

# KEP Industrial Instruments

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# New Products

## 130K Series



### Miniature Counters, Timers & Ratemeters

130K/131K/132K/133K - Totalizers

134K/135K/ - Time Meters

136K - Ratemeter/Tachometer

Standard 1/32 DIN Case

**See Pages 19, 80, 100 for Details**

## 531 and 532



### Temperature Displays

531 - Temp. Display for Pt100 and Ni100 RTD's

532 - Temp. Display for J, K & N Thermocouples

Standard 1/32 DIN Case

**See Pages 92, 93 for Details**

## CTR-544 & TR-545



### Counter, Timer, Ratemeter

CTR544 - Counter, Timer or Ratemeter

TR545 - Totalizer and Ratemeter

Standard 1/8 DIN Case

**See Pages 31, 54 for Details**

## PMT-555



### Process Monitor and Totalizer from Analog Inputs

Standard 1/8 DIN Case

**See Page 65 for Details**

## TR-910



### Programmable Time Relay with LCD Display

Standard 1/16 DIN Case

**See Page 88 for Details**

# KE 610

## 6 Digit Counter, Non Reset

### Features

- Low Cost, Large Quantity Discounts
- Patented High Performance Mechanism
- UL & CSA Approved (KE610)
- Rugged Plastic Package
- Many Voltage Ranges Available
- Long Life



### Applications:

The compact design and various mounting styles of the KE610 make it the ideal counter for almost all counting applications. This electro-mechanical counter will not lose its count during power failures or from electrical noise. The KE610 is used in:

- MAIL EQUIPMENT
- PHOTO MACHINES
- VENDING MACHINES
- GAMING MACHINES
- ELEVATORS
- COPY MACHINES
- TICKET MACHINES

### Description:

The KE610 Series incorporates the latest manufacturing technology together with a patented basic design to achieve high performance over a wide temperature range with low power consumption. These counters can be mounted by 2 front flange styles, base flange, behind the panel (front mount), or rear screws. The KE610 has UL/CSA approvals and can operate over a wide voltage range of DC or AC power.

### Specifications:

**Digits:** 6

**Digit Size:** 0.160" white on black. Colors available.  
Special 0-5-0-5 available.

**Operating Voltage  $\pm 10\%$ :**

DC: 4.5, 6, 12, 24, 48, 115 (2W)

AC: 24, 48, 120, 230 (5VA)

**Reset:** None

**Count Speed:** 10 CPS, standard. 50/50 ratio on/off.

**Max. On Time:** Infinite

**Temperature:** Storage: 14°F to 122°F (-10°C to +50°C).

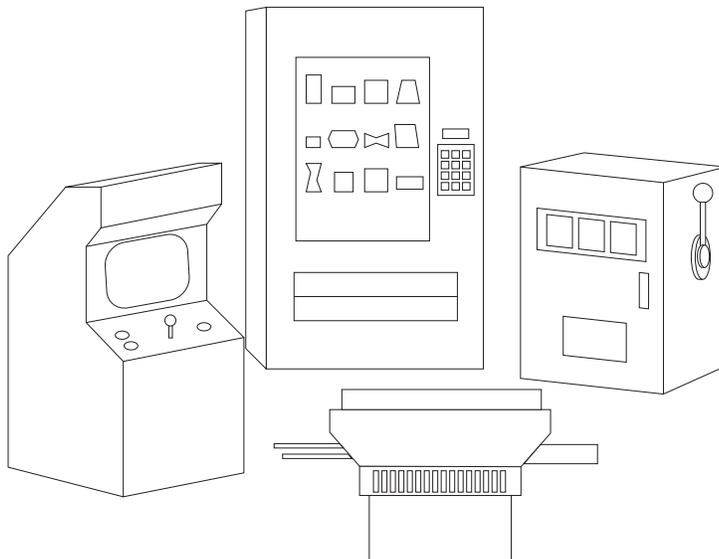
Operating: 23°F to 104°F (-5°C to +40°C).

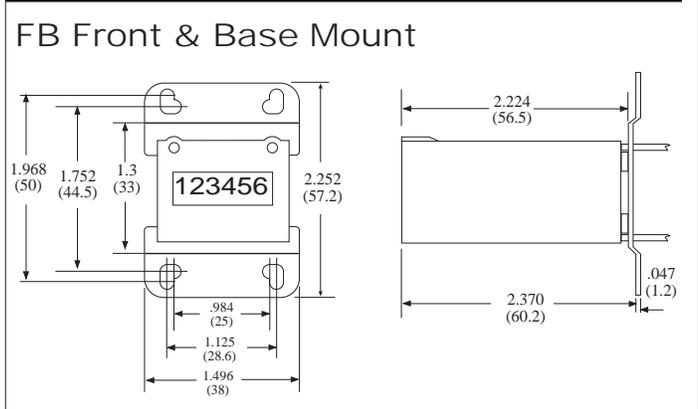
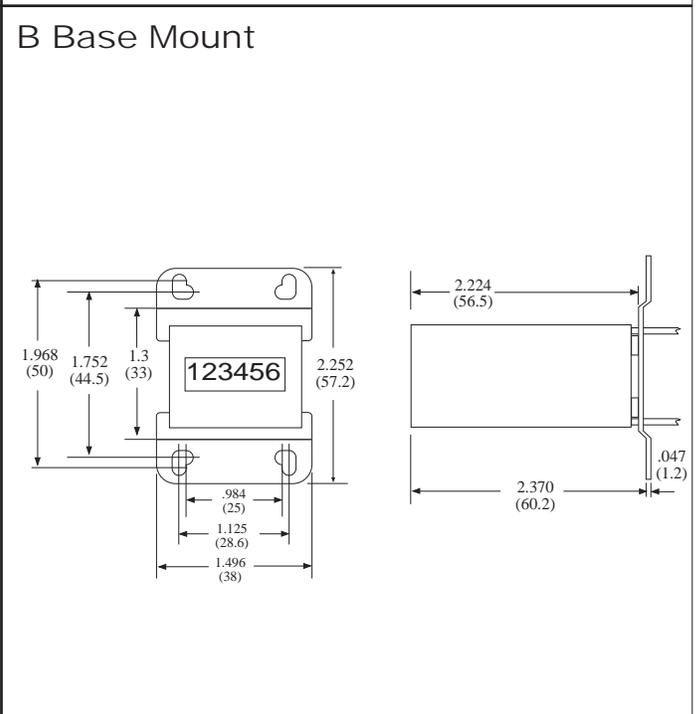
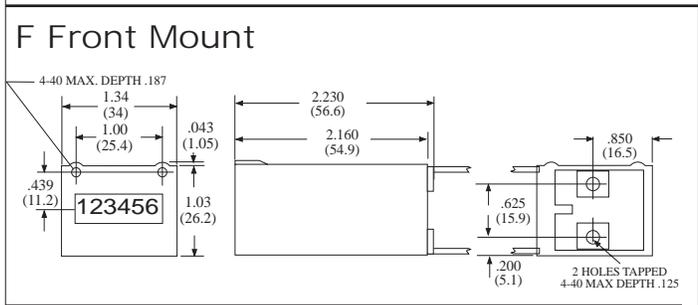
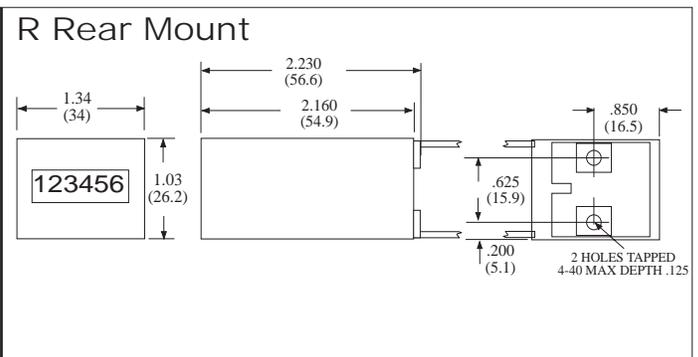
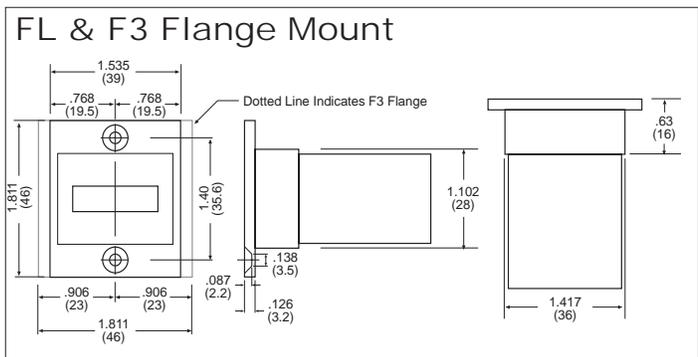
**Approvals:** UL# E60420, CSA# LR 91109-4

**Termination:** UL/CSA wire leads, 10" long, standard.

**Specials:** Many specials available. Consult factory.

**Weight:** 4 oz. (113 g.)





**How To Order**

<b>EXAMPLE:</b>	<b>KE 610</b>	<b>A</b>	<b>FB</b>	<b>10</b>	<b>DC</b>	<b>12</b>
<b>Series</b>	KE610 = 6 Digit					
<b>Special Features</b>	(Omit if no special feature desired) A = Add Diode Suppression (DC only) .01 = Coin, 2 wheels red on black .05 = Coin, 2 wheels red on black (steps 05, 10, 15 ...)					
<b>Mounting</b>	FL = Flange Mount 1.535" x 1.811" F3 = Flange Mount 1.811" x 1.811" F = Front FB = Front & Base R = Rear Mount B = Base Mount					
<b>Count Speed</b>	10 = 10 CPS (Standard)					
<b>Operating Voltage</b>	AC DC					
<b>Voltage Level</b>	DC: 4.5, 6, 12, 24, 48, 110 AC: 24, 48, 120, 240					

# E660, E760

6 or 7 Digit Counter, Non Reset

## Features

- Low Cost, Large Quantity Discounts
- Rugged ABS Case
- Many Voltage Ranges Available
- Long Life
- Compact Size

## Description:

The E series incorporates the latest manufacturing technology together with a basic design to achieve high performance over a wide temperature range with very low power consumption. These counters can be mounted by snap-in front flange or rear screw mount.

## Applications:

The compact design and competitive pricing of the E660 and E760 make them the ideal counters for almost all counting applications. These electro-mechanical counters will not lose their count during power failures, or from electrical noise. The E660 and E760 are used in:

- Mail equipment
- Photo machines
- Vending machines
- Gaming machines
- Elevators
- Copiers and printers
- Ticket machines
- Laundry machines

## Specifications:

**Operating Voltage:** (+/-10%)

**DC:** 5,12,24 (1.2W)

**Display:** Six or seven digit, .110" (2.8mm) high. White on black.

**Count speed:** 10 CPS standard. 15 and 25 CPS optional. 50/50 ratio on/off.

**Max. On time:** Infinite.

**Reset:** None.

**Termination:** UL/CSA wire leads, 13.78" (350mm).

**Operating temperature:** 23° F to 104°F (-5°C to +40°C).

**Storage temperature:** 14°F to 122°F (-10°C to +50°C).

**Weight:** 1 oz. (28.35 grams).

**Specials:** Many specials available. Consult factory.



## How To Order:

EXAMPLE:	E660	A	P	10	DC	12
<b>Series</b>	E660 = 6 Digit Counter E760 = 7 Digit Counter					
<b>Special Order Features</b>	_ = Blank if standard A = Diode across Coil M = M3 Threads					
<b>Mounting</b>	P = Panel Mount R = Rear Mount (4-40) F = Front Mount (4-40) FI = Front Mount (4-40) with inserts RT = Rear Mount (4-40) with Terminal Pins for PCB Mount B = Base Mount K = Rear Mount with 4-40 screw between Terminal Pins					
<b>Count Speed</b>	10 = 10 CPS (standard) 15 = 15 CPS (optional) 25 = 25 CPS (optional)					
<b>Operating Voltage</b>	DC					
<b>Voltage Level</b>	DC: 5, 12, 24					

Dimensions

**Panel Mount**

Panel Thickness	A
0.04~0.06 (1.0~1.4)	0.95~0.97 (24.2~24.6)
0.06~0.08 (1.4~2.0)	0.97~0.98 (24.3~24.7)

**Rear Mount**

**Front Mount**

**Base Mount**

**Pin Terminal Type**

# K46 / K47 Series

## Miniature Electro-Mechanical Totalizers

### Features

- 6 or 7- Digit Counter
- Low Cost
- High Shock Resistance
- Low Power Consumption; Suitable for Battery Operation
- Small Dimensions
- Magnified Large Figures
- Flush Mount with Integrated Spring Clip (snap in)
- PCB Mount Versions
- Solderable and Wash Proof
- Protection to IP 65
- Stores Value on Power Failure
- Long Service Life (50 x 10<sup>6</sup> impulses)



### Specifications

<b>Electrical Connection:</b>	flush mount:	flying leads AWG 22 app. 150 mm
	PCB mount:	solder pins 0.64 mm dia.
<b>Power consumption:</b>	up to 12 V DC:	appr. 70 mW
	at 24 V DC:	appr. 150 mW
<b>Rated voltage:</b>	1.5, 3, 4.5, 5, 6, 12, 24 V DC -10 % +20 %	
<b>Counting frequency:</b>	max. 10 Imp/s (type 0)	
<b>Pulse duration</b>	min. 50 ms	
<b>Pulse interval:</b>	min. 50 ms	
<b>Cycle duration factor:</b>	100 %	
<b>Number of digits:</b>	6 (K46), 7 (K47)	
<b>Display Height:</b>	4 mm optical	
<b>Color of figures:</b>	white on black	
<b>Reset:</b>	no reset	
<b>Ambient temperature:</b>	-10 ... +60°C	
<b>Mounting position:</b>	any	
<b>Operating life:</b>	> 50 x 10 <sup>6</sup> impulses	
<b>Protection:</b>	IP 65 (K46.20, K47.20: on frontside)	
<b>Housing:</b>	clear plastic	
<b>Weight:</b>	12 ... 14 g	

### How To Order:

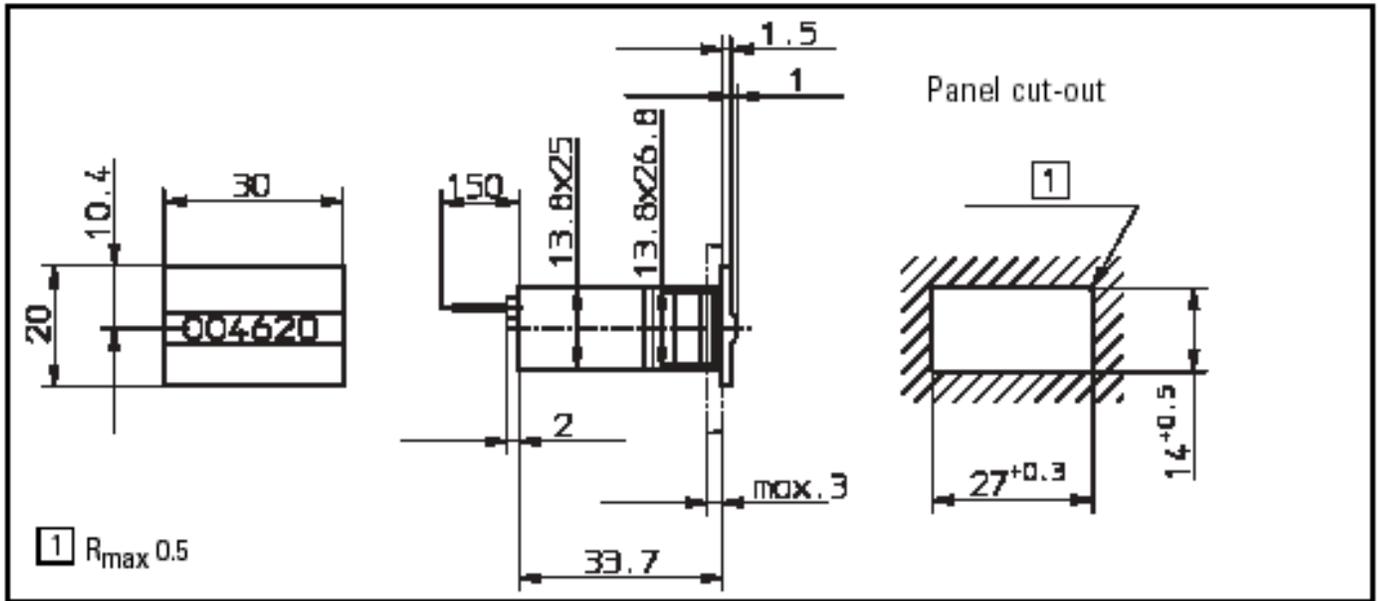
**EXAMPLE: K4 6 .20 .35 12VDC**

<b>Series</b>	K4 (basic series)			
<b>Digits</b>	6 = 6 digits 7 = 7 digits			
<b>Style</b>	.20 = plastic case, display on narrow side, wire leads, flush mount (snap in), magnifying lens	.80 = plastic case, display on narrow side, solder pins, PCB mount (wash proof), magnifying lens	.90 = plastic case, display on broad side, solder pins, PCB mount (wash proof), magnifying lens	.91 = plastic case, display on narrow side, solder pins, PCB mount (wash proof), magnifying lens
	.94 = plastic case, display on broad side, solder pins, PCB mount (wash proof), magnifying lens	.95 = plastic case, display on narrow side, solder pins, PCB mount (wash proof), magnifying lens		
<b>Options</b>	.35 = flat pins with .02" x .11" push on connectors (.20 and .80 Mount Style Only)			
<b>Voltage</b>	1.5, 3, 4.5, 5, 6, 12, 24 VDC ± 10% 24, 110, 220 VAC ± 10% (Other voltages available, Consult factory)			

