DPC-23 SERIES
1/16 DIN Preset Counters
# Servicing North America:

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Phone Numbers</th>
<th>Fax Numbers</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>One Omega Drive, Box 4047, Stamford CT 06907-0047</td>
<td>Tel: (203) 359-1660</td>
<td>FAX: (203) 359-7700</td>
<td>e-mail: <a href="mailto:info@omega.com">info@omega.com</a></td>
</tr>
<tr>
<td>Canada</td>
<td>976 Bergar, Laval (Quebec) H7L 5A1</td>
<td>Tel: (514) 856-6928</td>
<td>FAX: (514) 856-6886</td>
<td>e-mail: <a href="mailto:info@omega.ca">info@omega.ca</a></td>
</tr>
</tbody>
</table>

## For immediate technical or application assistance:

<table>
<thead>
<tr>
<th>Region</th>
<th>Sales Service</th>
<th>Customer Service</th>
<th>Engineering Service</th>
<th>Telex/Easylink/Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA and Canada</td>
<td>1-800-826-6342</td>
<td>1-800-622-2378</td>
<td>1-800-872-9436</td>
<td>996404 EASYLINK: 62968934</td>
</tr>
<tr>
<td>Mexico</td>
<td>Tel: (001) 800-826-6342</td>
<td>En Español: (001) 203-359-7803</td>
<td>FAX: (001) 203-359-7807</td>
<td>e-mail: <a href="mailto:espanol@omega.com">espanol@omega.com</a></td>
</tr>
</tbody>
</table>

# Servicing Europe:

<table>
<thead>
<tr>
<th>Region</th>
<th>Address</th>
<th>Phone Numbers</th>
<th>Fax Numbers</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benelux</td>
<td>Postbus 8034, 1180 LA Amstelveen, The Netherlands</td>
<td>Tel: +31 20 6418405</td>
<td>FAX: +31 20 6434643</td>
<td>e-mail: <a href="mailto:nl@omega.com">nl@omega.com</a></td>
</tr>
<tr>
<td>Czech Republic</td>
<td>Rudé armády 1868, 733 01 Karviná 8</td>
<td>Tel: +420 (69) 6311899</td>
<td>FAX: +420 (69) 6311114</td>
<td>e-mail: <a href="mailto:czech@omega.com">czech@omega.com</a></td>
</tr>
<tr>
<td>France</td>
<td>9, rue Denis Papin, 78190 Trappes</td>
<td>Tel: +33 130-621-400</td>
<td>FAX: +33 130-699-120</td>
<td>e-mail: <a href="mailto:france@omega.com">france@omega.com</a></td>
</tr>
<tr>
<td>Germany/Austria</td>
<td>Daimlerstrasse 26, D-75392 Deckenpfronn, Germany</td>
<td>Tel: +49 (07056) 3017</td>
<td>FAX: +49 (07056) 8540</td>
<td>e-mail: <a href="mailto:germany@omega.com">germany@omega.com</a></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>One Omega Drive, River Bend Technology Centre</td>
<td>Tel: +44 (0)161 777 6611</td>
<td>FAX: +44 (0)161 777 6622</td>
<td>e-mail: <a href="mailto:sales@omega.co.uk">sales@omega.co.uk</a></td>
</tr>
</tbody>
</table>

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

**WARNING:** These products are not designed for use in, and should not be used for, patient-connected applications.
**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**

![Diagram of rear terminal connections]
**INSTALLATION**

**WIRING**

**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.

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

**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.

<table>
<thead>
<tr>
<th>Preset</th>
<th>Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>11</td>
<td>18</td>
</tr>
</tbody>
</table>

**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 ratchet positions on the Counter housing and the mounting bracket springs should push firmly against the mounting panel rear face).
OPERATION

FRONT PANEL

1. Upper Display
2. Lower Display
3. Preset Output Displays (ON when active)
4. Program Annunciator
5. Preset Annunciator
6. Reset Key

9. Down Key
7. Enter Key
8. Next Key
10. Batch Annunciator

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.

