Introduction

A new standard of performance and functionality in a compact preset counter. The Squire Preset Batching Counter offers a single level, predetermining Main counter plus a single level, predetermining Batch, or cycle counter. This one product can provide both repetitive machine cycle control and end-of-job detection.

The "Supertwist" backlit LCD display provides simultaneous count and preset indication. The use of annunciators and simple key sequences makes operator changes quick and easy. A variety of count sources are accommodated, including relay and pushbutton contacts, photocells and proximity switches, and uni- or bidirectional incremental encoders. The solid state outputs can interface to light duty devices and PLCs, while the relay contacts offer heavy duty load switching. Setup and installation is simplified through configuration switches, pluggable terminal strip connectors and a unique 'no tools required' panel mount clamp.

The Squire family of preset counters combines state of the art circuitry and electronic assembly techniques with an ergonomic package design that results in the most cost effective, high performance counter value on the market.

Features

- Two line display indicates Count, Batch and Preset values simultaneously
- 'Supertwist' backlit LCD provides high contrast and visibility in high or low ambient light environments
- Pluggable terminal strip connectors for easy installation and service
- Compact — uses only 48 mm of panel space
- Built-in medium duty relays
- Accessory sensor power supply
- Reset-to-zero or set-to-a-number operation
- Two level program and preset data security
- Accepts current sinking or sourcing sensors
- Key reset, remote reset and auto reset
- Add / subtract or quadrature count inputs
- NEMA 4 / IP65 panel seal with gasket
- Nonvolatile RAM provides 10+ years data and program retention

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**Overview**

**Construction**

**Compact Design**
Uses only 48 mm of panel space

**Full Featured Display**
Simultaneous Count and Preset Data display
Backlit LCD for low ambient light environments
Annunciators show input, display and output status

**Ergonomic Keypad**
Simple key sequences to view and edit Presets
Front Panel Reset can be disabled

**Front Panel Seal**
NEMA 4 / IP65 rated when installed with panel mount gasket (supplied)

**Built-in Relays**
Form C (SPDT) contacts
Rated for 120 VAC, 5A or 1/8 hp

**Pluggable Terminal Strip Connectors**
Allows easy installation and service
Accepts 28 through 14 AWG, stranded wires

**Count Inputs**
Separate A and B channels for Add / Subtract or bidirectional (quadrature) counting
Compatible with sinking or sourcing sensors

**Control Inputs**
Remote Reset of Count
Program Input allows access to setup data

**DC Input / Output**
Provides output to power sensors or encoder
Accepts 10 to 26 VDC external input power
**Input Power**
AC: Terminals 9 (HOT/L1) and 10 (NEUT/L2) 95 to 130 VAC (190 to 260 VAC for SQB22E00), 50/60 Hz, 6 VA
DC: Terminals 3 (+VDC) and 6 (COM) 10 to 26 VDC, 0.4 A. max. total

**Output Power**
DC: Terminal 3 (+VDC) and 6 (COM) 9 to 15 VDC, 0 to 100 mA. max. 12 VDC nominal at 115 (230) VAC

**Main Counter**
Decades: 6, bidirectional, (rollover from 999 999 to 0 and rollunder from 0 to 999 999)
Preset: 1, 6 decades
Operation: Add / Subtract (Signal A counts up; Signal B counts down); or Bidirectional (quadrature: counts up when Signal A leads Signal B) when switch #7 is down
Direction: Up (reset-to-zero); or Down (set-to-a-number) when switch #3 is down
Count Rate: DC to 2.4 kHz max.
Resets: Remote manual; Front Panel disabled when switch #1 is down; Auto Reset when switch #2 is down

**Calibrator**
Range: 0.0001 to 9.9999
Function: Multiplies input pulses

**Batch Counter**
Decades: 6, (rollover from 999 999 to 0)
Preset: 1, 6 decades
Operation: Increments upon each Main Counter
Auto Reset

**Count Inputs**
Signal A: Terminal 4 (SIG A)
Signal B: Terminal 5 (SIG B)
Input Voltage, High: 3 min. to 26 VDC max.
Input Voltage, Low: 0 min. to 2.0 VDC max.
Input Impedance: 10 kΩ to COM; optional 4.7 kΩ to +VDC when switch #5 is down
Input Response: 200 μsec. min. pulse; 25 msec. min. pulse when switch #6 is down