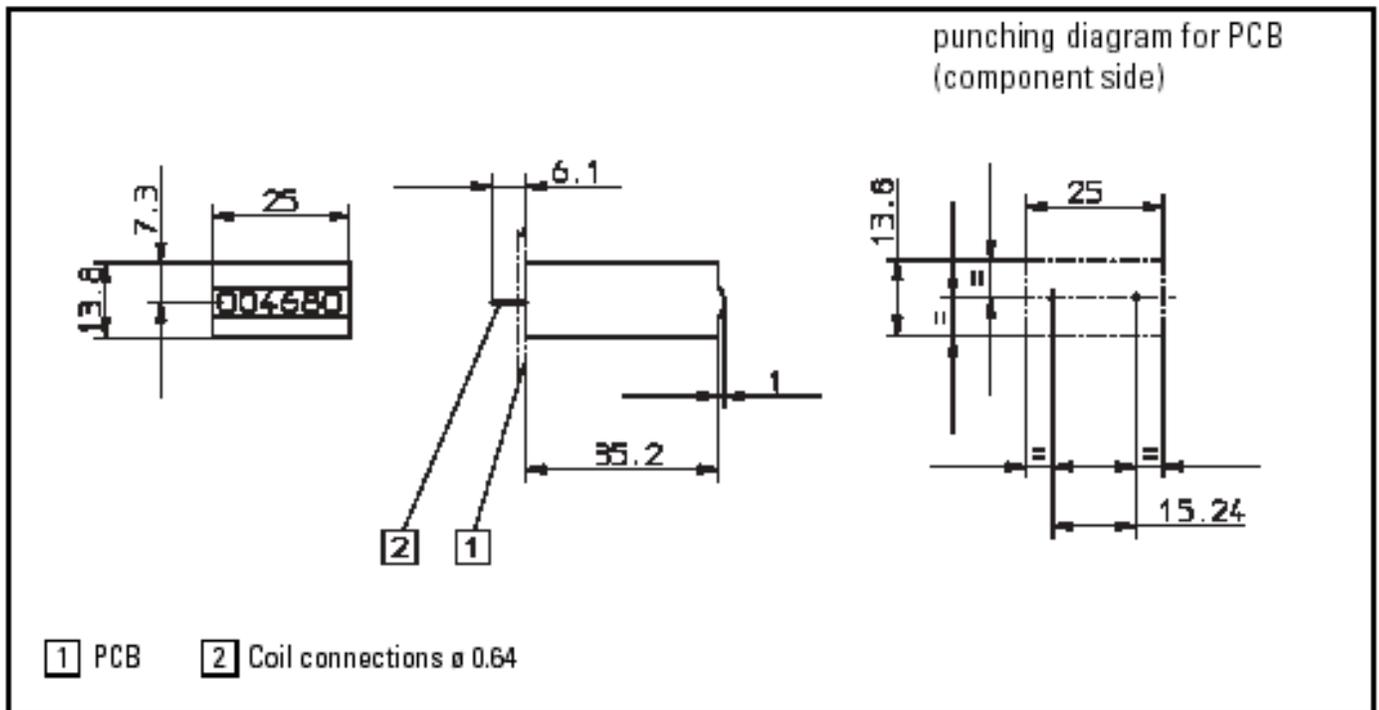
### Special Options (add to end of part number)

- 0 = Low power DC versions (30mW), 10CPS
- ET= Extended Temperature -30°C to +85°C

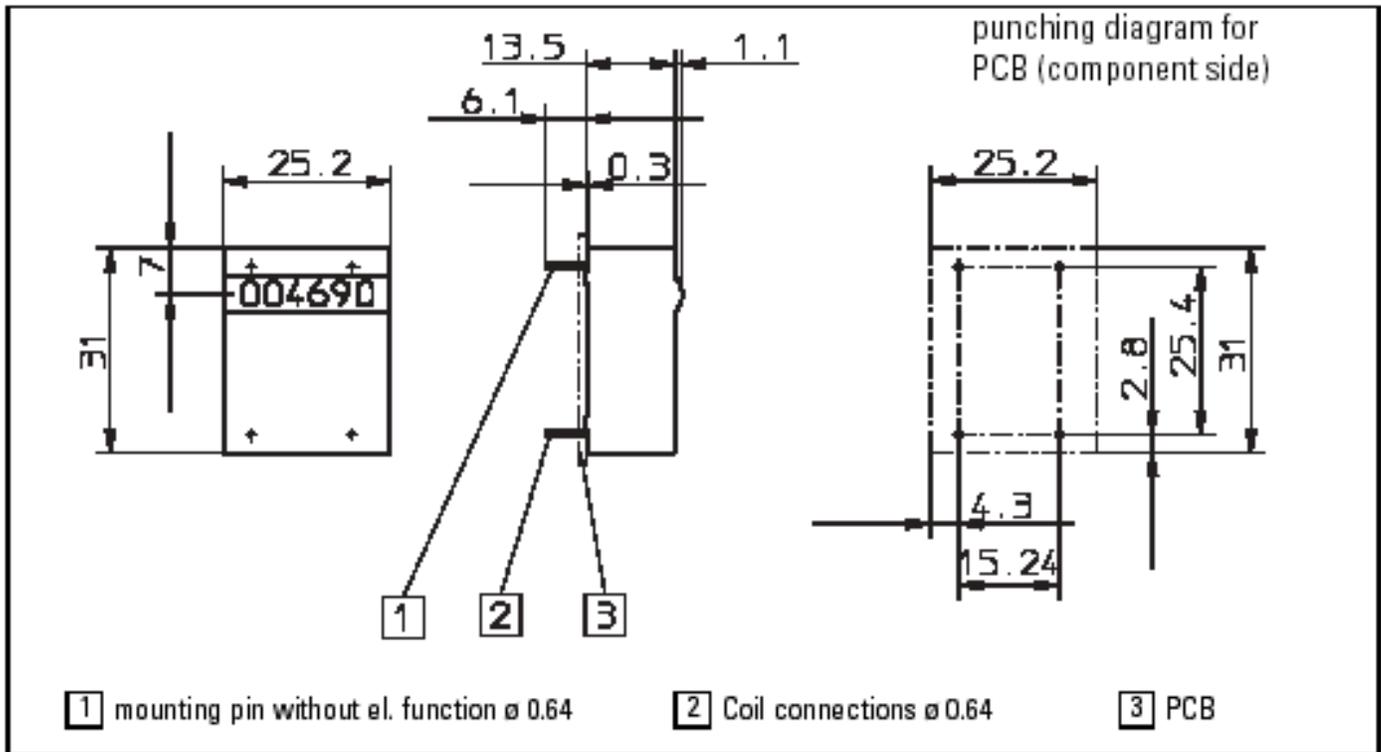
K46.20 / K47.20



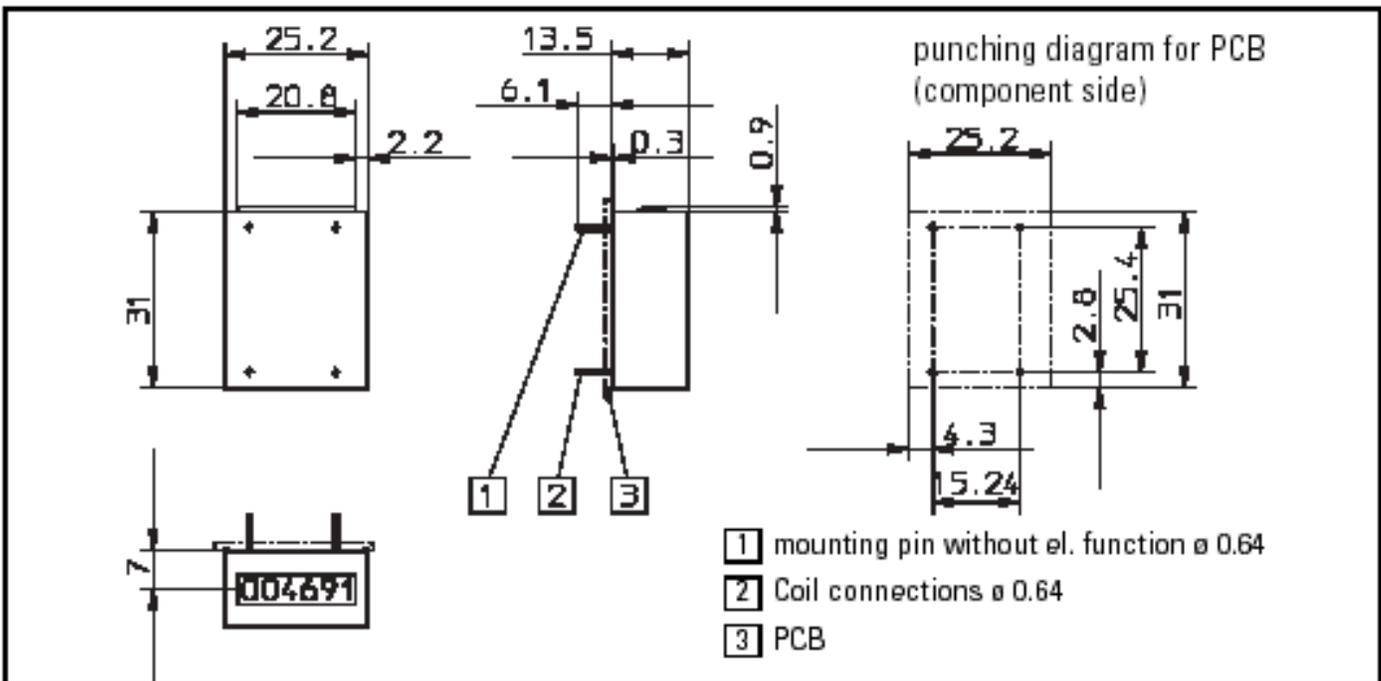
K46.80 / K47.80



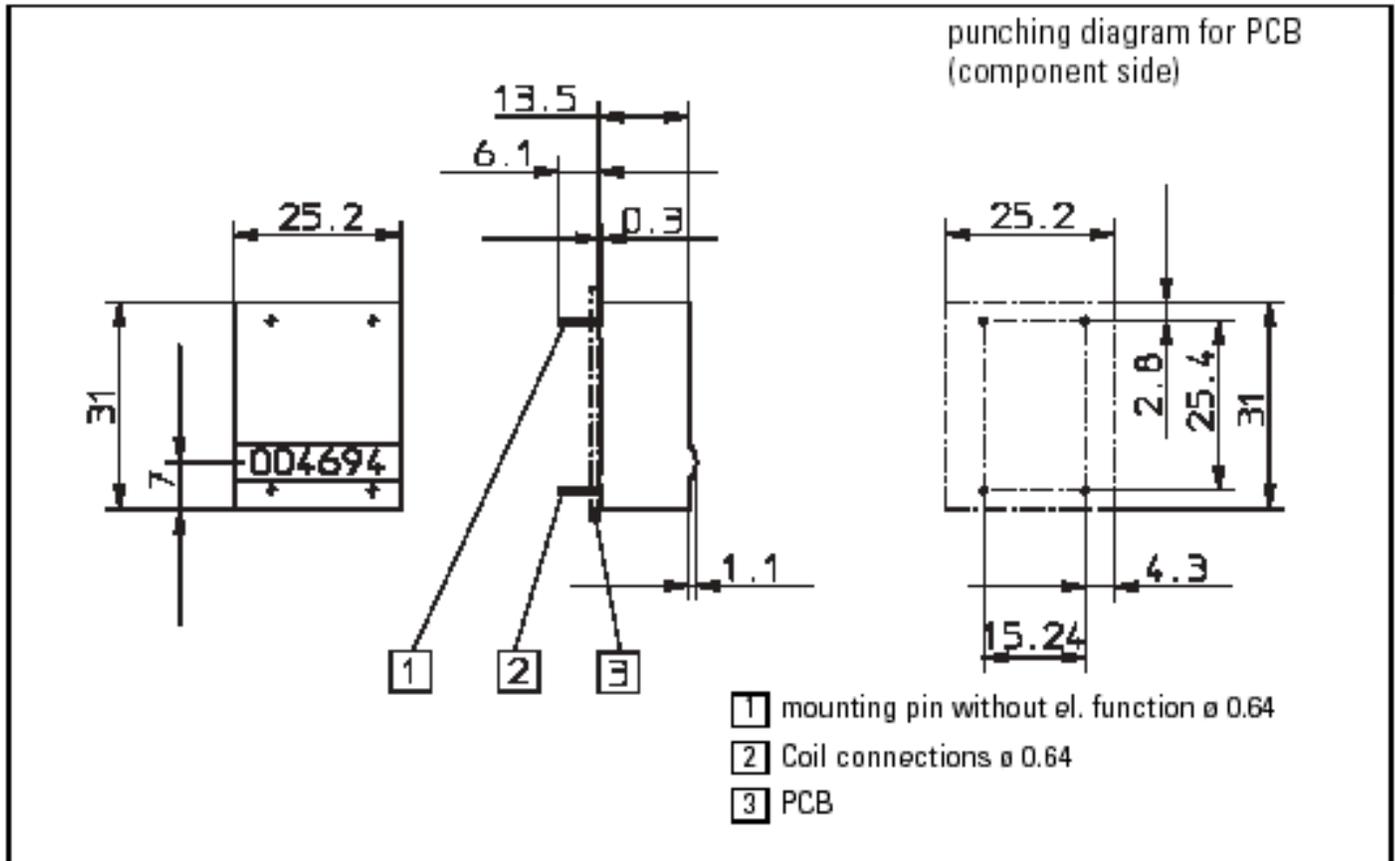
K46.90 / K47.90



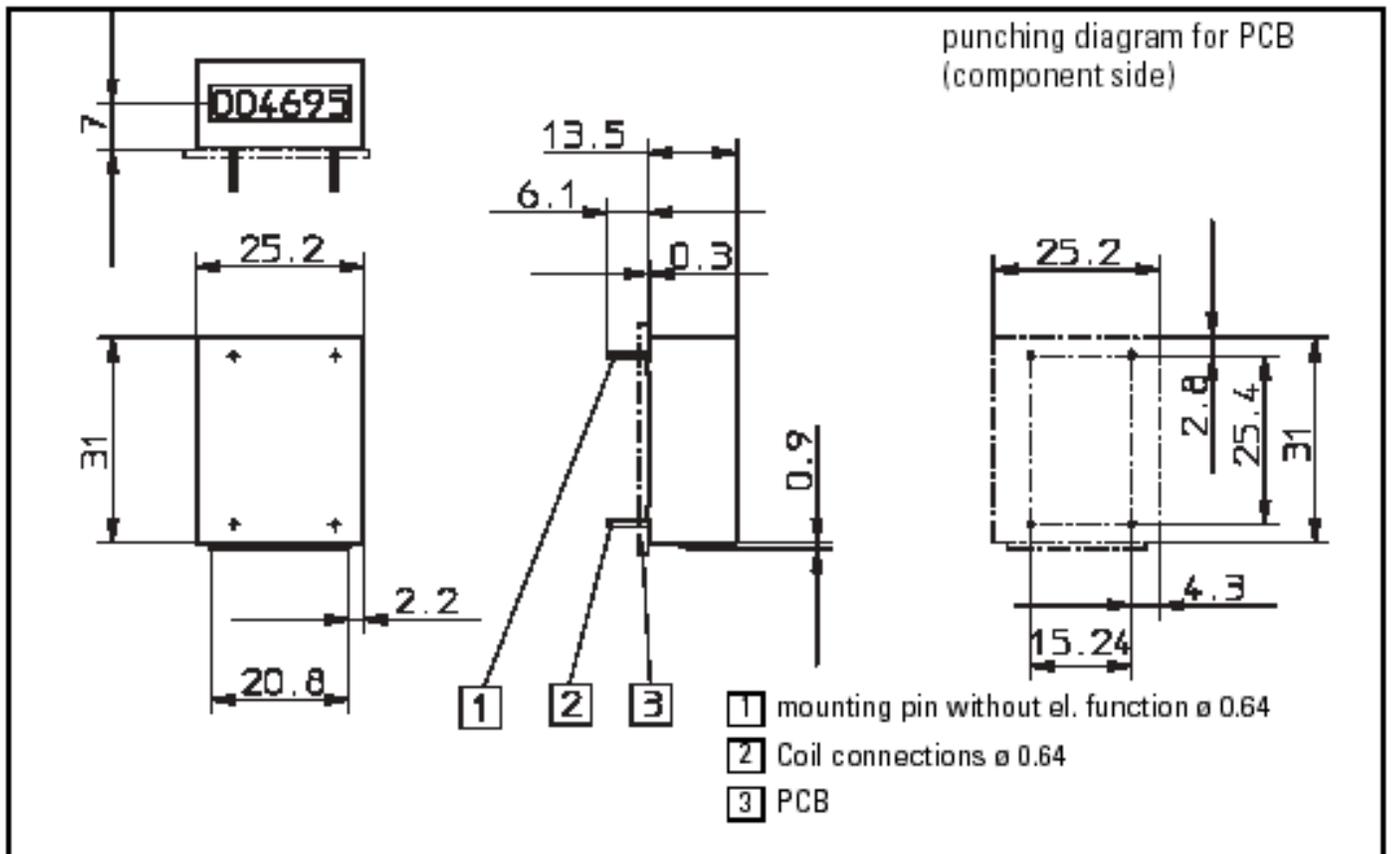
K46.91 / K47.91



K46.94



K46.95



# K0 Series

## Features

- UL Approved, CE Certified
- Super Small
- Low Power Consumption
- 4, 5 or 7 Digits
- 3 Mounting Styles
- Extended Temperature Option (-30° C to +85° C)
- Long Life

## Applications:

- Dispensing Equipment
- Medical Equipment
- Copy Machines
- Gaming Machines

## Description:

The K0 Series is a tiny 4, 5 or 7 digit totalizer. The armature system and novel anti-shock and vibration driving system provide a high degree of counting accuracy at a very low power consumption (250mW STD.; 30mW OPT.). Wear resistant materials provide a long maintenance free life, even at extreme temperatures. Versions supplied with a metal case provide electro-magnetic tamper-proof.

## Specifications:

**Digits:** 4, 5 or 7 - 0.158" high, white on black.

**Weight:** 0.60 oz. (17g)

**Reset:** None

**Terminations:** Wire leads or PC board mount with silver-plated pins or optional .02" x .11" tabs.

**Approvals:** UL# E43429, CE Approved

**Temperature:** +14°F to +140°F (-10°C to +60°C)

## Count Speed:

STD: DC 25CPS; (250mW)  
MIN. on/off 20mSec

OPT: DC 10CPS; (30mW)  
MIN. on/off 50mSec

NOTE: Power of 30mW must be maintained even on increase of temperature.