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.
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 a[ef]g in the lower display 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

<table>
<thead>
<tr>
<th>LED(s) ON</th>
<th>Lower Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST</td>
<td>Preset</td>
</tr>
<tr>
<td>BCH &amp; PST</td>
<td>Batch Preset</td>
</tr>
<tr>
<td>BCH</td>
<td>Batch Count *</td>
</tr>
</tbody>
</table>

* "View Only" display - not editable.

8-DIGIT SINGLE PRESET (UP 8) OPERATION

<table>
<thead>
<tr>
<th>LED(s) ON</th>
<th>Upper Display</th>
<th>Lower Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>PST</td>
<td>Count value *</td>
<td>Preset value (top 4 digits)</td>
</tr>
<tr>
<td>BCH &amp; PST</td>
<td>Preset value (bottom 4 digits)</td>
<td>Batch Count *</td>
</tr>
<tr>
<td>BCH</td>
<td>Count value (bottom 4 digits)</td>
<td>Count value (top 4 digits)</td>
</tr>
</tbody>
</table>

* "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:

<table>
<thead>
<tr>
<th>Decimal Point Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ]</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
<tr>
<td>[ ]</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Function</th>
<th>Parameter Description (Upper Display)</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-scaler</td>
<td></td>
<td>Pre-scales counter operation (multiply from 0.001 to 9.999)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value = Count units displayed Count pulses input</td>
</tr>
<tr>
<td>Preset Output Time</td>
<td></td>
<td>Sets momentary ON time for Preset output (0.01 - 99.99s; 0.00 for latched operation)</td>
</tr>
<tr>
<td>Batch Preset Output</td>
<td></td>
<td>Sets momentary ON time for Batch Preset output (0.01 - 99.99s; 0.00 for latched operation)</td>
</tr>
<tr>
<td>Time</td>
<td></td>
<td>Defines decimal point position</td>
</tr>
<tr>
<td>Decimal Point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operator Mode:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preset</td>
<td>None</td>
<td>Shows Preset value</td>
</tr>
<tr>
<td>Batch Preset</td>
<td>None</td>
<td>Shows Batch Preset value</td>
</tr>
<tr>
<td>Batch Count</td>
<td>None</td>
<td>Shows Batch Count value</td>
</tr>
</tbody>
</table>

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).
**SET UP**

**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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Parameter Description (Upper Display)</th>
<th>Available Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter Speed</td>
<td><strong>SPEE</strong></td>
<td>20Hz 200Hz 10kHz</td>
</tr>
<tr>
<td>Input Operation</td>
<td><strong>IN</strong></td>
<td>A-B Quadrature 8-digit</td>
</tr>
<tr>
<td>Panel Reset Key</td>
<td><strong>RES</strong></td>
<td>Enabled Disabled</td>
</tr>
<tr>
<td>Auto Reset</td>
<td><strong>AES</strong></td>
<td>Enabled Disabled</td>
</tr>
<tr>
<td>Input Pull-Ups</td>
<td><strong>PULL</strong></td>
<td>Yes (current sinking) No</td>
</tr>
<tr>
<td>Count Direction</td>
<td><strong>CNT</strong></td>
<td>Up-counting Down-counting</td>
</tr>
<tr>
<td>Lock Strategy</td>
<td><strong>LOG</strong></td>
<td>None Preset Lock Partial Program Lock Preset &amp; Program Lock</td>
</tr>
</tbody>
</table>

**NOTE**

When Input Operation is set to UP-B, 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.

### Control Inputs

**Remote Reset:**
- Terminals 5 (edge-sensitive)

**Program Mode:**
- Terminals 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 preset occurs

**Output 2 energised when:**
- Batch Count = Batch Preset

**Output 2 released when:**
- Hold time elapses or preset 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 (NC), 10 (C), 11 (NO)
- Batch Preset: 16 (NC), 17 (C), 18 (NO)

**Type:**
- Form C (SPDT)

**Rating:**
- 5A resistive @ 110V AC
- 3A resistive @ 240V AC

### Mechanical

**Cut-Out:**
- 45mm x 45mm (V<sub>10</sub>-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)
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.

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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.

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- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

**ENVIRONMENTAL MONITORING AND CONTROL**
- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments