 2), B input (Terminal 3) and COM (Terminal 4) as shown below. In Configuration Mode, set **InPu** parameter to **QuAd**. For NPN open collector devices with no pullup resistors, set **PuLL** parameter to **YES**.

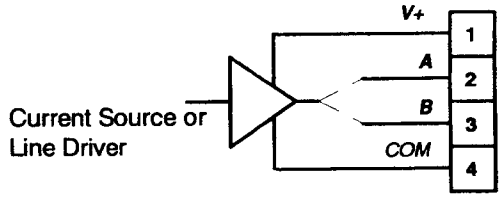


Current Sourcing (PNP) Count Inputs

Connect Add count input to Terminal 2 (A) and/or Subtract count input to Terminal 3 (B) - see below. In Configuration Mode, set **PuLL** parameter to **no** and, for Add/Subtract operation, set **InPu** parameter to **A-B**.

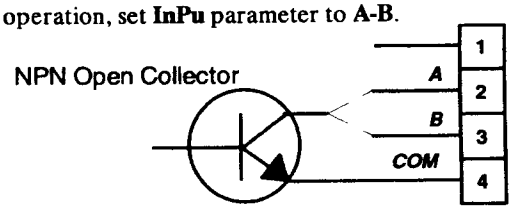


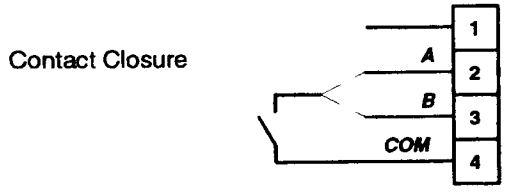


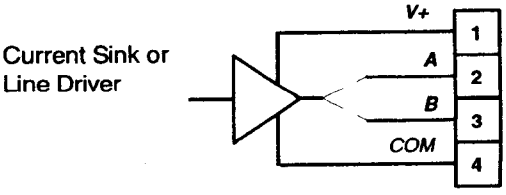


Current Sinking (NPN) Count Inputs

Connect Add count input to Terminal 2 (A) and/or Subtract count input to Terminal 3 (B) - see below. In Configuration Mode, set **PuLL** parameter to **YES** and, for Add/Subtract operation, set **InPu** parameter to **A-B**.



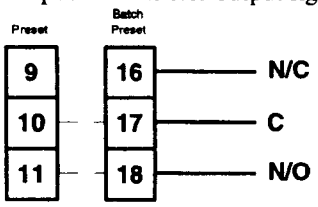




INSTALLATION

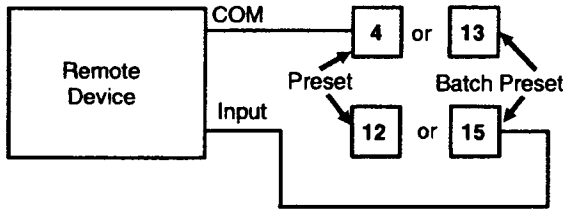
Relay Output

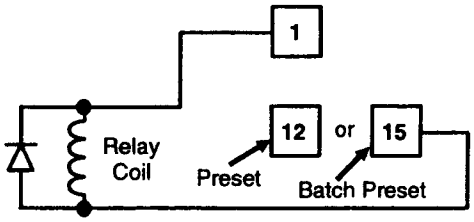
Connect AC or DC load circuits to Terminals 9, 10 & 11 (Preset 1 output) or 16,17 & 18 (Preset 2 output) (see below) as required. Do not route load wiring near count input or transistor output signals.



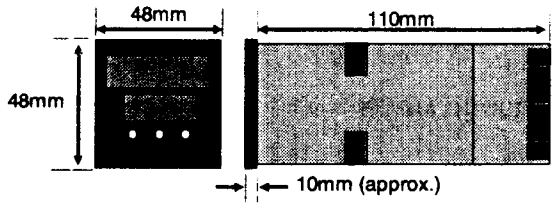
Open Collector Output

Connect Terminals 12 (Preset 1 open collector) and 4 (COM) or 15 (Preset 2 Open Collector) and 13 (COM) to solid state devices as below (upper circuit). To drive DC relay coils, connect Terminal 12 or 15 and V+ (Terminal 1) as below (lower circuit). Suppress switching transients with a suppression diode, connected as shown.