AC: 10CPS (.8VA);  
MIN. on/off 50mSec

## Electro-Mechanical Totalizers



## How To Order:

**EXAMPLE:** K0 7 .20 .35 12VDC

### Series

- K0 (basic series)
- AK0 (base mount)

### Digits

- 4 = 4 digits
- 5 = 5 digits
- 7 = 7 digits

### Style

- .00 (AK0 only) = plastic case, display on narrow side, wire leads, base mount, magnifying lens
- .20 = plastic case, display on narrow side, wire leads, flush mount (snap in), magnifying lens
- .40 = sheet steel case, display on broad side, solder pins, PCB mount, magnifying lens
- .50 = sheet steel case, display on narrow side, solder pins, PCB mount, magnifying lens
- .60 = sheet steel case, display on broad side, solder pins, PCB mount, flat lens
- .70 = sheet steel case, display on narrow side, solder pins, PCB mount, flat lens
- .80 = plastic case, display on narrow side, solder pins, PCB mount, magnifying lens
- .90 = plastic case, display on broad side, solder pins, PCB mount (wash proof), magnifying lens
- .92 = plastic case, display on narrow side, solder pins, PCB mount (wash proof), magnifying lens

### Options

- .35 = flat pins with .02" x .11" push on connectors (.20 Mount Style Only)

### Voltage

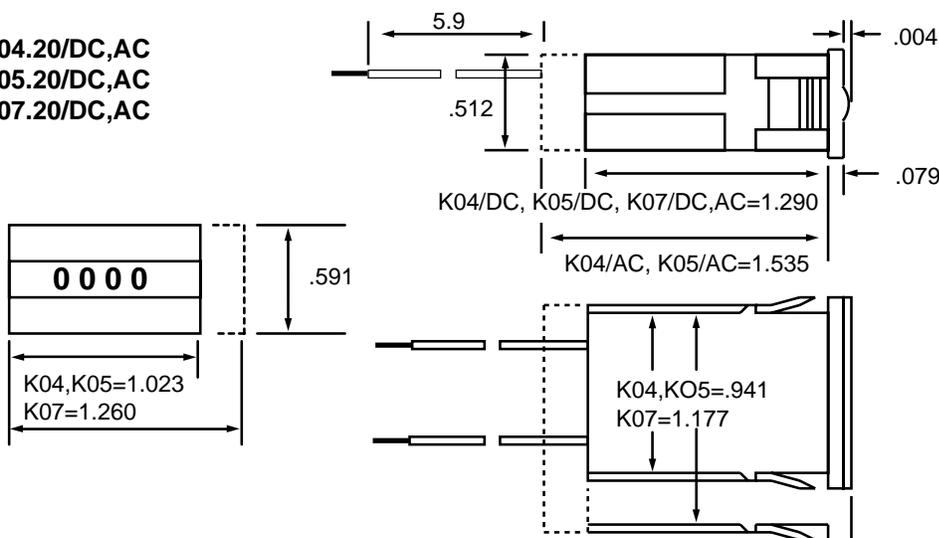
- 3, 5, 12, 24 VDC ± 10%
- 24, 110, 220 VAC ± 10%
- (Other voltages available, Consult factory)

### Special Options (add to end of part number)

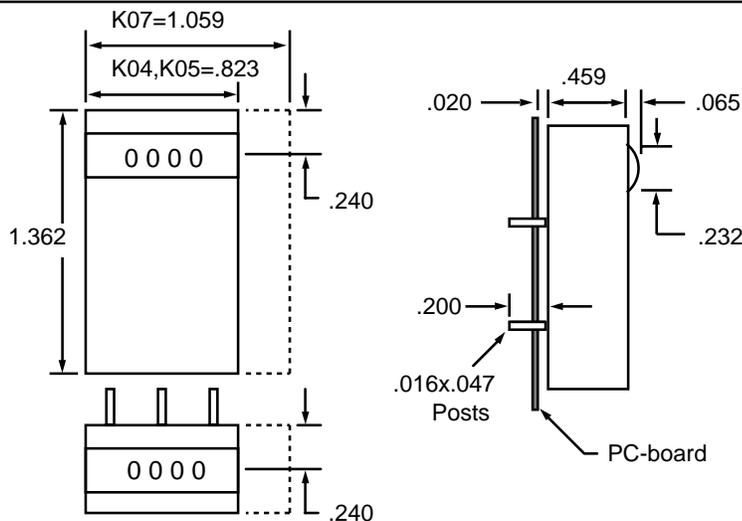
- 0 = Low power DC versions (30mW), 10CPS
- ET= Extended Temperature -30°C to +85°C

**Dimensional Diagrams:**

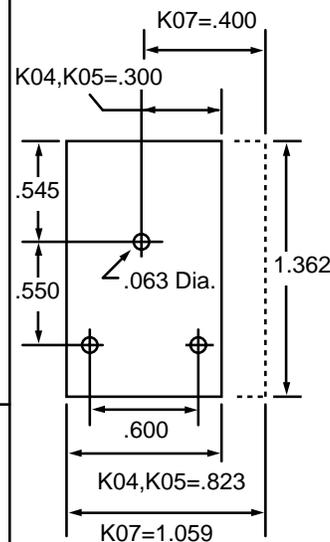
**K04.20/DC,AC  
K05.20/DC,AC  
K07.20/DC,AC**



**MAG. LENS  
K04.40/DC  
K05.40/DC  
K07.40/DC,AC**



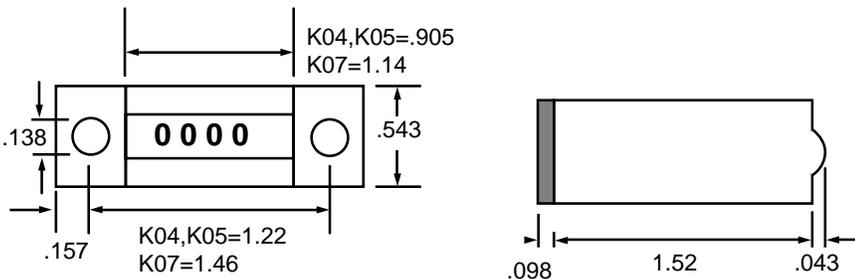
**Punching diagram for PCB  
(component side)**



**MAG. LENS  
K04.50/DC  
K05.50/DC  
K07.50/DC,AC**

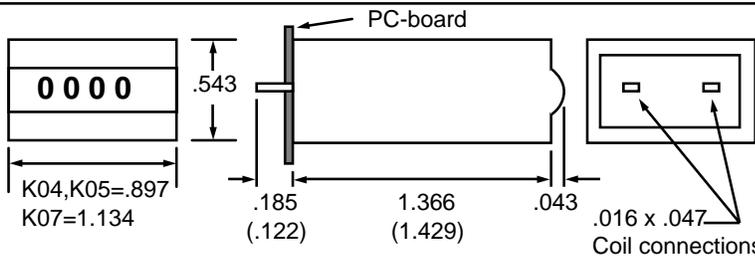
**FLAT LENS  
K04.70/DC  
K05.70/DC  
K07.70/DC,AC**

**AK04.00/DC  
AK05.00/DC  
AK07.00/DC,AC**

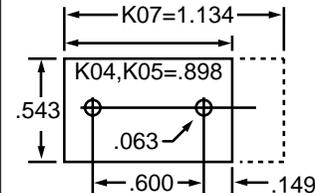


**K04.80/DC  
K05.80/DC  
K07.80/DC,AC**

**(K04.92/DC)  
(K05.92/DC)  
(K07.92/DC,AC)**



**Punching diagram for PCB  
(component side)**

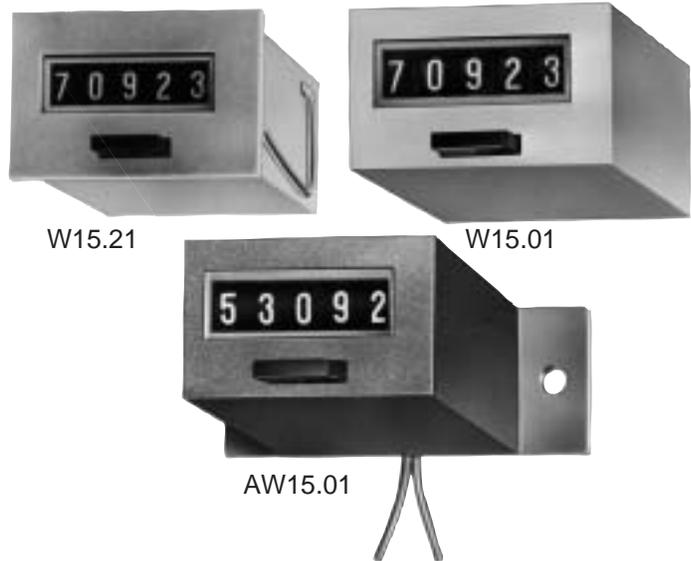


# W15 Series

## Low Cost, Reset Totalizer

### Features

- Super Low Power
- 5 Digits
- 3 Mounting Styles
- 2 Termination Types
- Resettable
- Optional Extended Temperatures
- Low Cost



### Applications:

W15 Series counters are well suited for battery operated traffic counters, vending machines, message accounting systems, and general event counting where a reset is required.

### Description:

The W15 Series 5 digit counters combine low 60mW power and reset capability in a small housing just .790" high and 1.22" wide. The proven armature phase system combined with an anti-shock/vibration driving system provides a high degree of counting accuracy. Wear-resistant plastic insures a high rate of maintenance free service life.

### Specifications:

**Digits:** Five 0.067" white on black.

**Weight:** 1.8 oz.

#### Operating Voltages:

3, 4, 6, 9, 12 VDC filtered  $\pm 5\%$

4, 6, 12, 24, 48, 110, 185 VDC  
unfiltered  $\pm 10\%$ .

12, 24, 48, 110, 220 VAC.

**Reset:** Manual, front push-button

**Count Speed:** 10 cps standard; 8 cps (low power-filtered)

**Max. on Time:** continuous

**Temperature:** +14°F to +122°F (-10°C to +50°C) standard.  
-22°F to +158°F (-30°C to +70 °C) optional.

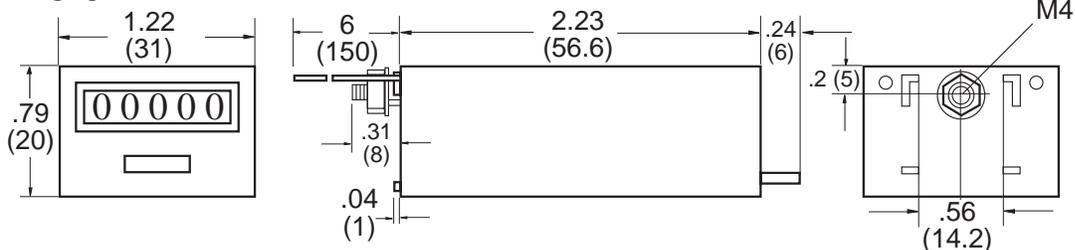
**Termination:** Wire leads 6" long or silver-plated pins 0.060" dia.

**Color of Housing:** Black

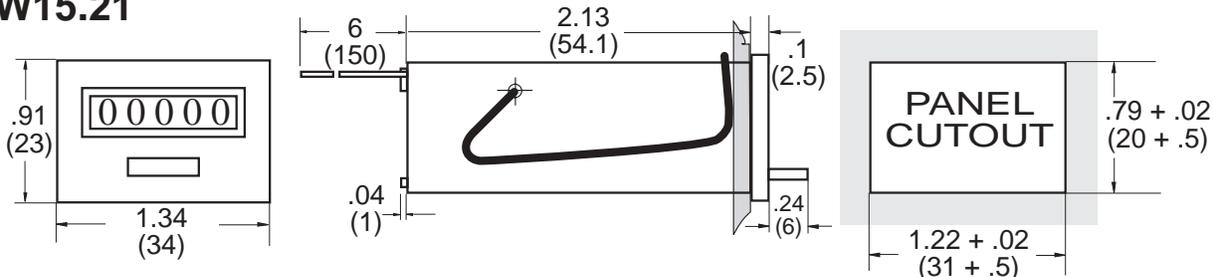
**Approvals:** CE Approved

Voltage	Model	Max. Pulse Speed	Pulse Duration Min.	Pulse Interval Min.	Power Consump. Approx.
VDC	Filtered	8	50 mS	75 mS	60 mW
VDC	Non-filtered	10	50 mS	50 mS	0.5W ( $\leq 110V$ ) 1W (185V)
VAC		10	50 mS	50 mS	0.75 VA ( $\leq 110V$ ) 1.5 VA (220V)

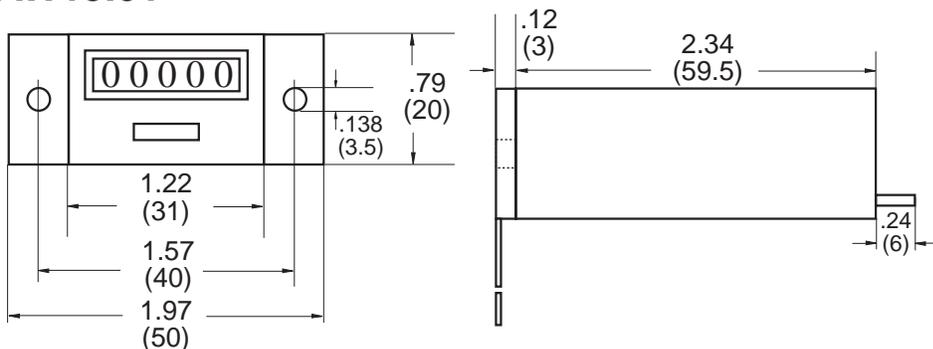
### W15.01



### W15.21



### AW15.01



#### How To Order:

**EXAMPLE: W15.01 .3 5VDC 10CPS**

Series	Termination	Operating Voltage	Count Speed	Options
W15.01 = Base mount W15.01 = Rear stud mount W15.21 = Spring clip mount	.3 = .060" (1.5mm) Solder pins (not available with AW type) .2 = Wire leads 6" long	DC: 3, 4, 6, 9, 12, 24, 110, 185 AC: 12, 24, 110, 220	8 CPS: 60 mW DC; available voltages 3, 4, 6, 9, 12 VDC 10 CPS: 500 mW DC; available voltages 4, 6, 12, 24, 110, 185 VDC 10 CPS: .75 VA; available voltages 12, 24, 110VAC; 1.5 VA, 220 VAC	Extended temperature: -22°F to +158°F (-30°C to +70°C) add prefix "HT" to part number

# B Series

## Industry Standard DIN Totalizing Counters

### Features

- 5 and 6 Digits with Reset
- 8 Digits Non-Reset
- Secret Rear Reset Option
- Reversed Colored Number Wheels
- UL Listed, CE Certified
- Low Cost



### Applications:

General purpose, high performance/low cost counter for monitoring manufacturing processes, flow totals, test cycles where accurate count must be displayed even when power is lost.

### Description:

This counter series utilizes an all plastic housing and frame to achieve lower cost without sacrificing quality. Count life is 200 million minimum with optional speeds to 50 counts per second possible. Spring clip or two screw mountings are standard. Plug-in and rear stud mounting available on special order.

### Specifications:

**Count Life:** 200 million.

**Numbers:** .160" (4mm) high.

**Housing:** Black plastic, 5, 6 or 8 digit,

**Connections:** .060" pins with push on connectors.

**Count Speed with DC:** 10, 25 count/sec. (optional 50 counts) per sec.

**Count Speed with AC:** 18 counts/sec.

**Impulse Ratio:** 60% on time, 40% off time (Min.).

#### Operating Voltage:

6, 12, 24, 48, 110, 220 VDC;

24, 48, 110, 220 VAC

**Operating Temperatures:** +23°F to +104°F (-5°C to +40°C);

**Shock:** Unit meets IEC 068-2-27 for Shock Stability

**Vibration:** Unit meets IEC 068-2-6 for Vibration

**Approvals:** UL# E60420, CE Approved

**Weight:** 3 oz.

**Max. Count Time:** Continuous 50/50 or 60/40, on/off.

### Count Input:

Voltage	Count Per Sec.	Time In Millisec On	Time In Millisec Off	Pulse Ratio	Power Consumption	
					Count	Reset
DC	5	120	80	3:2	85 mW	N/A
	10	60	40	3:2	1 W	
	25	24	16	3:2	2 W	
AC	18	27	27	1:1	2.9 VA	N/A

### How To Order:

**EXAMPLE:** B 16 1 1 24VDC 25CPS

<b>Series</b> _____					
B					
<b>Digits</b> _____					
15 = 5 digits					
16 = 6 digits					
18 = 8 digits					
<b>Mounting</b> _____					
0 = Non flange (for F1)					
1 = Screw panel					
2 = Spring clip					
3 = Large screw panel					
<b>Reset</b> _____					
0 = Non-reset					
1 = Manual push button					
4 = Secret Reset					
<b>Voltages (specify)</b> _____					
6, 12, 24, 48, 110 and 220 VDC					
24, 48, 110 and 220 VAC					
<b>Count Speeds (specify)</b> _____					
5, 10, 25 CPS DC					
18 CPS AC					

### Available Options (add to end of part number)

K1B - Silicone cover #3 mount style

F1B Frame - with socket box 945.2

0 Mount only

945.2 - Socket box

F1DVS - Frame with locking cover & 945.2 socket box

F1DK - Frame with knob closure cover & 945.2 socket box

US - Key reset

LT - Low temperature (-22°F to +115°F)

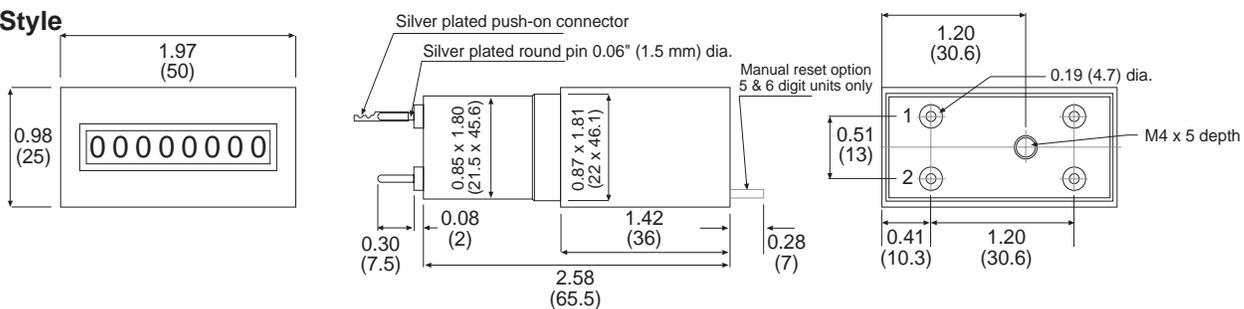
HT - High temperature (+14°F to +140°F)

50 counts per second (specify)

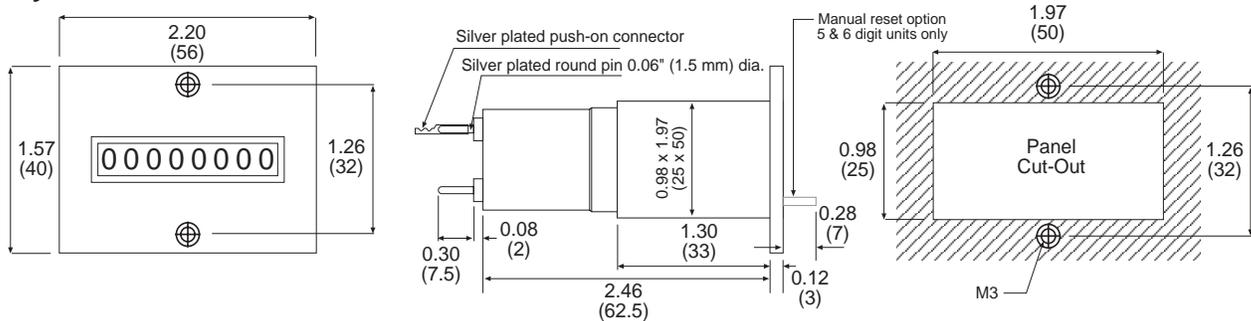
FL - 6" Wire Leads

N7 - Explosion proof housing (see accessories section)