**Control Inputs**
Remote Reset: Terminal 7 (RST)
Program Mode: Terminal 8 (PGM)
Input Voltage, High: 3 min. to 26 VDC max.
Input Voltage, Low: 0 min. to 2.0 VDC max.
Input Impedance: 4.7 kΩ to +VDC
Input Response: 25 msec. min. pulse

**Front Panel Keys**
Type: Conductive rubber, tactile response

**Display**
Type: "Supertwist" Transflective LCD; LED backlighting
Main Counter: 6 digits, 0.25' (7 mm) height
Preset: 6 digits, 0.13' (4 mm) height
Decimal Point: XXX XXX (none) to XX.XXXX

**Security**
Preset Data: Protected when switch #4 is down; accessible only in Program Mode
Program Data: Accessible only in Program Mode; Access limited to Calibration and Decimal Point only when switch #8 is down

**Solid State Outputs**
Output 1: Terminal 1 (OUT 1)
Output 2: Terminal 2 (OUT 2)
Type: NPN open collector, sink to COM
Output High: 30 VDC max., 100 μA. max. leakage current
Output Low: 1 VDC max., 100 mA. max.
Operation: Latched; or Momentary from 0.01 to 99.99 sec. +0, –10 msec.
Assignment: Output 1 turns on at Preset, turns off at manual Reset (Output 1 turns on at Counter=0, turns off at Reset if switch #3 is down); Output 2 turns on at Batch Preset, off at Batch Counter Reset

**Relay Outputs**
Relay 1: Terminals 11 (NC), 12 (NO), 13 (C)
Relay 2: Terminals 14 (NC), 15 (NO), 16 (C)
Type: Form C (SPDT)
Ratings: 5 A. res. at 24 VDC or 120 VAC; 3 A. res. at 240 VAC; 1/8 hp at 120/240 VAC
Assignment: Relay 1 turns on at Preset, turns off at manual Reset (Relay 1 turns on at Counter=0, turns off at Reset if switch #3 is down); Relay 2 turns on at Batch Preset, off at Batch Counter Reset

**Mechanical**
Enclosure Dimensions: 1.7" (44 mm) square X 5.1" (130 mm) long
Bezel Dimensions: 1.9" (48 mm) square X 0.2" (4 mm) deep
Panel Cutout Size: 1.8" (45 mm) square
Panel Thickness: 1/16" (2 mm) to 1/2" (13 mm)
Depth Behind Panel: 5.6" (144 mm)

**Environmental**
Operating Temp.: 32 to 122 °F. (0 to 50 °C.)
Storage Temp.: 0 to 186 °F. (–18 to 85 °C.)
Ambient Humidity: 0 to 90% noncondensing
Front Panel Seal: NEMA 4 / IP65 when installed with panel gasket (supplied)

**CAUTION:**
Avoid cleaning agents which contain ammonia! Repeated contact with ammonia may weaken the plastic. Many lubricants are not compatible with the structural plastic of the counter housing. Repeated exposure to these lubricants may weaken the plastic.

**IMPORTANT:**
Do not connect AC power when using an external dc source to power the unit.

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**SPECIFICATIONS**

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`701764-4`
**SETUP**

**CONFIGURATION SWITCHES**

Record your Configuration Switch settings in the chart at right for future reference.