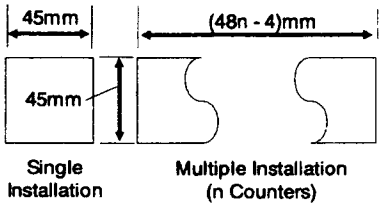


PANEL MOUNTING



Panel Mounting

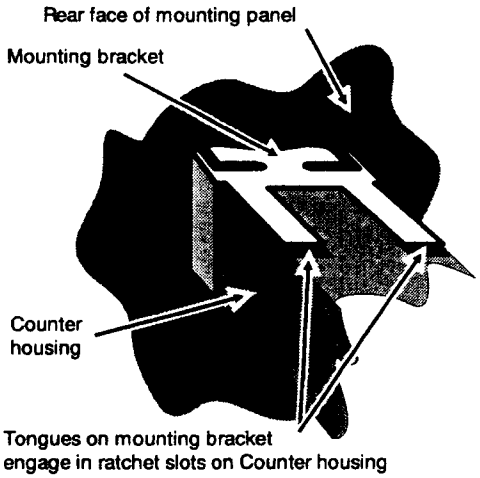
Make cut-out(s) according to the details in the diagram on the right. The maximum panel thickness is 6 mm.



CAUTION

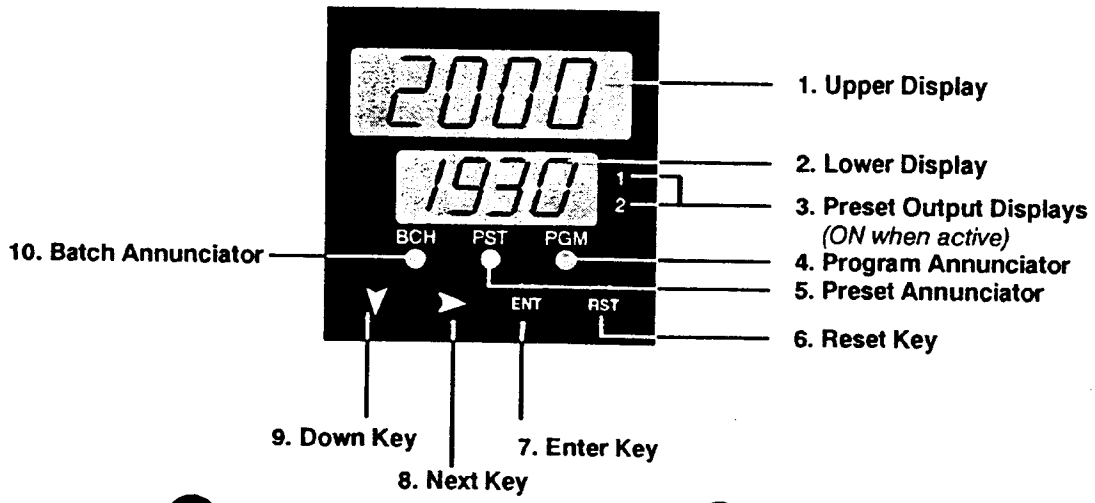
Do not remove the panel gasket from the Counter as this may result in inadequate clamping of the Counter in the mounting panel.

Insert the rear of the Counter housing through the cut-out (from the front of the mounting panel) and hold the Counter lightly in position against the panel. Ensure that the panel gasket is not distorted and that the Controller is positioned squarely against the mounting panel. *Apply pressure to the front panel bezel only.* Slide the mounting bracket in place (see right) and push it forward until it is firmly in contact with the rear face of the mounting panel (tongues on the bracket should engage in matching rachet positions on the Counter housing and the mounting bracket springs should push firmly against the mounting panel rear face).



OPERATION

FRONT PANEL



NOTE

To abort changes to a parameter value, press Down and Next together instead of **ENT**.

IMPORTANT

In Edit Mode, you must press the **ENT** key within 15 seconds of the last keypress, otherwise the new data will be lost and the old data will be restored.

Down key

Operator Mode: Used to change the currently-selected (flashing) digit. Depressing this key will decrement the value (wrap-around from 0 to 9). If the key is held continuously, the value will decrement at the rate of 2/sec.

Program Mode: Used to advance from one parameter to the next. Once a parameter value has been selected for editing (through use of the Next key), depressing this key will decrement the value (wrap-around from 0 to 9). If the key is held continuously, the value will decrement at the rate of 2/sec.

Configuration Mode: Used to advance from one parameter to the next.

Next key

Operator Mode: Used to select a parameter for editing (left-most digit will start to flash) and to move between the digits. Once the proper digit is selected (flashing) with the Next key, its value can be altered through use of the Down key. Also used with **RST** key to reset the Batch Count.