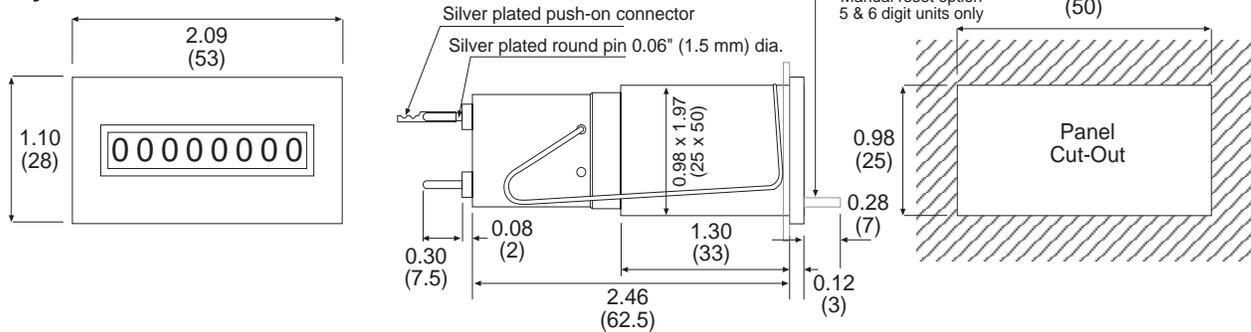
### 0 Mount Style



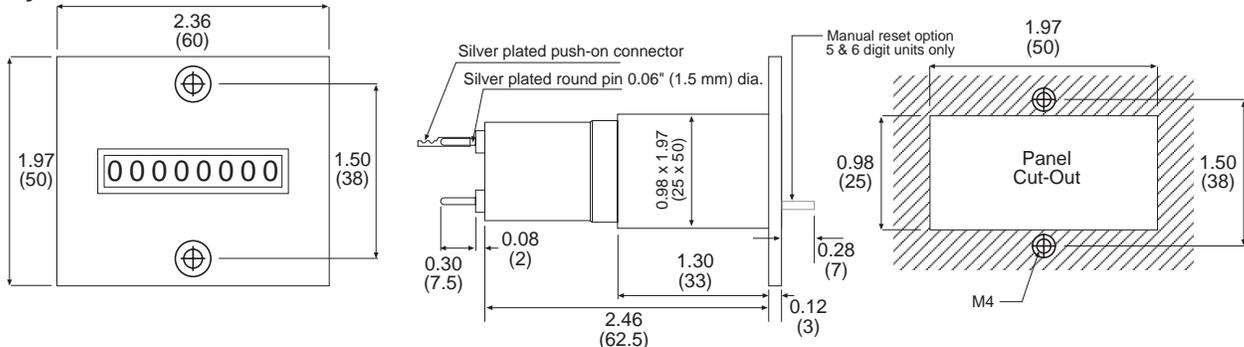
### 1 Mount Style



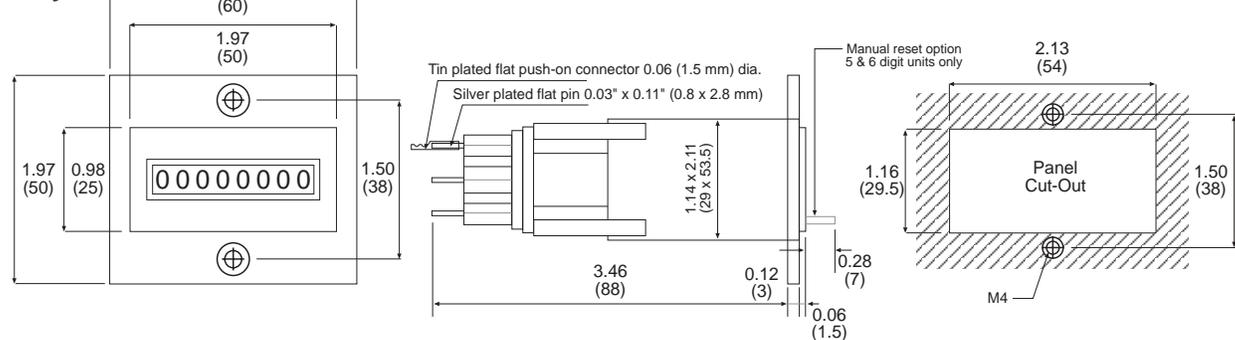
### 2 Mount Style



### 3 Mount Style



### F1B Mount Style



# MK16 - 18

## Electromechanical Totalizers 3, 4, 6 and 8 Digit

### Features

- UL Listed, CE Certified
- Rugged Case
- Varied Mounting Styles
- 3, 4 and 6 Digits with Manual & Electric Reset
- Many Standard Voltages
- 250 Million Count Life, Minimum
- Many Options Available



### Application:

Production counting, line counting (printers), events, fees, where count must be retained even if power is lost.

### Description:

MK counters combine extra long count life, 250 million minimum, and absolute accuracy even with 10% voltage variation. Varied mounting styles. The spring clip mount gives the user a clean uncluttered panel. Installation is expedited by 0.020" x 0.11" quick push on connectors.

### Count Input:

Voltage	Count Per Sec.	Time In Millisec On	Time In Millisec Off	Pulse Ratio	Power Consumption	
					Count	Reset
DC	10	50	50	1:1	1.2 W	9 W
	25	24	16	3:2	2 W	
	35	17	11	3:2	5.5 W	
AC	10	50	50	1:1	3 VA	14 VA
	18	27	27	1:1	3 VA	

### Specifications:

**Display:** 6 digit with manual or electric reset; 8 Digit without reset

**Digits:** .160" white on black wheels.

### Operating Voltages:

5, 6, 12, 24, 48, 110, 220 VDC;  
12, 24, 48, 110, 220 VAC

**Count Speed:** 10, 25, 35 CPS standard VDC (40 or 50 CPS optional, see OPTIONS); 10, 18 CPS standard VAC only.

**Temperature:** +14°F to +114°F (-10°C to +45°C) standard

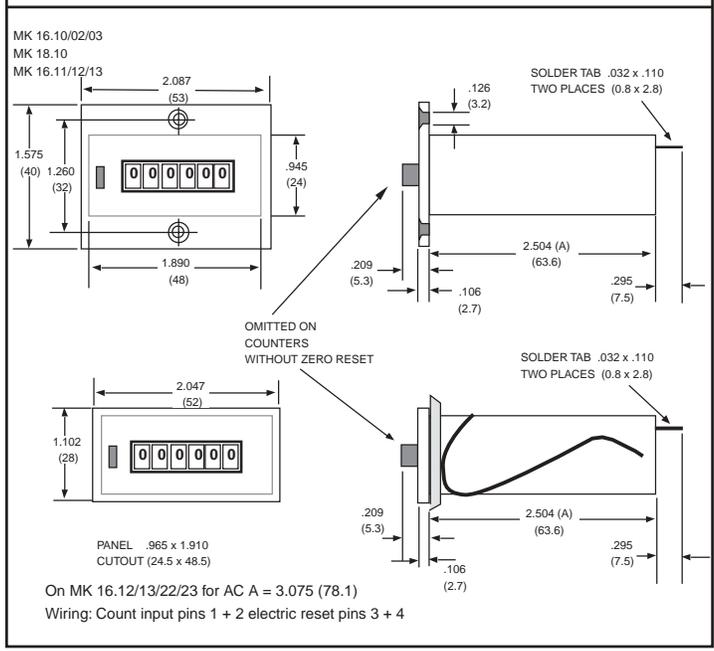
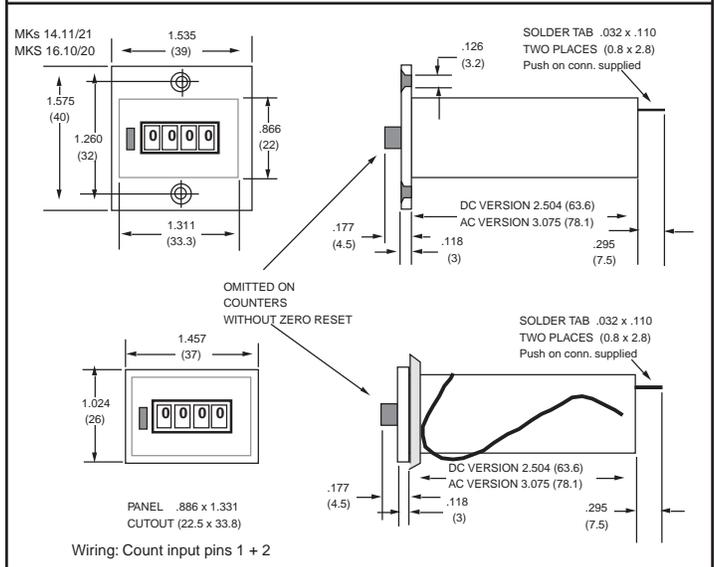
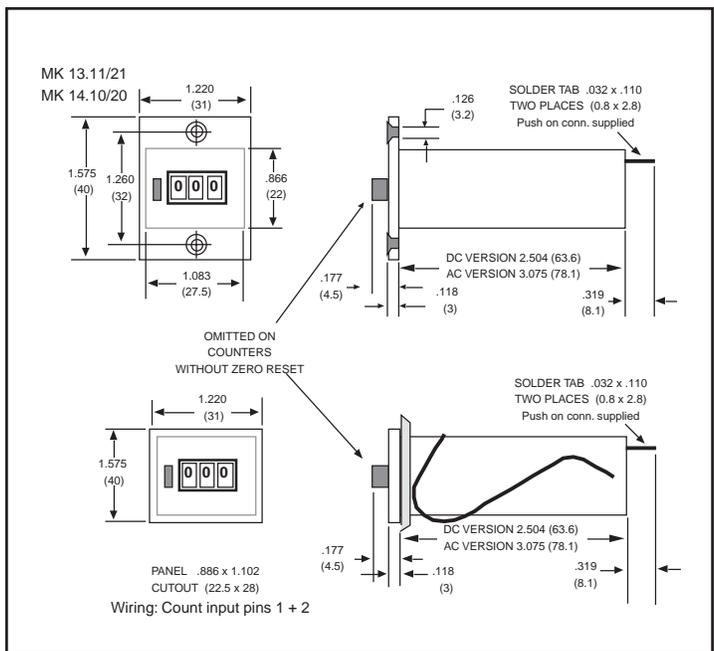
**Housing:** UL Listed, rugged, black, polycarbonate

**Termination:** Terminal pins 0.110" x 0.032 connectors supplied

**Weight:** 3 ounces

**Max. Count Time:** Continuous, 50/50 or 60/40 on/off pulse ratio.

**Approvals:** UL File#: E60420, CE Approved



**How To Order**

**EXAMPLE: MK16 1 2 24 VDC 25 CPS**

**Series** \_\_\_\_\_

MKS14 = 4 digits non reset (1.09" wide cut out)  
 MK14 = 4 digits with reset (1.32" wide cut out)  
 MKS16 = 6 digits non reset (1.32" wide cut out)  
 MK16 = 6 digits with/without reset (1.89" wide cut out)  
 MK18 = 8 digits non reset (1.89" wide cut out)

**Mounting** \_\_\_\_\_

0 = Rear mount  
 1 = Screw panel  
 2 = Spring clip

**Reset** \_\_\_\_\_

0 = Non-reset  
 1 = Manual push button  
 2 = Electric (6 digit only)  
 3 = Both (6 digit only)

**Voltages (specify)** \_\_\_\_\_

5, 6, 12, 24, 48, 110 and 220 VDC  
 12, 24, 48, 110 and 220 VAC

**Count Speeds (specify)** \_\_\_\_\_

10, 25, 35 CPS DC  
 10, 18 CPS AC

**Available Options (add to end of part number)**

V - Manual reset guard (6 digit version)  
 US - Spade key reset (6 digit version)  
 SR - Secret reset (6 digit version)  
 SL - Manual subtract lever (one count per stroke)  
 ML - Magnifying lens  
 M - SPDT microswitch operated by manual or electric reset (MK16.11/M)  
 FL - 6" wire leads  
 LT - Low temperature (-22°F to +115°F)  
 HT - High temperature (+14°F to +140°F)  
 40 or 50 counts per second (DC only)  
 Counts by 2's or 5's  
 TB - Terminal block  
 Z - Mounting stud (rear)  
 Reverse Color Wheels-black on white, red on black  
 Special engraving - faceplate  
 K6 - Flexible silicone cover for #2 mount style  
 A - Base mount ex: AMK 16.01  
 K4 - Silicone Cover (mK14.21)

**ENCLOSURES:**

N7 - Explosion proof (see accessories section)  
 N12 - Oil and dust proof  
 N4 - Weather and water proof  
 Add "R" for external Reset Button  
 (Unit must be ordered with Electric Reset)

# KAL-DIN

*Miniature, Low Cost, LCD,  
Electronic Counter*

## Features

- UL, CSA Listed, CE Certified
- 8 Digits Standard
- Meets NEMA 4X and IP65 Ratings
- Long Life Lithium Battery
- 10 kHz Count Speed
- Plug-on Adapter with Terminal Block and AC Pulsing
- Slow Speed Input for Contact Closures
- High Speed Input for Sinking Inputs from a Max. of 18VDC Without Module

## Description:

These are small, lithium battery powered, totalizing counters that are panel mounted. The counters are designed as replacements for standard electro-mechanical counters. They use the latest custom CMOS technology and incorporate an 8 digit, 0.276" high, LCD display.

The KAL-DIN operates from a long life lithium battery (life 10 years) and can be operated from contact closure or high speed electronic devices. No separate alkaline batteries are required. The front reset button can be disabled if desired.

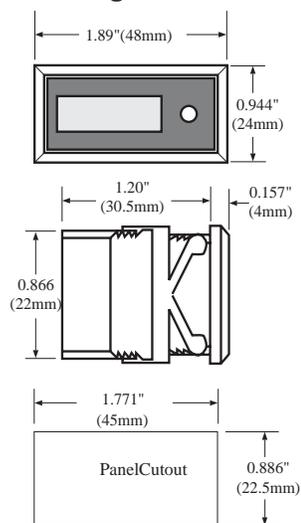
Connections are via .025" (6.35mm) square posts. Push on connector with 9" (229mm) leads are supplied with unit.

When installed, with the gasket provided, the unit meets NEMA 4X/IP65 ratings from the front.

Use the KAL-DAC/DC adaptor to pulse from 5 to 240 volts AC or DC.

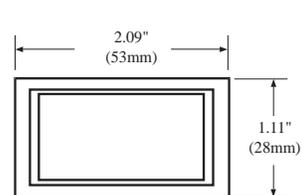
Use the KAL-DTB adaptor for screw terminals.

## Mounting:

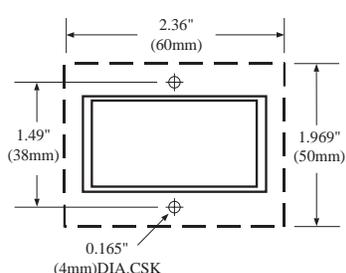


## Adaptors (included)

### KAL-DP1X2



### KAL-DP1



## Specifications:

**Power:** Internal lithium battery

**Display:** 8 digit black LCD, Digit size 0.276" (7mm) high

**Reset:** Panel or remote

**Temperature Range:** 14 to 140°F (-10 to 60°C)

**Signal Input:**

**Common (Pin 1)**

**Manual Reset Enable (Pin 2)**

Link to Common to enable front panel reset key

**External Reset (Pin 3)**

Contact closure/open collector neg. edge triggered, 0.7V threshold, minimum pulse length 15mS.

**Slow Speed Count Input (Pin 4)**

Contact closure/open collector, minimum pulse length 15mS, 30Hz max. negative edge triggered,

Low: < 0.7V,

High: 3 to 18 V or open.

**High Speed Count Input (Pin 5)**

Open collector input, 10KHz max., min. pulse length 50µS. negative edge triggered,

Low: < 0.7V,

High: 3 to 18 V or open.

TTL/CMOS compatible.

**Approvals:** UL File: E135458, CSA File: LR9602, CE Approved

**Material:** ABS Plastic.

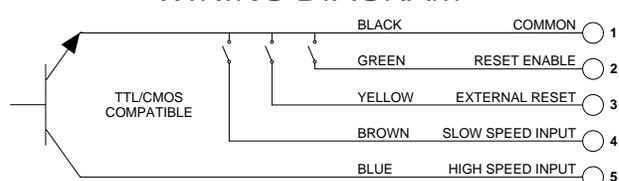
**Battery Life:** 10 years (calculated)

**Connection:** 5 pin, plug in connector with 9" (229mm) leads supplied with counter.

**Sealing:** Front Panel (without adaptors) sealed to NEMA 4X/IP65 when used with clip mount and gasket provided.

**Mounting Adaptors:** KAL-DP1x2 for 1" x 2" cutout and KAL-DP1 for screw mount are supplied.

## WIRING DIAGRAM



**TERMINAL BLOCK MODULE**

**Description -- KAL-D TB**

(For screw terminal connection with standard pulse characteristics)

Pin numbers shown on terminal block correspond to wire lead numbers.

Two Pins #1 are internally connected.

**DO NOT CONNECT KAL-D TB TO AC VOLTAGE**

**5-240 VOLT INPUT MODULES**

**Description -- KAL-D AC/DC (Counter)  
KAL-DTIME AC/DC (Timer)**

The KALD AC/DC Module enables the KALD to accept 5-240 VAC/DC input signals. (The KAL-DTime AC/DC is used for the KAL-DTIME series). The module snaps into the back of the counter. The circuitry allows various voltage pulses to be used for counting and provides opto-isolation of 2500V.

**KAL-D AC/DC (Counter)  
SPECIFICATIONS:**

**Signal Inputs:**

18 Hz max. (15 msec. pulse width min.)

5 to 48 VAC/DC

Low: < 1.5 VAC/DC or open

High: 5 to 55 VAC/DC

48 to 240 VAC/DC

Low: <15 VAC/DC or open

High: 48 to 264 VAC/DC

**Input Impedance:**

5 to 48 VAC/DC - 10K ohms

48 to 240 VAC/DC - 58.5K ohms

**Reset:**

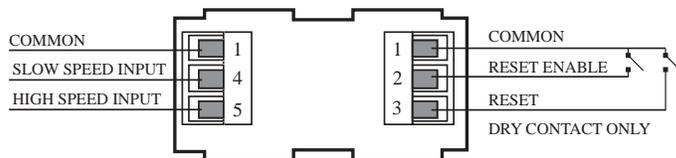
Dry contact closure only.

15msec. min. pulse.

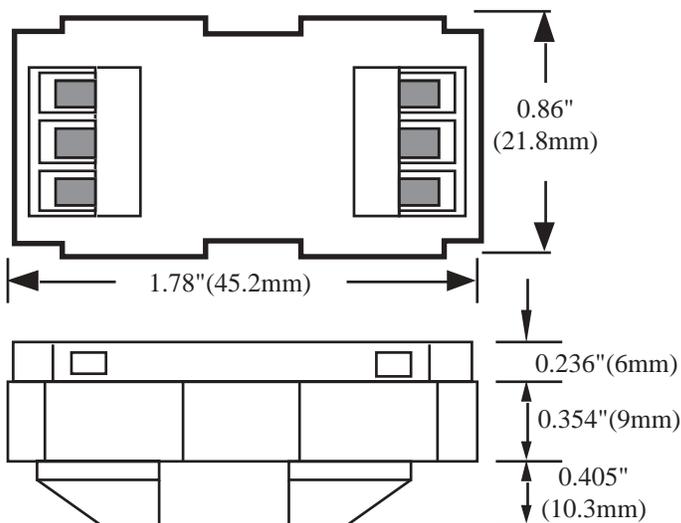
**Temperature Range:**

Same as KAL-D series

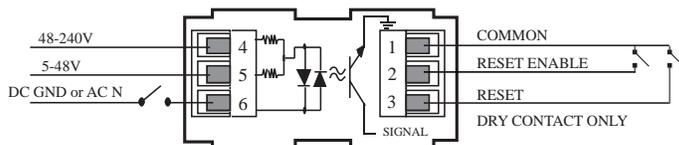
**Terminal Block (TB) Adaptor Connections**



**Dimensions for AC/DC Adaptor and Terminal Block**



**AC/DC Adaptor Connections**



**NOTE:**

Jumper terminal 5 to terminal 6 to raise the low threshold to 25V for triac inputs or when low voltage does not reach 0V. Connect input to terminals 4 & 6.