<table>
<thead>
<tr>
<th></th>
<th>UP</th>
<th>DOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Key Reset Disabled</td>
<td>Key Reset Enabled</td>
</tr>
<tr>
<td></td>
<td>Front Panel RST key will not reset the Counter.</td>
<td>Front Panel RST key will cause a Counter reset when pressed. Pressing both the (Next Digit) and RST keys together will cause a Batch Counter reset.</td>
</tr>
<tr>
<td>2</td>
<td>No Automatic Reset</td>
<td>Automatic Reset</td>
</tr>
<tr>
<td></td>
<td>Counter must be manually reset from remote reset input or front panel key. Batch Counter will not operate with Auto Reset turned off.</td>
<td>Counter repeats count cycle (Reset-to-Zero or Set-to-a-Number) at detection of Preset 1.</td>
</tr>
<tr>
<td>3</td>
<td>Reset-to-Zero Operation</td>
<td>Set-to-a-Number Operation</td>
</tr>
<tr>
<td></td>
<td>Reset (manual or automatic) causes Counter to go to zero.</td>
<td>Reset (manual or automatic) causes Counter to load to value of Preset 1. Output 1 is triggered at Counter value of 0.</td>
</tr>
<tr>
<td>4</td>
<td>Preset Data Unlocked</td>
<td>Preset Data Locked</td>
</tr>
<tr>
<td></td>
<td>Presets can be changed by front panel keys without activating PGM input.</td>
<td>Presets can be viewed by use of front panel keys. Presets can be changed only when PGM input is active.</td>
</tr>
<tr>
<td>5</td>
<td>No Input Pullup Resistors</td>
<td>Input Pullup Resistors</td>
</tr>
<tr>
<td></td>
<td>Use with current sourcing, PNP or totem-pole output devices and contact closures to +VDC.</td>
<td>Use with current sinking, NPN or totem-pole output devices and contact closures to COM.</td>
</tr>
<tr>
<td>6</td>
<td>High Speed Counting</td>
<td>Low Speed Counting</td>
</tr>
<tr>
<td></td>
<td>Use with pulsed output or high speed devices and quadrature encoders.</td>
<td>Limits input speed to 20 pulses/sec to eliminate contact bounce or provide additional noise filtering.</td>
</tr>
<tr>
<td>7</td>
<td>Add / Subtract Operation</td>
<td>Quadrature Operation</td>
</tr>
<tr>
<td></td>
<td>Pulses on Signal A input add counts; pulses on Signal B input subtract counts.</td>
<td>Phasing of Signals A and B provide direction information to Counter. Use when process may stop and/or reverse.</td>
</tr>
<tr>
<td>8</td>
<td>Full Program Access</td>
<td>Partial Program Access</td>
</tr>
<tr>
<td></td>
<td>Output momentary times are accessible when PGM input is active.</td>
<td>Output momentary times are hidden (not accessible) when PGM input is active.</td>
</tr>
</tbody>
</table>

**NOTE:**
- Set switch #2 down to enable Batch Counter operation.

**IMPORTANT:**
- Set switch #6 up for bidirectional Quadrature input sources.

**NOTE:**
- Use Signal B (subtract) input for Set-to-a-Number operation with a single count source.
**PST** Preset / Select

This key will select data to be displayed. During normal operation consecutive presses will switch the display from Batch Count to Preset 1 to Batch Preset and back again. This display will remain on the last value chosen.

When the PGM input is active, this key selects various program data for display: Calibrator, Decimal Point and Output 1 and 2 Times.

**ENT** Enter

The Enter key transfers edited Preset or Program Data to nonvolatile memory. The new value is not used until the Enter key is pressed.

During normal operation a ten second timer is in effect. If a Preset has been changed but not entered, the Preset Data will revert back to its old value after 10 seconds of inactivity.

**RST** Reset

The Counter may be reset from the front panel if switch #1 is down. The Counter is reset only once for each keypress, even if held.

To reset the Batch Count, press both the (Next Digit) and RST keys together.

**NOTE:**
Selected (flashing) digits are shown in this manual in outline form: `3.456`
### VIEWING PRESET DATA

**NOTE:**
To reset the Batch Counter, simultaneously press the ➤ and RST keys.

**Data Displays:**

- **Batch Counter**
  - Press Preset / Select key to view Preset 1

- **Preset 1**
  - Press Preset / Select key to view Batch Preset

- **Batch Preset**
  - Press Preset / Select key to view Batch Counter

### CHANGING PRESET DATA

**NOTE:**
To abort changes to a Preset or Program Data value, press the Preset / Select key instead of the Enter key.

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

**IMPORTANT:**
You must press the Enter key to transfer new data into memory within 10 seconds of your last keypress.

Use the Next Digit key to select one digit to change. The selected digit begins to flash.

Change the selected digit with the + and – keys.

When the all of the digits have been correctly set, press the Enter key to transfer the new value into memory.
NOTE:
To access Program Data, PGM input (terminal 8) must be active (low or tied to COM).