Program Mode: Used to select a parameter for editing (left-most digit will start to flash) and to move between the digits. Once the proper digit is selected (flashing) with the Next key, its value can be altered through use of the Down key. For Decimal Point Position, this key scrolls through the available choices.

Configuration Mode: Used to select a parameter for editing and to scroll through available choices.

ENT key

Operator Mode/Program Mode: Confirms an edited value (display will cease flashing after the **ENT** key is depressed).

Configuration Mode: Confirms setting/value selection (display will cease flashing after the **ENT** key is depressed).

Operator Mode - see Page 5.
Program Mode - see Page 6.
Configuration Mode - see Page 7.

RST key

Operator Mode/Program Mode: Resets count value to either zero or Preset value (based on the setting of the Count Direction parameter in Configuration Mode). Also releases latched outputs. Also used with Next key to reset the Batch Count in Operator Mode.

Configuration Mode: Exits Configuration Mode when held down for 2 seconds.

NOTE: The **RST** key will not be active unless enabled in Configuration Mode.

PROGRAMMING

OPERATOR MODE

NOTE

Use Down key to step through Count/Preset display, Count/Batch Preset display and Count/Batch Count display (Count/Preset display will be shown on power-up).

TO ABORT AN EDIT

To abort an edit operation (before the new value is confirmed), press the Down and Next keys simultaneously.

TO RESET THE BATCH COUNT

To reset the Batch Count (to zero or to the Batch Preset value, according to the Count Direction parameter setting in Configuration Mode):

1. Select the Count/Batch Count display (BCH ON, PST OFF).
2. Press the Next and RST keys simultaneously.

NOTE: This is the only way to reset the Batch Count. It cannot be reset via the rear terminals. The RST key is operative for this function even when disabled in Configuration Mode.

SETTING THE PRESET VALUE IN 8-DIGIT SINGLE PRESET COUNTER (UP_8) MODE

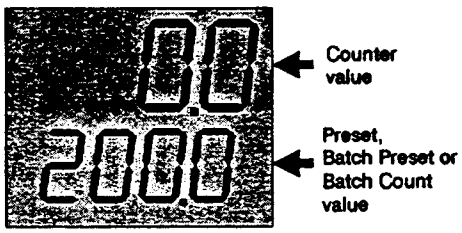
To set a Preset value of **abcdefgh**:

1. Select the Count value/Preset value display (BCH OFF, PST ON) and enter **efgh** in the lower dislpay in the normal manner.
2. Select the Preset value/Preset value display (BCH ON, PST ON) and enter **abcd** in the lower display in the normal manner.

WARNING!

Caution should be observed if it is necessary to change the preset value while the process is operating. Do not set values which are already exceeded by the count value without resetting the counter.

The Operator Mode is used for viewing the Count/Batch Count value and viewing/changing the Preset/Batch Preset value.



NORMAL OPERATION

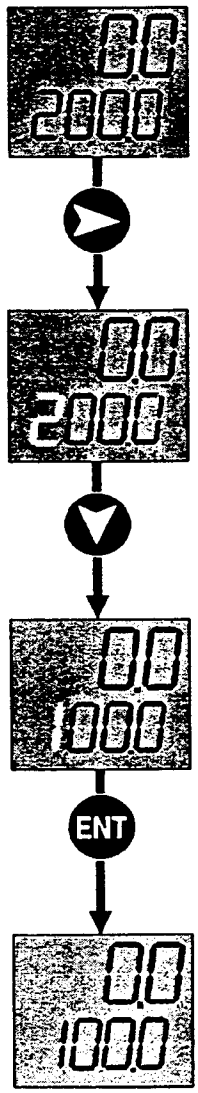
LED(s) ON	Lower Display
PST	Preset
BCH & PST	Batch Preset
BCH	Batch Count *

* "View Only" display - not editable.

8-DIGIT SINGLE PRESET (UP_8) OPERATION

LED(s) ON	Upper Display	Lower Display
PST	Count value *	Preset value (bottom 4 digits)
BCH & PST	Preset value (bottom 4 digits)	Preset value (top 4 digits)
BCH	Count value (bottom 4 digits) *	Count value (top 4 digits) *

* "View Only" display - not editable.



Press the Next key to enter Edit Mode. The most significant digit of the Preset Data display will then flash. Press the Next key repeatedly as required to select the desired digit.

Press the Down key to change the value of the selected digit (there is wrap-round from 0 to 9).

When all digits are as required, press the ENT key to confirm the changes; the display will stop flashing.