It may be necessary to place a 10 kΩ 7W resistor across terminals 4 & 6 to bring voltage below 25V.

**How To Order:**

- KAL-D ..... 8 digit counter with 10 yr battery
- KAL-DAC/DC ..... 5-240V AC/DC input module
- KAL -DTB ..... Terminal block adaptor

**Accessories**

- N7 - Explosion proof housing (see accessories section)
- E200 - Outdoor Enclosure (see accessories section)

# KAL-DIN AS

COUNTERS

## Features

- UL, CSA Listed, CE Certified
- 8 Digits Standard
- Meets NEMA 4X and IP65 Ratings
- Long Life Lithium Battery (10 years)
- 10 kHz Count Speed
- Add and Subtract Counter

## Description:

The KAL-DAS is a small add-subtract counter suitable for panel mounting and is powered by an internal lithium battery with an operating expectancy of 10 years. The counter is designed as a replacement for standard electro-mechanical counters. It has a front panel reset button which, for security, is enabled by an external connection to the rear of the unit. Based on the latest CMOS technology, these units incorporate an 8 digit, 0.276" character height, high contrast, LCD display.

The KAL-DAS will add and subtract pulses at count frequencies up to 10 kHz displaying 99999999 when it counts below 0. No separate alkaline batteries are required.

Connections are via .025 inch square posts (push on connector with 9" leads supplied with units).

When installed, with the gasket provided, the unit meets NEMA 4X/IP65 ratings from the front.

## Specifications:

**Power:** Internal lithium battery

**Display:** 8 digit black LCD, Digit size 0.276" high

**Reset:** Panel or remote

**Temperature Range:** +14 to 140°F (-10 to 60°C)

## Signal Input:

COMMON (Pin 1)

RESET ENABLE (Pin 2)- Link to COMMON to enable front panel reset key.

## Miniature, Low Cost Add-Subtract Counter



EXTERNAL RESET (PIN 3)-external via dry contact or open collector, negative edge triggered, 0.7 V threshold. Minimum pulse 15 mS.

DIRECTION INPUT (Pin 4)-Electronic input, TTL/CMOS compatible.

Add: open or 3-18 VDC

Sub: Contact to Pin 1 or <0.7V

Direction level must precede count input by 5µs for valid operation.

COUNT INPUT (Pin 5)-Electronic input, 10KHz max., negative edge triggered,

Low: < 0.7V,

High: 3 to 18 V or open.

ON/OFF pulse 50µS TTL and CMOS compatible (18 V max.)

NOTE: All inputs have Schmitt characteristics.

**Approvals:** UL File: E135458, CSA File: LR96702, CE Approved

**Material:** ABS

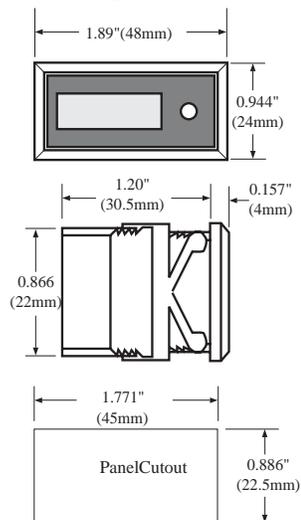
**Weight:** 1.7 oz.

**Battery Life:** 10 years (calculated)

**Connection:** 5 pin, plug in connector with 9" leads supplied with counter.

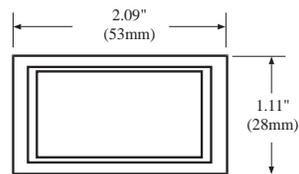
**Sealing:** Front Panel sealed to NEMA 4X/IP65

## Mounting:

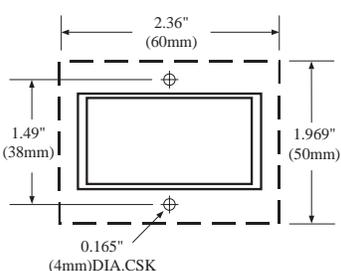


## Adaptors (included)

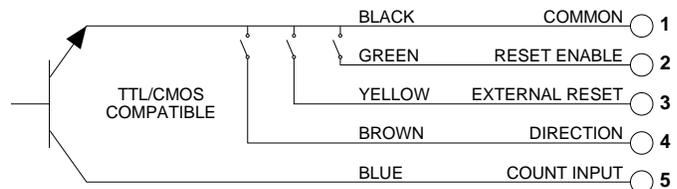
### KAL-DP1X2



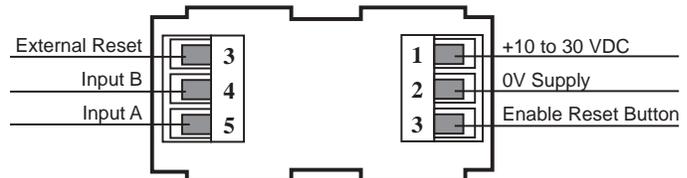
### KAL-DP1



## KAL-DAS WIRING DIAGRAM



## KAL-DQUAD WIRING DIAGRAM



## How To Order:

KAL-DAS ..... 8 digit add/subtract counter

KAL-DTB ..... Snap-on terminal block adaptor

KAL-DQUAD ..... Snap-on quadrature input adaptor

## Accessories

N7 - Explosion proof housing (see accessories section)

E200 - Outdoor Enclosure (see accessories section)

# 130K-133K

## Battery Powered Counters with LCD Display

### Features

- Low price and high efficiency
- Large (8 mm) 8-digit LCD display,
- Optional backlighting
- Various counting modes: up /down, differential, quadrature and pulse doubling
- High voltage input for 10 to 260 V AC/DC voltage pulses
- NEMA4/IP65 Front Panel
- Screw terminals, RM 5 mm
- Lifetime of the battery approximately 8 years
- Locking of the reset key
- Operating temperature –10 to +60 °C



- All versions for positive or negative counting edge
- Debounce filter function for counting with mechanical contacts.

### Technical data

**Power supply:** non-replaceable lithium battery (lifetime approximately 8 years at 20°C)

**Backlighting:** external electrical source 24 V DC +/-20 %, 50 mA

**Display:** LCD, 8 decades, 8 mm high characters

**Mode:**  
a. adding or subtracting (selectable)  
b. counting direction  
c. differential counting  
d. phase discriminator

**Display range:** –9999999 to 99999999, with overflow display

**Reset:** manual and electrical

#### Counting inputs:

##### A. Standard DC Input (max. 30 V DC)

**Slow counting input:** max. 30 Hz NPN

**Fast counting input:** max. 12 kHz (PNP), 7 kHz (NPN)

##### Switching level:

NPN: Low: 0 to 0.7 V, High: 3 to 30 V DC

PNP: Low: 0 to 0.7 V, High: 4 to 30 V DC

##### B. High Voltage Input (10 to 260 V DC/AC)

**Counting input:** Optocoupler input, max. 30 Hz

**Min. pulse time:** 16 ms

**Switching level:** Low: 0 to 2 V DC/AC, High: 10 to 260 V DC/AC

##### C. Counting direction switching (only DC-version)

**Mode :** see order table

##### Contact input:

Open Collector NPN (switching at 0 V DC)

##### Switching level:

NPN: Low: 0 to 0.7 V, High: 3 to 5 V DC

##### D. Reset Input (only DC and high voltage)

###### Minimum pulse time:

DC: 50 ms, high voltage: 16 ms

###### Contact input DC\*:

NPN: Low: 0 to 0.7 V, High: 3 to 30 V DC

###### High voltage input: 10 to 260 V DC/AC

##### E. Electrical reset key locking (for DC and AC)

###### Contact input:

Open Collector NPN (switching at 0 V)

###### Switching level:

NPN: Low: 0 to 0.7 V, High: 3 to 5 V DC

##### Interference emissions:

EN 55011 Class B, EN 61000-6-2 EN 61010 Section 1 (only AC versions)

**Housing:** dark grey RAL 7021

##### Operating temperature:

–10 to +55 °C

##### Ambient temperature:

–10 to +60 °C

##### Storage temperature:

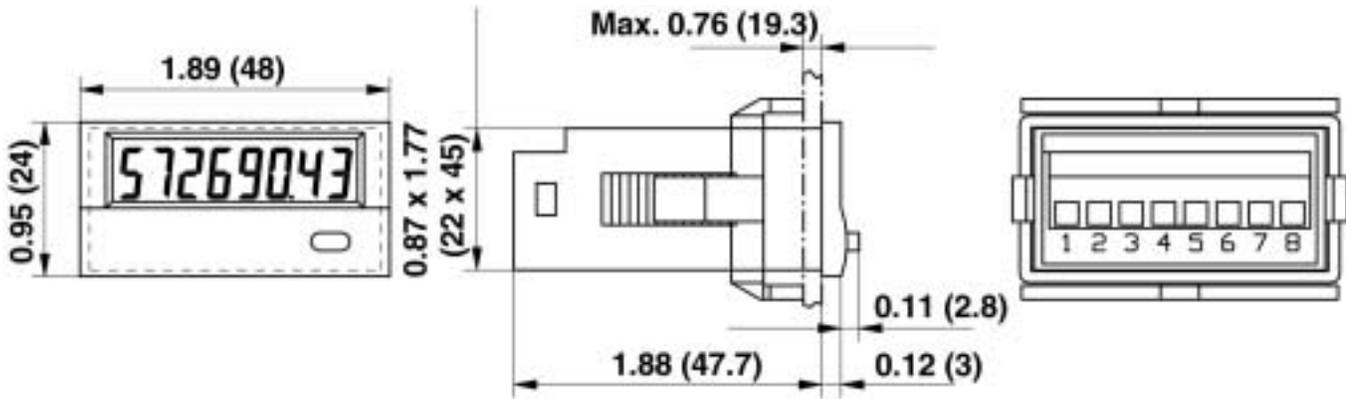
–20 to +70 °C

**Protection:** NEMA4/IP65 front

**Weight:** approximately 50 g

\* and high voltage on 131K and 132K

**Dimensions:**



**Order Table**

Type	Input type	Counting inputs							
		INP A				INP B			
130K.012.8x0	Count <sup>1)</sup>	0 ... 0,7 V DC	count	NPN	7 kHz	0 ... 0,7 V DC	count	NPN	30 Hz
130K.012.8x2		4 ... 30 V DC	count	PNP	12 kHz	0 ... 0,7 V DC	count	NPN	
130K.012.8x3		10 ... 260 V AC/DC	count	AC/DC	30 Hz	10 ... 260 V AC/DC	reset	AC/DC	—
131K.012.8x0	Cnt.Dir <sup>2)</sup> /Up.Dn <sup>3)</sup>	0 ... 0,7 V DC	count	NPN	7 kHz	0 ... 0,7 V DC	count/direction	NPN	7 kHz
131K.012.8x1		4 ... 30 V DC	count	PNP	12 kHz	4 ... 30 V DC	count/direction	PNP	12 kHz
131K.012.8x3	Up.Dn <sup>3)</sup>	10 ... 260 V AC/DC	count	AC/DC	30 Hz	10 ... 260 V AC/DC	count	AC/DC	30 Hz
132K.012.8x3	Cnt.Dir <sup>2)</sup>	10 ... 260 V AC/DC	direction	AC/DC	30 Hz	10 ... 260 V AC/DC	count	AC/DC	30 Hz
133K.012.8x0	Quad <sup>4)</sup> /Quad2 <sup>5)</sup>	0 ... 0,7 V DC	channel A	NPN	3 kHz	0 ... 0,7 V DC	channel B	NPN	3 kHz
133K.012.8x1		4 ... 30 V DC	channel A	PNP	6 kHz	4 ... 30 V DC	channel B	PNP	6 kHz

X: 5 = no backlight  
X: 6 = with backlight

1): one-channel, adding or subtracting counting  
2): counting input with counting direction input  
3): one adding and one subtracting counting input (differential mode)

4): Phase discriminator for incremental encoders with single processing  
5): Phase discriminator for incremental encoders with double processing

**Accessories:**

N7 - Explosion proof housing (see accessories section)  
E200 - Outdoor Enclosure (see accessories section)

# MICRO-KAL

## Miniature, LCD, Self Powered Electronic Totalizer

**Features**

- Self Powered (3.5 years)
- 4 Digits, 0.24" Character Height
- High Contrast LCD Display
- Simple to Install
- Integral De-bounce Circuitry



**Applications:**

- ☛ Applications where no power is available
- ☛ Amusement machines
- ☛ Portable equipment
- ☛ Dispensing machines
- ☛ Luggage lockers
- ☛ Copiers and printers
- ☛ Ticket machines
- ☛ Utility meters

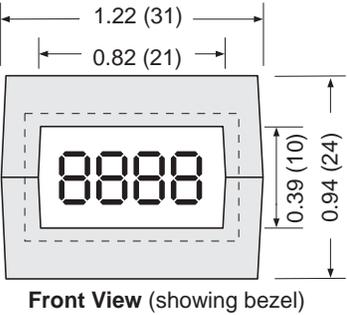
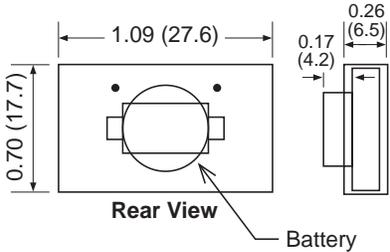
**Description:**

The Micro-KAL1 features flying leads for remote contact closure input. The Micro-KAL1 increments the count when the contact is open. It may be panel mounted with the optional bezels supplied.

**Specifications:**

- Supply Voltage:** 1.5V button cell type 386 or SR43.
- Expected battery life:** 3-4 years at 68° F (20° C).
- Display:** 4 digit black LCD, .24" (6mm) characters.
- Count range:** 9999 display rollover to 0.
- Count input:** 18 Hz maximum, contact closure. Operates on contact opening.
- Reset:** Reset to zero on insertion of battery.
- Operating temperature:** 32° to 122° F (0° C to +50° C).
- Storage temperature:** 32° to 140° F (0° C to +60° C).
- Material:** Clear poly-carbonate, black ABS bezel.
- Environmental protection:** IP40/DIN40050.
- Weight:** .26 ounces (7.5 grams).
- Lead length:** 9.45" (240mm).
- Approvals:** CE Compliant

**Dimensions:**



**How To Order:**

Micro-KAL1 ..... Totalizer with flying leads

# MINI-KAL

## Features

- UL, CSA Listed, CE Certified
- 6 and 8 Digit models
- PC Board Mountable
- Low Power Consumption
- 10 kHz Count Speed
- Easily Integrated Into OEM Systems
- Add-Subtract (AS Version)

### MINI-KAL1

#### MINI-KAL1AS

##### Description:

The MINI-KAL series of small, easy-to-mount LCD counters can be mounted directly to a PC board, or, with SLIM-KAL, through two screw holes in a panel. They are useful for counting applications where space is tight, and where OEM instrument makers want a pre-designed counter.

The MINI-KAL is a PC board mountable, 6 digit counter which counts up to 10 kHz, and consumes less than 15  $\mu$ A of current. Connections are via four pins on 0.1 inch centers.

The MINI-KAL-DAS is a small 6-digit electronic add/subtract totalizing counter, based on the latest CMOS technology and incorporates a 6-digit 6mm character height, high contrast LCD display.

The MINI-KAL-DAS has been specifically designed to use minimal power—quiescent current less than 5 microamps making the unit ideally suited in low power battery applications. The counter will add and subtract count pulses at input frequencies up to 10 kHz making the unit suitable for use in position, length and distance measuring applications.

### MINI-KAL 1

#### Specifications:

**Voltage:** 3 VDC ( $\pm$  0.6V)

**Current:** 15  $\mu$ A

**Display:** 6 digit, LCD, 0.2" high

#### Temperature Range:

Operating: +14 to 122°F (-10 to 50°C)

Storage: -14 to 140°F (-20 to 60°C)

#### Signal Inputs:

COUNT INPUT: Electronic 10 kHz max. (min. on/off 50 $\mu$ sec)  
Negative edge triggered, 0.7 V threshold. Max. input 24 VDC

RESET: Electronic Negative edge triggered 0.7 V threshold. (min. on/off pulse 20 mS)

**Material:** Clear polycarbonate

**Weight:** 0.25 oz.

## Miniature, Low Cost Electronic Counter



### MINI-KAL1AS

#### Specifications:

**Voltage:** 3VDC  $\pm$  0.4V (VDD)

**Current:** 5 $\mu$ A typical

10 $\mu$ A maximum at 10 kHz

**Display:** 6 digit 0.2" character height black LCD

#### Temperature Range:

Same as MINI-KAL1

#### Signal Inputs:

COUNT INPUT: Electronic 10 kHz max. (min. on/off 50 $\mu$ sec) Negative edge triggered, 0.7V threshold, TTL/CMOS compatible.

DIRECTION: Electronic input, TTL/CMOS compatible.

Add—logic 1 (VDD)

Subtract -logic 0 (0 to 0.7 V)

RESET: Negative edge triggered 0.7V threshold, minimum pulse length 50  $\mu$ S.

**Material:** Clear PETP

**Weight:** 3 oz. (75 grams)

**Sealing:** IP40/DIN40050

**Dimensions:** 27x175x65 mm

### MINI-KAL2AS

#### Description:

The MINI-KAL2 AS add/subtract totalizing counters operate from an external 3VDC supply and feature an 8 digit high contrast LCD display with a character height of .315". The unit is suitable for PCB mounting and is available with or without the front panel reset button. Inputs are provided for count direction and external reset. The counter will add and subtract count pulses at input frequencies up to 10 kHz making it suitable for use in position length and distance measuring applications. With power consumption less than 10 $\mu$ A, typically 5 $\mu$ A, this unit is ideally suited in portable battery powered applications.

**MINI-KAL2AS**

**Specifications:**

**Voltage:** 3VDC  $\pm$  0.4V (VDD)

**Current:** 5 $\mu$ A typical, 10 $\mu$ A max. at 10 kHz

**Display:** 8 digit 8mm character height black LCD

**Temperature Range:**

Operating: +14 to 122°F (-10 to 50°C)

Storage: -14 to 140°F (-20 to 60°C)

**Signal Inputs:**

**COUNT INPUT:** Electronic input 10KHz max., negative edge triggered, 0.7V threshold, minimum pulse length 50  $\mu$ S, TTL/CMOS compatible.

**COUNT INPUT:** Contact closure/open collector input, 30 Hz max, negative edge triggered, 0.7V threshold, minimum pulse length 15 mS.

**DIRECTION:** TTL/CMOS compatible.

Add—logic 1 (VDD)

Subtract—logic 0 (0 to 0.7 V)

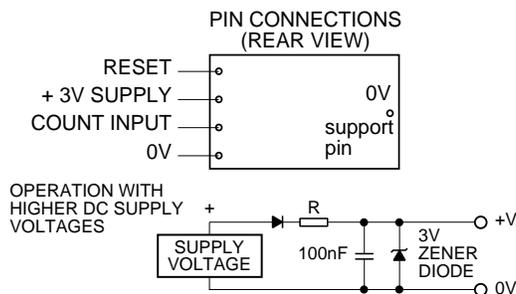
**EXTERNAL RESET:** Contact closure/open collector input, negative edge triggered, 0.7V threshold, minimum pulse length 15 mS.