WARNING!
Changing program data 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 data values.

IMPORTANT:
You must press the Enter key to transfer new data into memory.

NOTE:
Possible Decimal Point selections:
- OFF
- .0
- .00
- .000
- .0000

NOTE:
Output 1 and 2 Times appear only when Partial Program, switch #8, is up.

Preset 1
Preset 1 appears in Program Data only if Preset Data Lock, switch #4, is down.

Batch Preset
Batch Preset appears in Program Data only if Preset Data Lock, switch #4, is down.

Calibrator
Multiplies (scales) count pulses to display meaningful units of measure. Enter by using:

\[
\text{Calibrator} = \frac{\text{Count units displayed}}{\text{Count pulses input}}
\]

Decimal Point
Select 1 to 4 decimal places or no decimal point for Main Counter and Preset 1 displays. Use + key to increase and – key to decrease the number of decimal places shown.

Output 1 Time
Sets the momentarily on time for Output 1 (Preset 1) from 0.01 to 99.99 seconds. Set to 00.00 for latched operation.

Output 2 Time
Sets the momentarily on time for Output 2 (Batch Preset) from 0.01 to 99.99 seconds. Set to 00.00 for latched operation.
**Panel Mounting**

Make cutout(s) according to the details in the drawing at right.

If the installation requires a front panel seal, slide the panel sealing gasket over the rear of the counter up to the bezel.

Slide the counter through the panel cutout.

DO NOT squeeze the (rounded) handles of the panel mount clamp during installation. This may cause the clamp to slide back before locking into place and result in a loose panel mounting.

Slide the panel mount clamp, with the springs pointed toward the panel, over the rear of the unit. Push the clamp as far forward as possible. The clamp will lock into the corners of the enclosure.

**Wiring**

**AC Power Input**

Connect AC power to L1/HOT (terminal 9) through a 1/8 A., "slow blow" type fuse and to L2/NEU (terminal 10), as shown in the diagram on the right. AC power should be from a separate branch circuit that is noise-free and does not feed heavy loads.

**DC Power Input**

Connect DC supply to +VDC (terminal 3) through a 1/2 A., "slow blow" type fuse and return to COM (terminal 6), as shown in the diagram on the right. DC power should have low ripple and be noise-free.

**Relay Outputs**

Connect AC or DC load circuits to relays contacts on terminals 11 through 16 as needed. DO NOT route load wiring near count input or transistor output signals. Load switching noise can be minimized with RC or MOV suppression.

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

**WARNING!**

In installation and use of this product, comply with the national electrical code; federal, state and local codes, and any other applicable safety codes. In addition, turn off power and take other necessary precautions during installation, service and repair to prevent personal injury, property loss and equipment damage.

**Note:** For multiple unit installations, the counters can be installed with close unit-to-unit spacing in horizontal rows or vertical columns, but not both. Observe the minimum unit-to-unit clearance shown.

For side by side mounting, the rounded handles of the panel mount clamp will be located at the top and bottom of the counter. For vertical mounting, the clamp can be rotated so that its handles are on the left and right sides of the counter.
Current Sourcing Count Inputs
Set switch #5 to up.
For Add/Subtract operation, set switch #7 to up.
Connect Add count input to Signal A (terminal 4) and/or Subtract count input to Signal B (terminal 5) and +VDC (terminal 3) as shown on the right.
For bidirectional Quadrature operation, set switch #6 to up and switch #7 to down. Connect signals A and B as shown for bidirectional Quadrature below.

Current Sinking Count Inputs
Set switch #5 to down.
For Add/Subtract operation, set switch #7 to up.
Connect Add count input to Signal A (terminal 4) and/or Subtract count input to Signal B (terminal 5) and COM (terminal 6) as shown on the right.
For bidirectional Quadrature operation, set switch #6 to up and switch #7 to down. Connect signals A and B as shown for bidirectional Quadrature below.

Bidirectional Quadrature Inputs
Set switch #6 to up and switch #7 to down.
Connect +VDC (terminal 3), Signal A (terminal 4), Signal B (terminal 5) and COM (terminal 6) as shown at right.
For NPN open collector output devices without internal pullup resistors, set switch #5 to down.