IMPORTANT

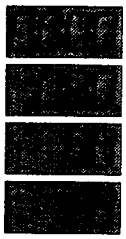
You must press the **ENT** key within 15 seconds of the last keypress when entering a new value, otherwise the new value will be discarded and the old value will be retained.

PROGRAM MODE

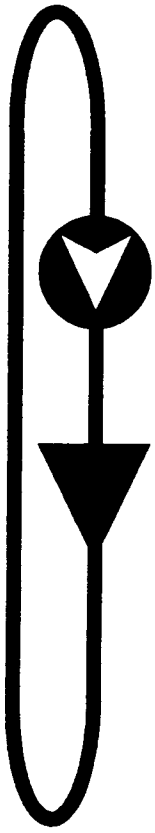
WARNING!
Changing Program Mode parameter values while the process is operating may be hazardous to the operator and/or the controlled equipment. Use extreme caution and stop the process before attempting to change Program Mode parameter values.

IMPORTANT
You must press the **ENT** key to implement new parameter values.

NOTE
Possible Decimal Point Position settings are:



To enter Program Mode, set the PGM input active (low) e.g. by tying it to COM. Whilst in Program Mode, the **PGM indicator will be ON.**



Function	Parameter Description (Upper Display)	Meaning
Pre-scaler INPUT COUNTER MULTIPLIER/DIVIDER	[redacted]	Pre-scales counter operation (multiply from 0.001 to 9.999) Value = Count units displayed / Count pulses input
Preset Output Time	[redacted]	Sets momentary ON time for Preset output (0.01 - 99.99s; 0.00 for latched operation)
Batch Preset Output Time	[redacted]	Sets momentary ON time for Batch Preset output (0.01 - 99.99s; 0.00 for latched operation)
Decimal Point	[redacted]	Defines decimal point position
Operator Mode:		
Preset	None	Shows Preset value
Batch Preset	None	Shows Batch Preset value
Batch Count	None	Shows Batch Count value

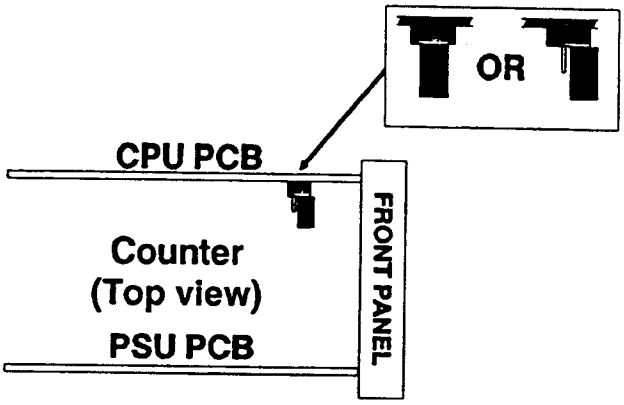
NOTES

1. To adjust Pre-scaler, Out Time or either Preset or Batch Preset value (as selected), press Next key to enter Edit Mode (digits will flash), use Next key to select each digit to be adjusted, and adjust digit value using Down key. When adjustment is complete, press **ENT** key to exit Edit Mode (digits will become static).
2. To adjust decimal point position, select that parameter, press Next key to enter Edit Mode, then use Next key to position decimal point. Press **ENT** key when finished.

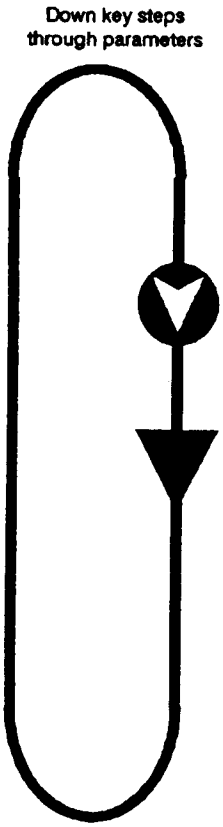
To exit Program Mode, set the PGM input inactive (High).

CONFIGURATION MODE

To enter Configuration Mode, power-down the Counter and remove it from its housing. Change the position of the link jumper on the CPU PCB (the actual position is irrelevant, as long as the position is changed). Replace the Counter in its housing and power-up. The PGM indicator will flash whilst the Counter is in Configuration Mode.