**Connections:** 6 PCB mounting pins on a 0.1 inch pitch.

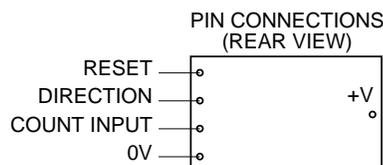
**Approvals:** UL File: E135458, CSA File: LR96702, CE Approved

**Wiring:**

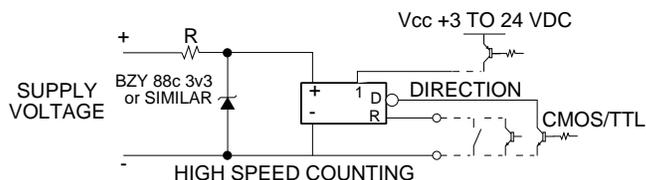
**MINI-KAL1 Hookup**



**MINI-KAL-DASHookup**

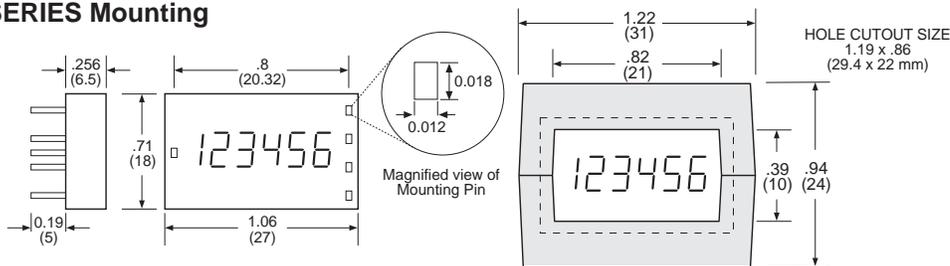


**MINI-KAL2AS Hookup**



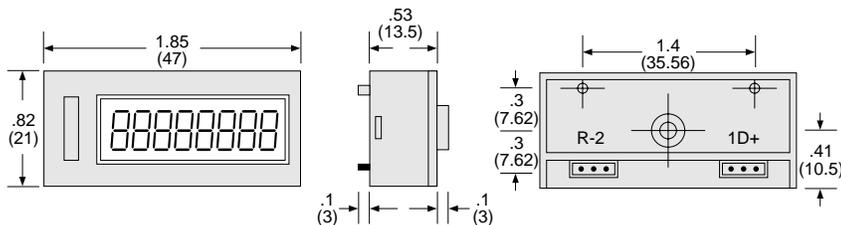
**Mounting:**

**MINI-KAL1 SERIES Mounting**



MINI-KAL1 SERIES with KALPM1 panel adaptor clips into panel .050 to .125 thick

**MINI-KAL2AS Mounting**



**How To Order:**

- MINI-KAL1 ..... 6 digit adding counter
- MINI-KAL1AS ..... 6 digit add/subtract counter
- KALPM1 ..... MINI-KAL panel mount adaptor
- MINI-KAL2AS ..... 8 digit add/subtract counter
- MINI-KAL2ASNR ..... Non-reset MINIKAL2AS (non-reset)

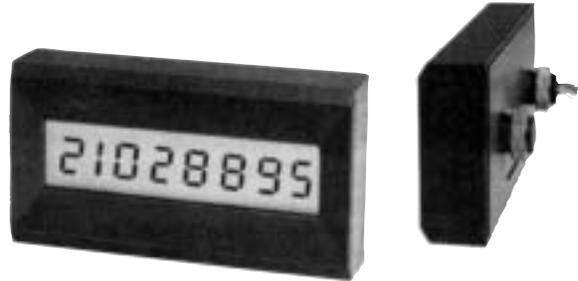
\* For no reset, add "NR" to part number

# SLIM-KAL

*Miniature, Low Cost Electronic Counter*

**Features**

- 8 Digit Display
- Panel Mount - Just 2 Screw Holes Needed
- Low Power Consumption
- Contact Closure/ NPN Transistor Input



**Description:**

This totalizing counter replaces mechanical counters. It offers high reliability, better readability, noiseless operation and easy, two-hole mounting.

The SLIM-KAL has two critical features. They are:

1. Easily mounted on a panel with only two screws.
2. Displays 8, very large digits.

**Specifications:**

**Power:** 6-110 VDC, 6-240 VAC

**Current:** 50  $\mu$ A-5VDC

**Display:** 8 digit, LCD, 0..472" (12 mm) high

**Temperature Range:**

Operating: +14 to 122°F (-10 to 50°C)

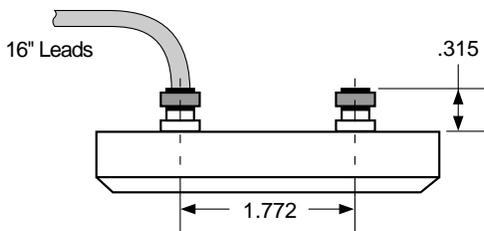
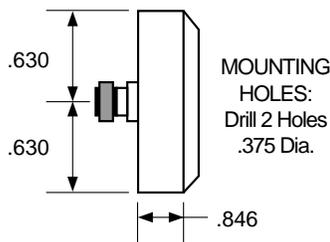
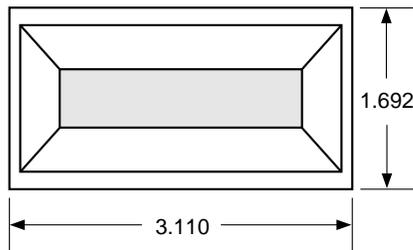
Storage: -14 to 140°F (-20 to 60°C)

**Input:** Contact closure and/or NPN transistor inputs for count and reset.

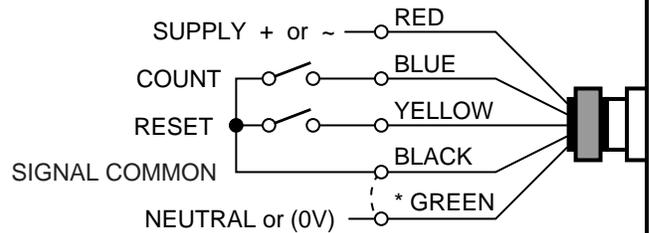
**Count Rate:** 30 Hz maximum speed

**Approvals:** CE Pending

**Dimensions—SLIM-KAL**

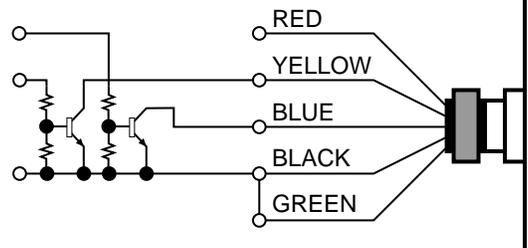


**Connection Details:**



\* Jumper Black to Green for voltages less than 48V DC or AC

**APPLICATION NOTE FOR LOGIC INTERFACE ONLY**



**How To Order:**

SLIM-KAL ..... 8 digit counter

# XL-10 Counter

## Electronic Totalizer

### Features

- 6 Digit Display
- 5-260 VDC or VAC Count Inputs
- Switch Closure Inputs
- 10 Year Battery Operation
- 2-Wire Hook-Up
- Backlit Display (optional)
- Decimal Point
- Heated (optional)



### Applications:

Perfect when a self-powered electronic LCD totalizer is needed. Applications include packaging machinery, flow totalization, production, test equipment, and any other requirement where continuous count display and simple hookup and installation are important.

### Description:

The XL-10 is a 6 digit liquid crystal display totalizing counter designed for use where older electro-mechanical counters have been the standard. It also is attractively priced for new applications requiring utmost reliability even during a power outage.

Packaged in a handsome black anodized extruded housing, the XL-10 features high contrast LCD digits 1/2" high designed for clear viewing at all angles in the brightest of light. The unit is powered by a lithium battery designed for 10 years of continuous use. A converter is available for back lighting in applications where ambient light is limited or night viewing required. In addition, the XL-10 can be ordered with a built-in heater for use in applications to -40° C. Standard operating temperatures are -20° to +55° C.

Two mounting styles, wire lead termination, and KEP support make the XL-10 the perfect electronic totalizer for a wide variety of applications where long life and reliability are key.

### Specifications:

**Count Speed:** 0 to 50 CPS.

#### Count Input:

**H:** High Impedance - Any AC or DC voltage between 12 and 260 Volts.

**L:** Low Voltage - Any AC or DC voltage between 5 and 11 Volts.

**C:** Contact Closure - For simple switch closure inputs.

#### Reset:

Standard: Push-button.

Optional: Key operated or Remote Reset via contact closure.

**No. of Digits:** 6 digit LCD.

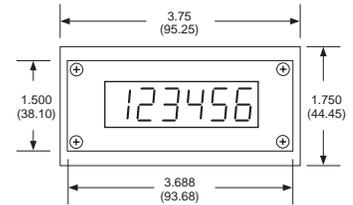
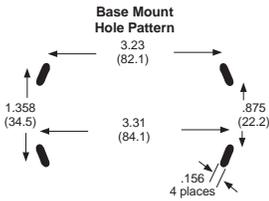
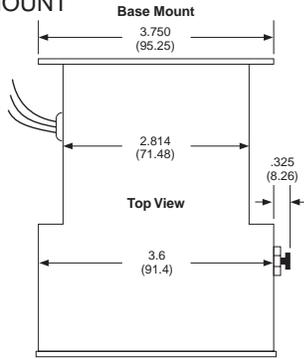
**Digit Size:** 1/2" high.

**Power Supply:** Built-in lithium battery designed for 10 year operation. No external power source required for applications to -20° C.

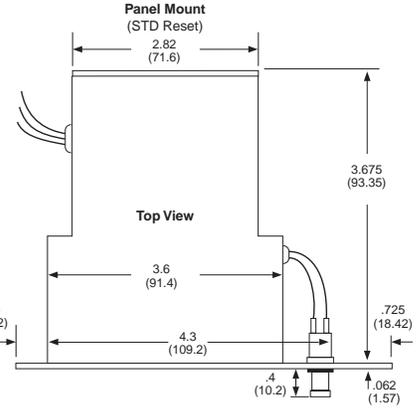
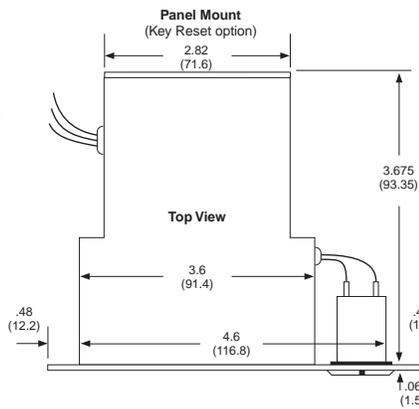
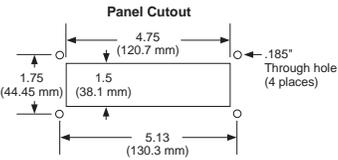
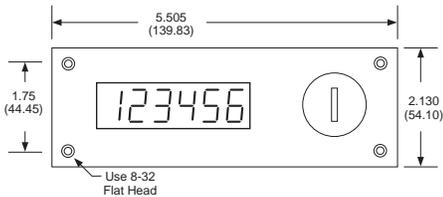
**Mounting:** Wall or panel.

**Termination:** 10" long color coded wire leads.

**BASE MOUNT**

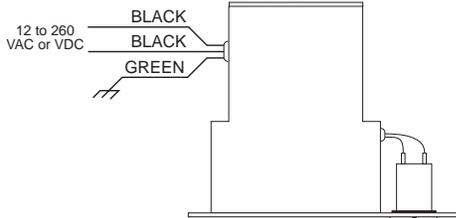


**PANEL MOUNT**

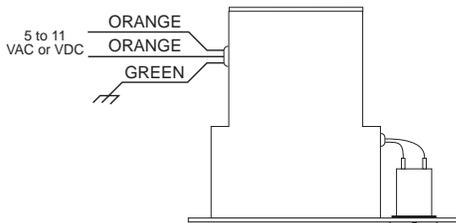


**Wiring:**

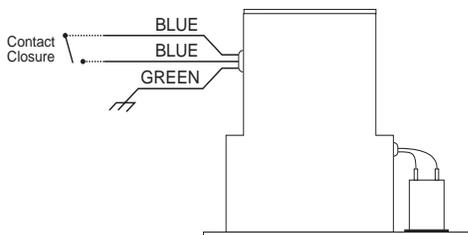
**Count Input H (High Impedance)**



**Count Input L (Low Voltage)**



**Count Input C (Contact Closure)**



**How To Order:**

**EXAMPLE: XL-10 P 1 H(12DC) 50CPS DP1 LT**

<b>Series</b>	XL-10
<b>Mounting</b>	P=Panel (reset on front) B=Base (reset on side)
<b>Reset</b>	1= Standard reset (see Mounting) 2= Keyswitch (panel mount only)
<b>Count Input</b>	H ( )=Pulse inputs, specify voltage, (AC or DC, 12-260 Volts) L ( )=Low voltage pulse inputs, (AC or DC, 5-11 Volts) C ( )=Simple switch closure
<b>Count Speed (Maximum)</b>	50 CPS=standard (for higher count speeds, consult factory)
<b>Decimal Points</b>	DPX=No decimal point DP1=xxxx.x DP2=xxxx.xx DP3=xxx.xxx DP4=xx.xxxx DP5=x.xxxxx
<b>Options</b>	BL= Back Lighting LT= Heated for low temp applications (requires ext. 12VDC) RR= Remote Reset

# K Series

## Miniature Electronic Counter

### Features

- Add and Subtract Counter
- Accepts Simultaneous Inputs
- Built-In Battery Backup
- 8 Digit LED Display
- Optically Isolated Inputs
- Accepts AC or DC pulses & Switch Closure Inputs
- 1" x 2" (25 x 50 mm) Standard Case Size



### Applications:

Ideal when small size and fast count speeds are needed. Uses include piece part totals, flow totalization and other OEM machinery needing a simple LED totalizer.

### Description:

The K series is a 4 or 8 digit totalizer electronic counter. Its unique count input accurately registers simultaneous overlapping pulses, is optically isolated, and accepts counts at speeds up to 100 kHz. Further, the K series has a "built-in" battery to protect against power failures, can be powered with DC voltage and pulsed with AC or DC voltages, and is built with CMOS L.S.I. circuitry. In addition, all K series 4 digit counters have open collector logic level zero output as an optional feature. The K series 5-30 VDC power, small size and standard built-in battery makes it the perfect counter for those demanding applications where good looks, long life, and a secure count are important.

### Specifications:

**Count Speed:** 0-100 kHz

**Reset:** Follows count input selected above, overrides count and triggers on leading edge.

**Number of Digits:** 8; at 99999999 all digits "roll" to zero for continued counting.

Digit Size .170" high standard.

**Power Supply:** 5-30 VDC regulated or unregulated.

**Current Consumption:** 80 milliamps with all 8 digits lit to number 8.

**Power Interruptions:** Built-in battery. Power may be interrupted for up to 1 week without loss of count. Counter may be stored for six months before 24 hours operation will be needed for battery recharge. While on standby, display blanks to conserve energy.

**Count Input:** Five inputs may be selected.

**SP:** Simultaneous Pulses - Positive going signals from 5 V to 30 VDC. Simultaneous overlapping add and subtract pulses are accurately registered to 15,000 counts per minute, 2 millisecond minimum pulse widths. 10 kOhm impedance.

**H:** High Impedance - 0-100 kHz non-simultaneous input operation standard. Separate add and subtract inputs or common data input together with up/down control line. Input impedance is 10 K ohm. Use with 715-1 shaft encoder.

**V:** AC Pulses - AC pulses 120 VAC. 50 counts per second. 75 K ohms impedance.

**O:** Optically Isolated - 1500 Hz maximum input

**S:** Up/Down Control - Use this with KEP encoder model 715-2. 5 VDC positive going pulses are fed into a single terminal. When held high, the up/down control line adds the incoming pulses to the total. When allowed to go low, the incoming pulses are subtracted from the total. 10 K ohm impedance.

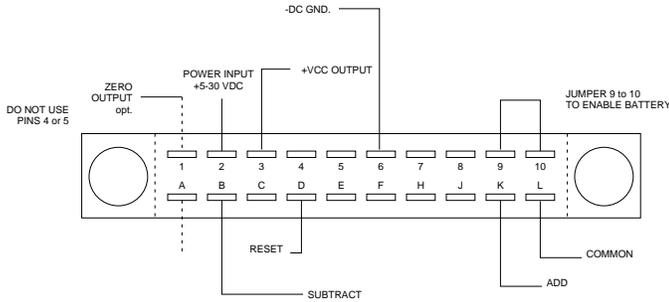
**Mounting:** Panel mounted or "spring clip".

**Termination:** Printed circuit board edge connector supplied-standard

**Zero Output:** Logic level zero output provides 300 milliamps of switching power whenever the counter passes through or idles at zero This option is available in 4 digit models only.

**Temperature:** +32°F (0°C) to +130°F (+54°C)

**HOOKUP**



**INPUT WIRING**

**SWITCH CLOSURE (Input H)**

- ADD K TO 2
- SUB B TO 2
- RES D TO 2

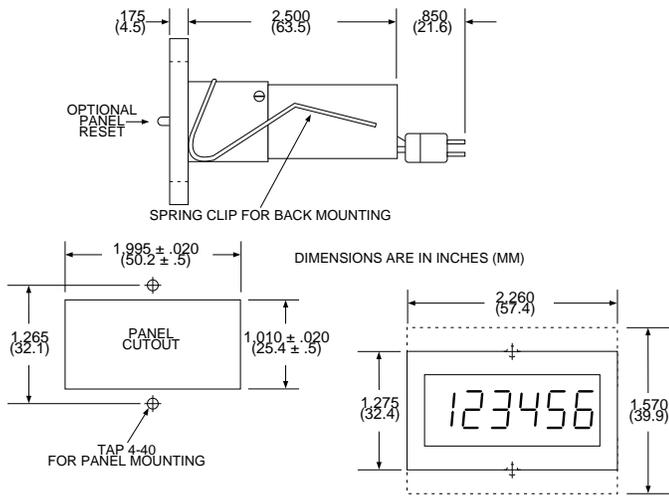
**DC PULSES (Input H)**

- ADD K PLUS 6 GROUND
- SUB B PLUS 6 GROUND
- RES D PLUS 6 GROUND

**OPTICALLY ISOLATED AND AC PULSES (Inputs SP & V)**

- ADD K
- SUB B
- RES D
- COM L

**MOUNTING**



**How To Order;**

**EX: K 0 8 2 3 SP(12) B 2 A Z.O. 50Hz**

<b>Series</b>	K
<b>Function</b>	0 = Totalize function 1 = Add/Subtract
<b>Digits</b>	4 = 4 Digits 8 = 8 Digits
<b>Mounting</b>	1 = Panel mounting
<b>Reset</b>	1 = Panel push-button 2 = Remote 3 = Both
<b>Input to Count</b>	SP() = Optically isolated. Accepts simultaneous pulses. Specify voltage 5-30 VDC. H() = Voltage pulse, 3-30 VDC. V() = AC pulses, 120 VAC for counts speeds to 50 CPS O() = Voltage - Optically isolated DC inputs S() = Voltage - up/down control.
<b>Digit Size</b>	B = 170" standard
<b>Power Supply</b>	1 = 12 VDC 2 = 24 VDC 7 = 5 VDC (must be regulated ± 5%)
<b>Power Quality</b>	A = Regulated B = Unregulated
<b>Options</b>	Z.O. = Zero output (4 digit models)
<b>Count Speed (specify actual speed)</b>	0-10KHz Over 10KHz Over 100KHz

**Accessories**

115-5 Power Supply

# MC (Minicount)

## High Speed, LED Electronic Counter

### Features

- CSA Approved
- Counts Pulse Inputs Up To 10 kHz
- NEMA 4X / IP65 Front Panel
- 1/8 DIN Cutout
- Add & Subtract Capabilities



### Applications:

This totalizing counter is perfect for high speed counting applications where a 6 digit total count is required.