Reset and Program Inputs
Connect Reset pushbutton or current sink device to RST (terminal 7), Program switch or jumper to PGM (terminal 8) and COM (terminal 6).

Solid State Outputs
Connect Output 1 (terminal 1) or Output 2 (terminal 2) and COM (terminal 6) to solid state devices as shown at right, top.
To drive DC relay coils, connect Output 1 (terminal 1) or Output 2 (terminal 2) and +VDC (terminal 3) as shown at right, bottom.
Suppress turn-off transients with a flyback diode, connected as shown.

NOTE:
When using current sourcing devices, set switch #5 to up.

NOTE:
For contact closures, or to limit input response to 20 Hz, set switch #6 to down.

NOTE:
When using current sinking devices, set switch #5 to down.

NOTE:
For contact closures, or to limit input response to 20 Hz, set switch #6 to down.

NOTE:
When using bidirectional (quadrature) devices, set switch #6 to up and switch #7 to down.

WARNING!
When the counter is used to control a machine or process where personal injury or equipment damage might occur as a result of failure of any electronic or other counter function, you are urgently recommended to insist on installation of safeguards which would protect the operator and/or machine in the event of any unexpected operation of the machine or process.
NOTE:
The Diagnostic can be displayed only upon application of power when the ENT key is being pressed.

NOTE:
To exit from the Diagnostic display, press the ENT key. Normal display operation will resume.

To start the Diagnostic display: turn power off, press and hold the Enter key, and re-apply power.

Display
The first diagnostic will turn on all digit segments and annunciators, as shown on the left. Segments that do not appear may indicate a malfunction. Press any key to end the Display Test.

Inputs
The electrical states of the count and control inputs are shown by the four legends. The displays are On for active (low) inputs.

Preset / Select Key
The PST key can be tested by observing the display. Consecutive keypresses will cycle the annunciators (BCH-PST-1-2-BCH-etc.).

Reset Key
The RST key is tested (but is otherwise inactive) by its alternating the CALIB and DEC PT prompts.

Next Digit Key
This key alternately displays OUT 1 and OUT 2.

Outputs (and + and – Keys)
When OUT 1 or OUT 2 is displayed (above), the outputs can be turned on and off. The + key will turn on (or trigger for the momentary time) the output; the – key will turn the output off.

Switches
The Configuration Switch settings can be checked and tested by viewing the Data Display. Each switch will display either an upper segment, if the switch is up, or the lower segment, if the switch is down.
NOTE:
Error code displays can be cleared by pressing any front panel key.

The Squire Counter has the ability to detect and display certain external conditions which prevent normal counter operation. These are shown in the lower Data display as numeric codes which are described below.

**Brownout**
This error is caused by the AC or DC input power falling below the minimum operating voltage. This error will not be displayed during normal power off-on cycles unless the input power rises slowly. The Count data is stored in nonvolatile memory before power is lost.

**Input Too Fast**
This error is the result of an excessive count rate usually caused by count signal inputs above the maximum operating frequency. This error may also result from noise at the count signal inputs.

**Nonvolatile Memory Failure**
This error appears upon application of power. This failure may mean that Count, Preset, or Program data has been corrupted and should be checked.

IMPORTANT:
Error displays indicate abnormal operating conditions! Count, Preset or Program Data may not be valid and should be checked before continuing.
**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQB22000</td>
<td>Squire Batching Counter, 115VAC</td>
</tr>
<tr>
<td>SQB22E00</td>
<td>Squire Batching Counter, 230VAC</td>
</tr>
</tbody>
</table>

**WARRANTY**

Standard products manufactured by the Company are warranted to be free from defects in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced, at the option of the Company, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company. The obligation of the Company hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period, and in the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof. No products shall be returned to the Company without its prior consent. Products which the Company consents to have returned shall be shipped F.O.B. the Company’s factory. The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of the Company depends, to a large extent, upon the type of usage thereof, and THE COMPANY MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

**SERVICE**

If this product requires service, call the number below for an Return Material Authorization (RMA) number, pack it in a sturdy carton with the RMA number clearly marked on the outside, and ship prepaid to: Service Department at the address below.

Please Include:
1. A description of problem
2. The name of responsible person
3. Your purchase order number
4. Your return shipping instructions