To edit a parameter, use the Down key to step through the parameters; when the desired parameter description is shown in the upper display, press the Next key to enter Edit Mode and to scroll through the available settings. When the desired setting is shown, press the ENT key. The Configuration Mode parameters, in order of appearance, are:



Parameter	Parameter Description (Upper Display)	Available Settings
Counter Speed	SPEE	20 (20Hz) · 200 (200Hz) · 10kHz
Input Operation	InPo	A-B (Add/Subtract) · Quadrature (bi-directional) · 8-digit Single Preset Mode
Panel Reset Key	PrES	Enabled · Disabled
Auto Reset	ArES	Enabled · Disabled
Input Pull-Ups	PULL	YES Yes (current-sinking) · no No (current-sourcing)
Count Direction	Cdir	up Up-counting · dn Down-counting
Lock Strategy	LOC	none None · PSE Preset Lock · PArt Partial Program Lock · both Preset & Program Lock

NOTE
When Input Operation is set to **UP_8**, counter counts up from zero only (top 4 decades in Batch Preset, bottom 4 decades in Preset).

LOCK STRATEGY:

None = No security; all parameters available through regular methods of access
Preset Lock = Preset/Batch Preset become Read Only
Partial Lock = Output ON times are Read Only
Both = Operator Mode parameters and Output ON times are Read Only.

To exit Configuration Mode, either momentarily remove power from the Counter or press and hold down the RST key for at least two seconds.

APPENDIX A

SPECIFICATIONS

Input Power

AC:	Terminals 7 (Line) and 8 (Neutral) 90 - 264V 50/60Hz (standard) 20 - 50V AC 50/60Hz (option)
DC:	Terminals 7 and 8; 22 - 65V (option)
Power consumption:	4W approx.

Output Power

DC:	Terminals 1 (+) and 4 (COM) 9 - 15V DC (unregulated) 0 - 100mA. ≤0.5V ripple

Main Counter

Decades:	4, Bi-directional (8, uni-directional in UP_8 mode)
Presets:	2 (4 decades each) - Preset & Batch Preset 1 (8 decades) in UP_8 mode
Operation:	Add/Subtract (Input A counts up, Input B counts down) or bi-directional (quadrature; counts up when Signal A leads Signal B).
Direction:	Up (reset-to-zero) or Down (set-to-a-number)
Count Rate	
High:	10kHz max.
Medium:	200Hz max.
Low:	20Hz max.
Resets:	Manual or automatic. Selectable reset-to-zero or reset-to-Preset

Calibrator

Range:	0.001 to 9.999 Common to Inputs A and B.

Count Inputs

Signal A:	Terminal 2
Signal B:	Terminal 3
Input Voltage	
High:	≥3.0V (source) ≥3.0V or open (sink)
Low:	≤2.0V or open (source) ≤2.0V (sink)
Max.:	30V DC
Input Impedance	
Source:	10kΩ to COM
Sink:	4.7kΩ to +V
Input Response: (Source or sink)	0.05ms (high speed) 2.5ms (medium speed) 25.0ms (low speed)

Control Inputs

Remote Reset:	Terminal 5 (edge-sensitive)
Program Mode:	Terminal 6 (level-sensitive)
Input Voltage:	High - ≥3.0V or open Low - ≤2.0V
Input Impedance:	4.7kΩ to +V
Input Response:	25.0ms
Max.:	30V DC

Front Panel Keys

Type:	Mechanical switches under sealed membrane overlay.

Display

Type:	LED (red) 4 digit
Height:	Upper - 0.4" (10mm) Lower - 0.3" (7mm)

Security

Preset data can be protected (selectable in Configuration Mode).
Program data is accessible only if the PGM input is active.

Output

Operation:	Output 1 energised when: Count = Preset 1 (Up mode) Count = 0 (Down mode) Output 1 released when: Hold time elapses or reset occurs Output 2 energised when: Batch Count = Batch Preset Output 2 released when: Hold time elapses or reset occurs
SOLID STATE (OPEN COLLECTOR)	
Terminal Nos.:	12 (Preset) and 15 (Batch Preset)
Type:	Open collector, current sink to COM. 30V DC max. 100mA max.
RELAY	
Terminals:	Preset: 9 (N/C), 10 (C), 11 (N/O) Batch Preset: 16 (N/C), 17 (C), 18 (N/O)
Type:	Form C (SPDT)
Rating:	5A resistive @ 110V AC 3A resistive @ 240V AC

Mechanical

Cut-Out:	45mm x 45mm (1/16-DIN)
Depth:	110mm
Weight:	0.2kg approx.

Environmental

Operating Temp.:	0 - 55°C (32 - 131°F)
Storage Temp.:	-20 - 80°C (-4 - 176°F)
Relative Humidity:	20 - 95% non-condensing
Front Panel Seal:	NEMA 4/IP65 when installed with panel gasket (supplied)

MADE IN USA

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

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- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

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- Data Acquisition & Engineering Software
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- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
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- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

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