### Specifications:

**Display:** 6 digits, .55" high LED

#### Input Power:

110VAC ±15% or 12 to 15VDC

220VAC ±15% or 12 to 15VDC.

24VAC ±15% or 12 to 15VDC.

**Current:** Max. 250mA DC or 6.5 VA at rated AC voltage.

**Sealing:** Front panel sealed to NEMA 4X/IP65 specifications.

**Excitation Voltage:** (AC powered units only) + 12VDC @ 50mA unregulated -10% + 50%.

**Memory:** EEPROM Stores data for 10 years if power lost.

#### Input Types:

Standard: INPUT 3

This input is ideal for flowmeters that produce a DC pulse output. Also may be used with KEP 711 series or 715-1 encoders or PD & D series sensors. User can select high or low speed modes for debounce filtering. NOTE: For sinking driver inputs (NPN), use an external pull up resistor (2.2KΩ to 10kΩ) between pin 7 (+12VDC) and inputs used (pin 5 and/or 6).

Up/Down Control: INPUT 5

Count inputs on A, direction control input on B. When input B is "high" (4-30VDC), the count inputs on A will count up. If Input B is low (open or <1 VDC), the count inputs on A will count down. May be used with KEP 715-2 Encoder.

Quadrature: INPUT 9

Accepts pulses 90° out of phase for bidirectional counting. May be used with KEP 716 encoder.

NOTE: The unit will only show rate of one direction (when A precedes B).

NOTE: All inputs can be ordered with mag. input (30 mV) option (see "How To Order").

**Reset:** Rear terminal, 4-30 VDC negative edge triggered.

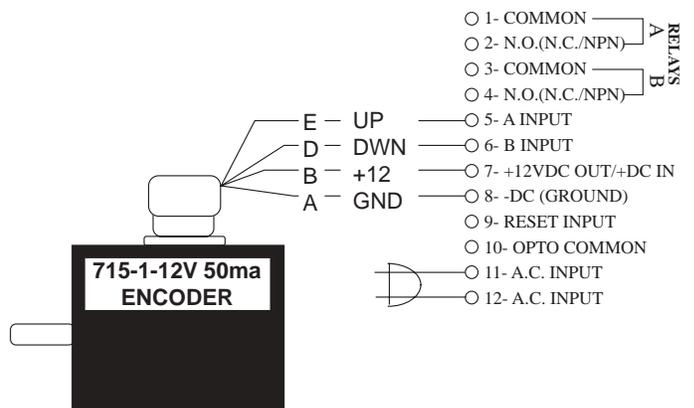
**Approvals:** CSA File# LR91109-7, CE Approved

### Typical Application:

#### MC Series (MCHA3)

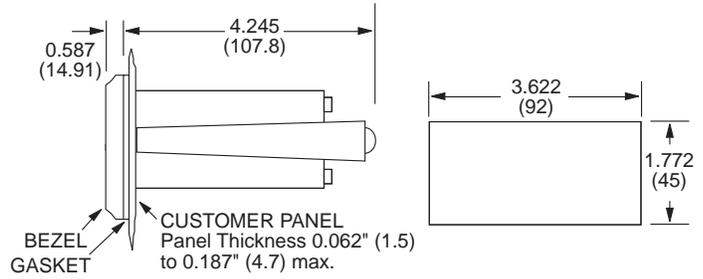
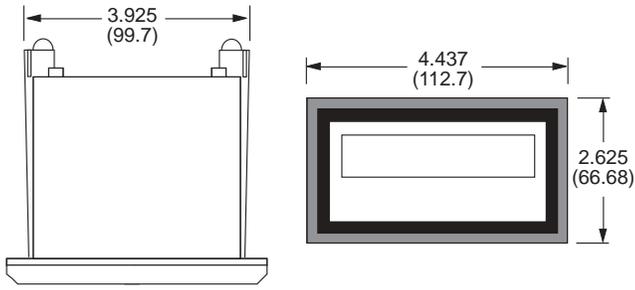
This unit is a dual input, bi-directional totalizer only. This unit does not have presets, outputs or scaling available. Each pulse received on input A or input B equals one count. The Minicount has separate up and down inputs. Pulses on pin 5 (input A) will count up (add); pulses on pin 6 (input B) will count down (subtract), even if the pulses occur simultaneously. Low and high count speed debounce filtering is factory set, output relays are not supplied with this unit. The MC series is perfect for applications where a low cost, bi-directional totalizer is needed.

### TYPICAL WIRING

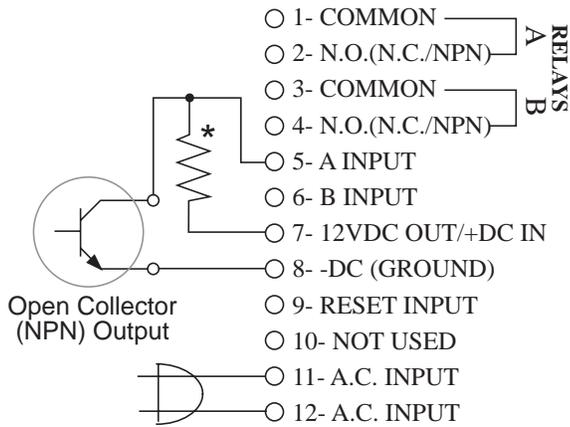


NOTE: Relay outputs are not supplied with MC series.

**Dimensions:**



**Open Collector Wiring:**



\* Pull-up resistor required for open collector (NPN) outputs.

Use resistor values from 2.2kΩ to 10kΩ.

NOTE: Relay outputs are not supplied with MC series.

**HOW TO ORDER**

<b>EXAMPLE:</b>	<b>MC</b>	<b>H</b>	<b>A</b>	<b>3</b>	<b>1</b>
<b>Series</b>	_____				
<b>MC</b>	= Minicount Counter				
<b>Input Speed</b>	_____				
<b>L</b>	= Low speed input debounce filter 40Hz max.				
<b>H</b>	= High speed input (0 to 9.99 KHz)				
<b>Operating Voltage</b>	_____				
<b>A</b>	= 110 VAC ± 15% or 12 to 15 VDC				
<b>B</b>	= 220 VAC ± 15% or 12 to 15 VDC				
<b>C</b>	= 24 VAC ± 15% or 12 to 15 VDC				
<b>Count Input</b>	_____				
<b>3</b>	= Standard, 4-30 VDC simultaneous inputs.				
<b>3M</b>	= Mag. Input, Input A only, 30mV input (Input B, 4-30V)				
<b>3MB</b>	= Mag. Input, Inputs A & B, 30mV input				
<b>5</b>	= 4-30 V pulses on Input A, 4-30 V Direction Control input on Input B.				
<b>5M</b>	= 30 mV pulses on Input A, 4-30 V Direction Control input on Input B				
<b>9</b>	= Quadrature, accepts 4-30 V pulses				
<b>9MB</b>	= Quadrature, accepts 30 mV pulses (A & B)				
<b>Options</b>	_____				
<b>1</b>	= RS232 Communications				
<b>2</b>	= RS422 Communications				

**Accessories**

Separate non keyboard panel order #34235

Separate keyboard panel - order #34237

# CTR-544 Series

*Multipurpose Device  
Counter, Timer or Ratemeter*

## Features

- Multipurpose device (programmable mode)
  - Display counter (adding and subtracting)
  - Position Monitor
  - rate meter
  - timer
- Display range –199 999 to 999 999
- Screw terminal connections
- Locking SET-Key for reset
- Option: Optocoupler output if f = 0, i.e. Operation indicator



## Description:

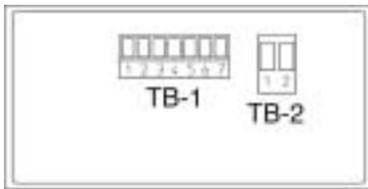
The CTR-544 is a multipurpose device that can be programmed as a counter, position monitor, timer or ratemeter. It accepts DC pulse inputs up to 20kHz. It is a perfect solution for all high speed counting, timing and rate monitoring applications.

## Specifications:

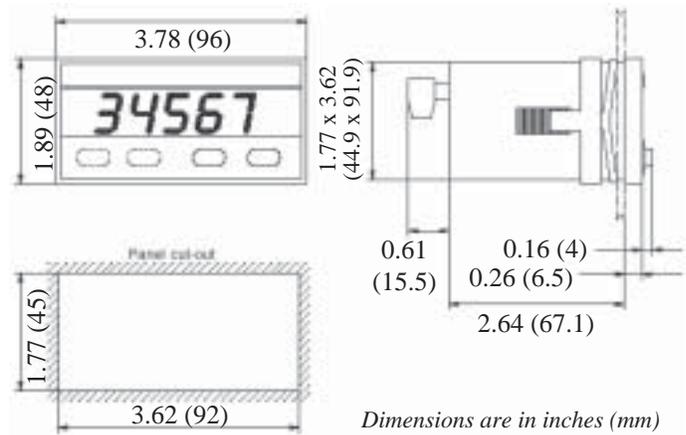
Supply voltage:	10 to 30 V DC, with reverse polarity protection 90 to 260 V AC 50/60 Hz mains hum suppression	Level of inputs:	DC-version Low: 0 to 0.2 x UB [V DC] High: 0.6 x UB ... 30 V DC AC-version Low: 0 to 4 V DC High: 12 to 30 V DC
Power consumption:	max. 2 W/6 VA	DC Output:	24 V DC $\pm$ 15 %/100 mA (AC powered units only)
Display:	6-digit, red 7-segment LED's height 14 mm	Accuracy:	Ratemeter: <0,1 % Timer < 50ppm
Data backup:	EEPROM	Ambient temperature:	–10 to +50°C
Housing:	housing for control panel 96 x 48 mm acc. to DIN 43 700; RAL 7021, dark grey	Storage temperature:	–25 to +70°C
Polarity of Inputs:	programmable, npn or pnp for all inputs	EMC:	according to EC EMC directive 89/36/EWG
Input resistance:	appr. 10 k $\Omega$	Interference emmissions:	EN 50081-2/EN 55 011 class B
Input frequency:	20 kHz, can be damped to 30 Hz (11 kHz max. for position display)	Interference resistance:	EN 6100-6-2
Reset time:	5 ms	Protection:	NEMA4/IP65 (front panel)
Timer resolution:	up to 0.001 s	Weight: appr.	150 g

Wiring Connections

Rear View



Dimensions



TB-1 Measurement Inputs

Pin	AC-version	DC-version
1	Optocoupler-output Emitter	
2	Optocoupler-output Collector	
3	SET	
4	INP B	
5	INP A	
6	GNDout	n.c.
7	+24 Vout	n.c.

TB-2 Supply Voltage and Outputs

Pin	AC-version	DC-version
1	90 ... 260 V AC	0 V DC (GND)
2	90 ... 260 V AC	10 ... 30 V DC

Order Code

Example: CTR544.01 0 00

Series: \_\_\_\_\_  
 CTR-544 = Multipurpose Device  
 Counter, Timer or Ratemeter

Operating Voltage: \_\_\_\_\_  
 0 = 90 to 260 VAC  
 3 = 10 to 30 VDC

Options:  
 00= None  
 01 = Optocoupler output

# SUPER-KAL

## Features

- 6 Digit Display with 9.6mm High Characters
- Supertwist Display Viewable From Any Angle
- Meets NEMA 4 and IP65 Ratings
- EEPROM Memory
- 50 kHz High Speed Input
- 30 Hz Low Speed Input for Contact Closures

## DESCRIPTION

This unit monitors both rate and totalizing count simultaneously. While the display is indicating units per minute (period mode) a "background" totalizer keeps count of events or items. The ratemeter function can operate in either Period or Gated mode. The display indicates the mode and whether the multiplying or dividing prescaler is in use. (Totalizer is not available when the ratemeter is in Gated mode).

A push-button on the front panel can toggle the display between rate and count readings and is also used to reset the count (by holding it pressed for 3 seconds). Mode selection, prescaling and decimal point positioning are all configured in programming which is carried out using the two push-buttons on the front panel.

The operating voltage can be selected by moving a jumper on the back of the unit.

## SPECIFICATIONS

### Display

6-Digit Supertwist, 9.6mm characters. Locatable decimal point to 0, 1, 2 or 3 places of decimals. Leading zero blanking.

### Annunciators

PROGRAM (mode), PERIOD or GATED (modes), TOTALIZER, MULTIPLIER or DIVIDER (prescalers).

### Ranges

Totalizer: 0-999999 with roll over to 0.

Period mode Measurement: 3-19,999 PPM (1/20Hz-333.3Hz).

**Gated mode Measurement:** 0-50kHz.

**Gated Mode Timebase:** 0.01-9.999S adjustable in 1mS intervals.

### Accuracy

Both Gated and Period modes:  $\pm 1$  least significant digit or 0.18% whichever is the greater.

### Prescalers

Period Mode Divider: 1-9999

Totalizer Divider: 1-9999

Totalizer Multiplier: 0.01-9.999 in 0.001 increments

### Program and Data Security

Program disable input allows authorized personnel only to change program. Internal EEPROM retains program indefinitely after power loss.

**Approvals:** CE Approved

**Factory Default Settings**

## Combined Totalizer and Ratemeter with Scaling



Unit adopts Period mode on power up  
Annunciators: PERIOD annunciator only

Period Mode Divider Prescaler: 1

Gated Mode Timebase: 1 second

Totalizer Divider Prescaler: 1

Decimal places: 0

### Low Speed (Contact closure) Input

30Hz maximum frequency. 0.7V threshold, 15mS minimum closure time. Negative edge triggered.

### High Speed (Electronic) Input

50kHz maximum frequency. Logic 0: <0.7V DC, logic 1: >2.4V DC. TTL/CMOS compatible. Maximum input 18V. 10 $\mu$ S minimum pulse length. Negative edge triggered.

### Dimensions

Front 72mm x 36 mm. Depth 32mm (excl. connector)

Panel Cutout

69mm x 33 mm  $\pm$  0.2mm.

### Power Supply

Measurement function: 10-30VDC 8mA

With Backlight 12V or 24VDC @ 100mA or 50mA.

### Operating temperature

-10°C to +60°C

### Storage temperature

-10°C to +70°C

### Housing

Black die-cast aluminium

### Mounting

Panel mounting using supplied clip

**Sealing** IP65/NEMA4 using gasket supplied

## FUNCTIONS and MODES

**GATED MODE** (Frequency) utilizes a variable time base and counts the number of pulses occurring within the time frame (number of pulses through the "gate").

**PERIOD MODE** (RPM) derives its output by computing the reciprocal of the time period measurement between successive pulses.

**TOTALIZER** function. The unit operates as a totalizing up counter when the Ratemeter is in Period Mode.

Mode selection prescaling and decimal point positioning are carried out in programming mode (see next page).

**MODE APPLICATIONS**

Period mode is suitable for relatively slow events such as items passing on a conveyor belt. An application which uses the dividing prescaler is measurement of shaft rotation by counting the passing teeth on a gear. If the gear wheel has 64 teeth, set the Period mode divider prescaler to 64 and the unit displays rate in revolution/min.

Gated mode is for high speed electronic inputs and will measure frequency up to 50kHz.

NOTE: Positioning of the decimal point allows the user to display Period or Gated measurements in chosen engineering units. A 100Hz frequency will show as 100 when there is no decimal point but as 1.00 if two places of decimals are selected.

**PROGRAMMING**

To enter programming press the recessed Program button on the front panel using a ball point pen or similar. The PROG annunciator appears on the display. Only the two front panel buttons are used for programming.

The Reset button changes the parameter (number of decimal places, increments the displayed digit, toggles between available options etc.).

The Program button accepts the currently displayed value or function and continues to the next step in the sequence.

The parameters which appear on the display during programming are those which were set up at the preceding programming session. You can use this facility to review the settings by entering programming and going through the sequence again.

If a time base or multiplier prescaler less than 0.01 is entered, the unit will default to 0.01 on exit from the programming mode. The programming sequence is shown in the illustration.

When you press the Program button to accept the last parameter in the programming sequence, the unit exits from the program mode and adopts the mode which you selected at step 1.

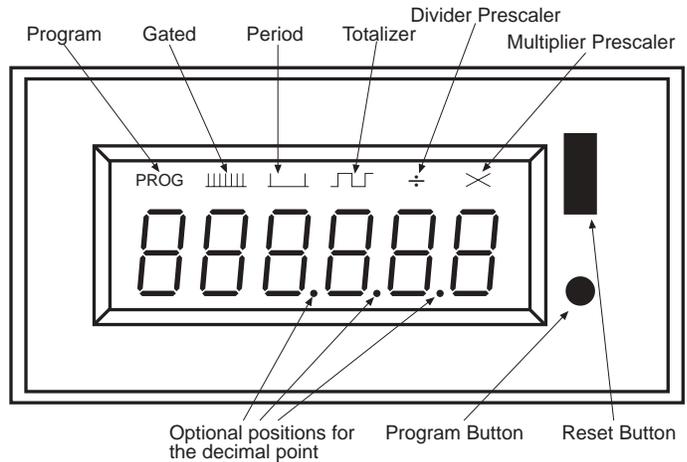
**OPERATING**

To toggle the display between the totalizer count and the Period mode rate measurement, press the Reset button on the front panel. (Totalizer is not operating in Gated Mode).

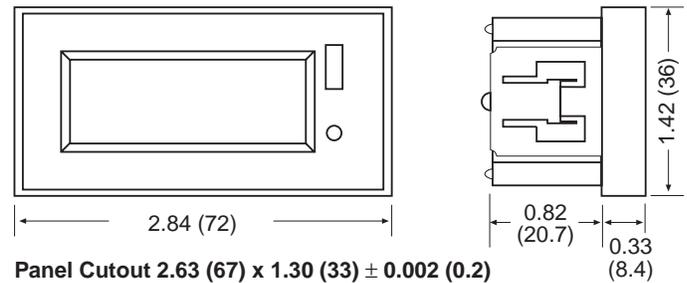
To Reset the totalizer count to zero press Reset and hold it for 3 seconds.

The Reset function can be disabled in the programming sequence.

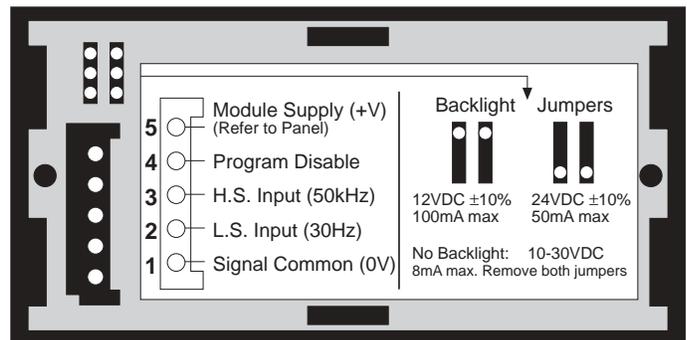
**ANNUNCIATORS**



**DIMENSIONS**



**CONNECTIONS**



**HOW TO ORDER:**

- SKAL1 ..... Standard
- SKAL2 ..... With Backlight

# 520K-530K

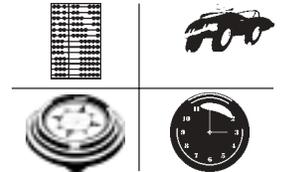
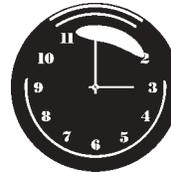
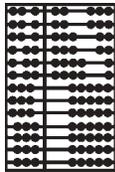
Pulse Counters, Position Displays, Rate Meters, Time Meters & Combinations

COUNTERS

*New Family: Your choice for your application!*

## Features

- LED display with very high luminosity
- 0.315" (8mm) digit height
- 6 digit display
- DIN housing, 1.88"x.944" (48x24mm)
- Easy 2 button programming
- Connection with screw terminal
- IP65 NEMA 4X (front)
- Input pulse-shape variable (Schmitt Trigger characteristics)



**520K**

Simple Display Counter

- Display range 0..999999 with leading zero blanking
- Overflow condition will be indicated by displaying the count value without leading zero blanking
- Count frequency up to 10kHz (can be damped to 30Hz in setup)
- SET-key resets the counter to zero (can be disabled in setup)
- 1 count input
- 1 reset input

Order #: 520K.2

**521K**

Totalizer and Position indicator

- Display range -199999..0..999999 with leading zero blanking
- Overflow condition will be indicated by 1Hz flashing of display
- Count frequency up to 10kHz (can be damped to 30Hz in setup)
- SET-key resets the counter to zero (or selected preset number)
- 2 count inputs
- 1 reset input
- Multiplying factor (0.00001...99.9999)
- Option: optocoupler output if count value  $\leq 0$
- Counting with direction input, differential counting, counting with phase discriminator (also with pulse doubling)

Order #: 521K.1 w/optocoupler  
521K.2 w/out optocoupler

**522K**

Frequency meter and Tachometer

- Display range 0..999999 with leading zero blanking
- Indicates rate per sec or min (1/Tau) to 0.1% accuracy
- Overflow condition will be indicated by 1Hz flashing of display
- Input frequency up to 10kHz (can be damped to 30Hz in setup)
- 1 count input
- Operating principle: period duration measurement (average value at higher frequencies)
- Option: optocoupler output if frequency  $f=0$  (e.g. no operation indicator)
- Multiplying factor (0.00001...99.9999)

Order #: 522K.1w/optocoupler  
522K.2 w/out optocoupler

**523K**

Time meter

- Display range 0..999999 with leading zero blanking to 0.03% accuracy
- Lowest digit's decimal point flashes when timing
- Timing in s, min, h or h.min.s (programmable) Timing resolution x1, .1, .01, .001, fixed by selected decimal point
- SET-key resets the counter to zero
- Gate, start and stop via 2 inputs (programmable)
- 1 reset input
- Operation mode: Precise timing from hours to 1/1000 sec
- Option: optocoupler output (e.g. Timing indicator, 0.5 sec On/Off)

Order #: 523K.1 w/optocoupler  
523K.2 w/out optocoupler

**524K**

Multipurpose device

- 521K-523K in just one device
- Operation mode can be programmed

Order #: 524K.1 w/optocoupler  
524K.2 w/out optocoupler

**NOTE:** E200 Outdoor Enclosure and N7 Explosion Proof Housing available for all Models (see accessories section)

## 525K

### Adding Counter and Tachometer

- Display range 0..999999 with leading zero blanking
- Overflow condition will be indicated by 1 Hz flashing of rate value and leading zeros of totalizer
- Count frequency up to 10kHz
- Indicates rate / sec or min (1/Tau)
- SET-key resets the counter to zero (can be disabled in the setup)
- Key to switch rate / total display
- 1 count input
- 1 reset input
- Separate multiplying factors for totalizer & ratemeter (0.00001...99.9999)
- Operating mode: Rate meter: 1/Tau (average value at higher frequencies)

Order #: 525K.2

## 526K

### 2 Display Counters

- Display range 0..999999 with leading zero blanking
- Overflow indicated by the leading zeros
- Count frequency up to 10kHz
- SET-key resets the counter to zero (can be disabled in setup for each counter separately)
- Push-button for switching between counter 1 and counter 2
- 1 count input
- 1 reset input (programmable for each counter separately in setup)
- One multiplying factor (0.00001...99.9999)

Order #: 526K.2

## 527K

### Display Counter and Time meter

- Display range 0..999999 with leading zero blanking (Overflow shows leading zeros)
- Lowest digit's decimal flashes when timing
- Adding counter: Decimal point only optical function
- Hour meter: Timing in s, min, h or h.min.s (programmable) Decimal point fixes the resolution
- SET-key resets the counter to zero (can be separately disabled in the setup for each channel)
- Push-button switches adding counter / time meter
- Count frequency up to 10kHz
- 1 count input
- Gate, start and stop via 1 input (programmable)
- 1 reset input (can be disabled in setup)
- Multiplying factor (0.00001...99.9999)

Order #: 527K.2

## 528K

### 2 Time meters

- Display range 0..999999 with leading zero blanking
- Active timing will be indicated by flashing the lowest digit's decimal point (one control)
- Timing in s, min, h or h.min.s (programmable) Decimal point fixes the resolution (ex: 1, 0.1, 0.01, 0.001)
- SET-key resets the counter to zero (can be disabled in the setup)
- Push-button for switching between time meter 1 and 2
- Gate, start and stop via 2 inputs (programmable)
- 1 reset input (programmable for each timer separately in setup)

Order #: 528K.2

## 529K/530K

### Analog Displays

- Display range -19999..0..99999 with leading zero blanking
- Resolution 14 bit
- 5 digit display 6 digit total display (530K)
- 4 different resolutions (0..20mA; 4..20mA; 0..10V or 2..10V)
- Scaling factor for displayed value
- Automatic storage of maximum and minimum value (can be disabled in setup)
- Input to activate storing of displayed value

Order #:

**529K.2 = Rate Display Only**

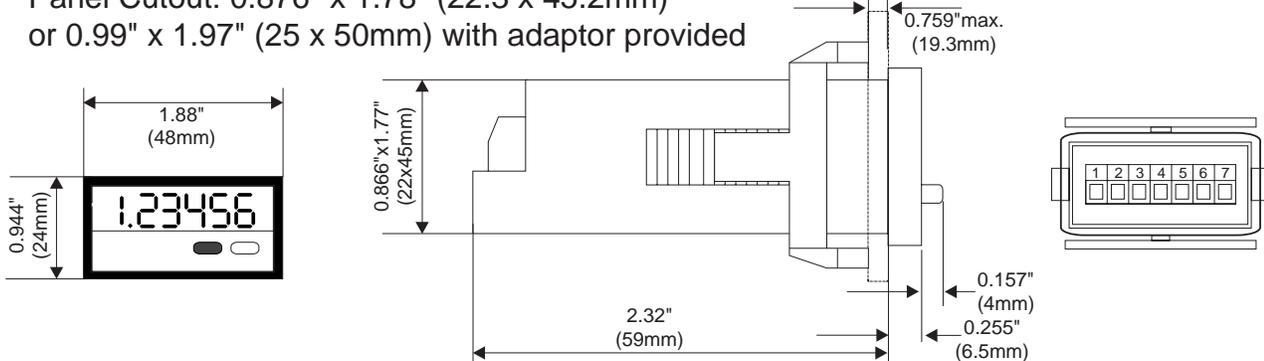
**530K.2 = Rate and Total Display**

**NOTE:** E200 Outdoor Enclosure and N7 Explosion Proof Housing available for all Models (see accessories section)

### Electrical characteristics:

- Supply Voltage: 10 to 30 VDC
- Data retention: EEPROM (1 million cycles or 10 years)
- Noise immunity acc. to EN 50081-2; EN55011 class B; EN 50082-2
- Ambient temperature: 14°F to 122°F (-10°C to +50°C)
- Input sensitivity: Low: 0 to 1 VDC High: 4 to 30 VDC
- Input resistance: 10 k ohm
- Polarity of inputs: programmable for all inputs in common
- Optocoupler: Max 30VDC, 10 mA, 1V drop @ 10 mA

Panel Cutout: 0.876" x 1.78" (22.3 x 45.2mm)  
or 0.99" x 1.97" (25 x 50mm) with adaptor provided



# BVA

## Electro-Mechanical Preset Counters

### Features

- 5 Large Digits
- Visible Setpoint Number
- Counts Up With Output at Preset
- 5 Amp, Form C Switch
- Many Voltages Available
- Rugged Case (50 x 50 mm)

### Applications:

For counting and controlling industrial processes and production quantities. Offers high noise immunity while displaying number of items and preset number even if power is lost.

### Description:

The BVA is a 5 digit preset counter loaded with features never before offered. The BVA has 2 registers. One shows the set point continuously. The other totalizes the incoming pulses. At coincidence, a 5 Amp form C relay transfers. The totalizer meanwhile continues adding any incoming pulses to the total providing an accurate tally of overrun. One hand sets the BVA. Simply push the conveniently located set buttons and change the preset register. All standard voltages are available in a 50 x 50 mm rugged plastic case.

### COUNT INPUTS

#### Counting Mechanism

Voltage	Max. cps	Min. pulse duration	Min. pulse interval	Pulse ratio	On time	Power consmp.
DC	10/s	60 ms	40 ms	3:2	100%	1.6W
	25/s	24ms	16ms	3:2	100%	3W
	40/s	15ms	10ms	3:2	60%	5.5W
AC	10/s	50.0ms	50.0ms	1:1	100%	2.2VA
	18/s	27.7ms	27.7ms	1:1	100%	3.0VA



PRESET COUNTERS

### Specifications:

**Digits:** 5 digits, 0.195" high.

**Preset Register:** yellow numbers on black.

**Totalizing Register:** white numbers on black.

**Termination:** Push on connectors (supplied). Wire leads optional.

### Voltages:

6,12, 24, 48, 110DC  $\pm 10\%$

24, 48, 110, 220AC.  $\pm 15\%$

**Switching:** Form C contacts transfer after the total count reaches the final half step of the preset number. Switch remains transferred until reset. Totalizing may continue without effect.

**AC Load Max:** 250VAC = 5 Amps

**DC Load Max:** 24VDC = 2 Amps

60VDC = .7 Amps

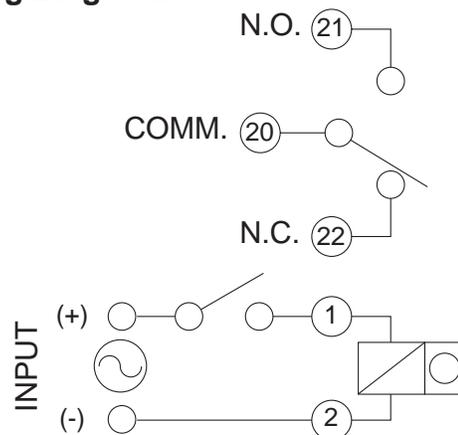
110VDC = .4 Amps

220VDC = .2 Amps

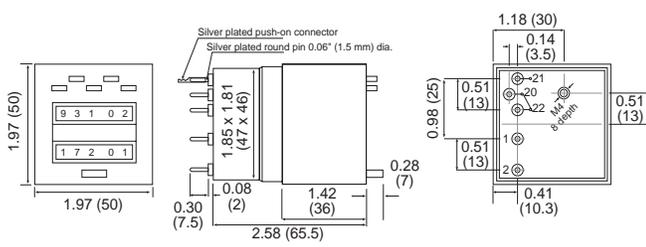
Arc suppression recommended for inductive loads.

**Temperature:** - 10 ° to 60 ° (+14 °F to 140°F) standard.

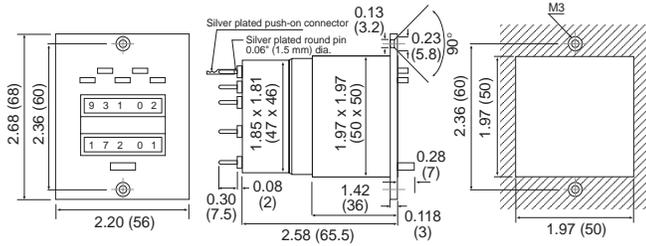
### Wiring Diagram:



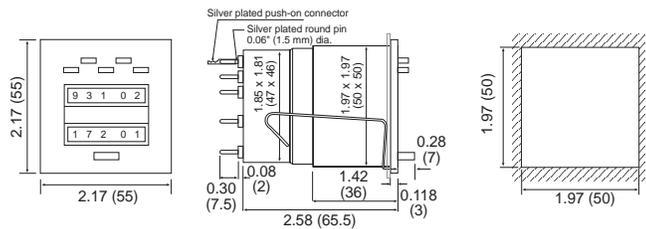
**0 Mounting Style:**



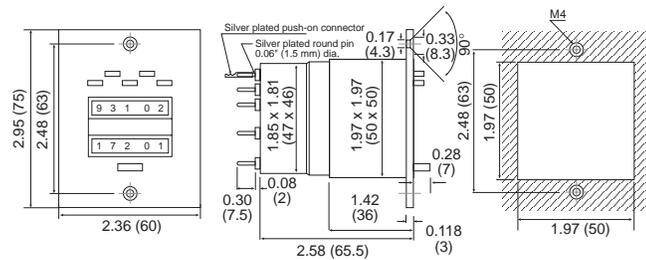
**1 Mounting Style:**



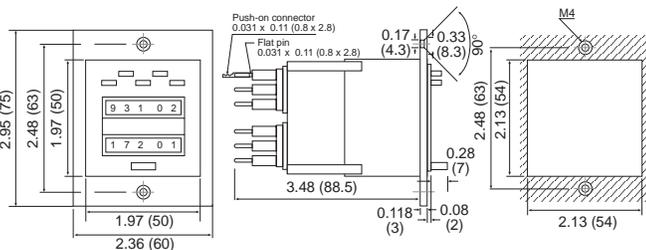
**2 Mounting Style:**



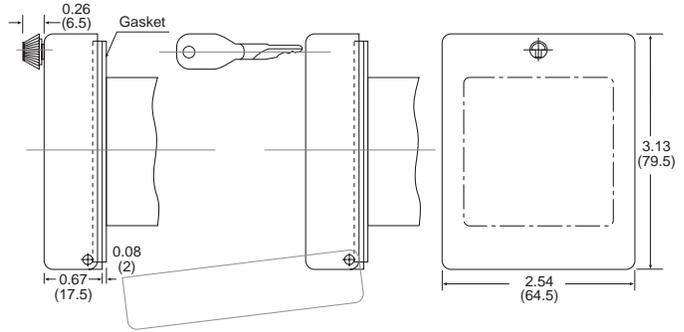
**3 Mounting Style:**



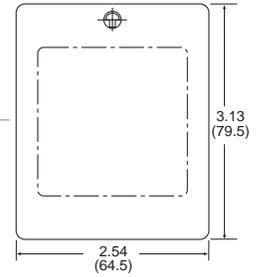
**F2B Option:**



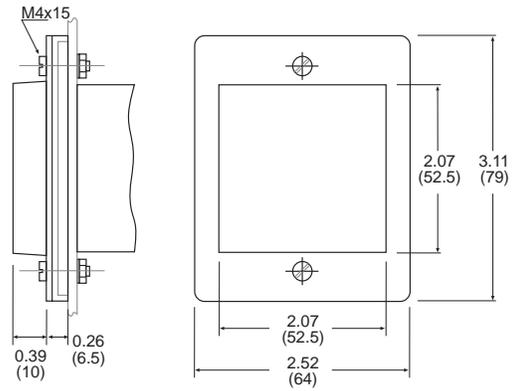
**F2DV Option:**



**F2DVS Option:**

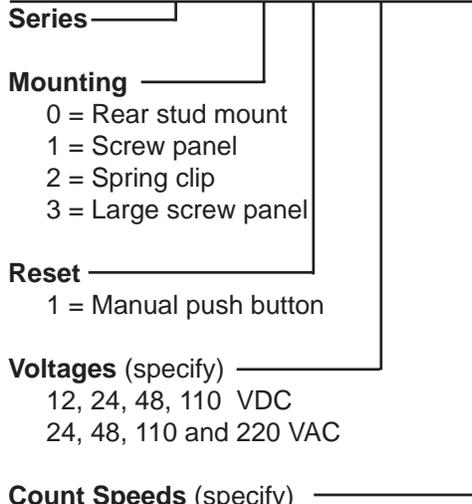


**K2 Option:**



**How To Order:**

**EXAMPLE: BVA15 1 1 24VDC 25CPS**



**Mounting**

- 0 = Rear stud mount
- 1 = Screw panel
- 2 = Spring clip
- 3 = Large screw panel

**Reset**

- 1 = Manual push button

**Voltages (specify)**

- 12, 24, 48, 110 VDC
- 24, 48, 110 and 220 VAC

**Count Speeds (specify)**

- 5, 10, 25 CPS DC
- 10, 18 CPS AC

**Available Options (add to end of part number)**

- K2 - Silicon cover
- F2 - Frame w/ Socket Box
- F2DVS - Frame w/ locking cover & Socket Box
- F2DV- Frame w/ knob cover & Socket Box
- US - Key reset
- DVS -Locking cover without Frame
- DV - Knob cover without Frame
- N7 - Explosion proof housing (see accessories section)
- 50 CPS (DC only)

# CTF5

## LED Preset Add/Subtr. Counter, Timer, Frequency Meter

### Features

- 5 Digit Counter, Timer or Frequency Meter
- Input Scaling (0.001 to 9.999) Multiplier
- Bright LED Display .295" (7.5 mm) High
- Count & Preset Range of -19999 to 99999
- Add or Subtract Count Control
- AC or DC Operation
- 10 Year Data Memory
- 24VDC to Power Peripherals

### Applications:

Preset batch counting, length measuring, simple positioning, time control, speed control, rate control.

### Description:

The CTF5 is a LED preset counter, timer or frequency meter. The following features are programmable: operating mode (output at 0 or preset, with or without autoreset), decimal point, polarity of input (NPN or PNP), output signal latched or timed, gate time (frequency meter), time resolution (Hrs., Min., Sec; timer)

### Inputs:

**Input A, Input B:** Count inputs. Max. count speed is 30 Hz or 10 kHz separately selectable for both inputs.

**Gate:** Voltage level gate input;  
Counter & Freq. Mode - inhibits counts when activated.  
Timer Mode - Starts timing when activated.

**Reset:** Edge triggered reset input; it is connected in parallel with the front reset key and resets the counter to 0 (add) or preset (sub).

**Latch:** Voltage level input for display hold; when activated, the display "freezes" the current count value while counting continues in the background. The display updates when this input is de-activated.

**Key:** Voltage level keyboard lock input; when activated, all front keys are disabled.

### Selection of Basic Function:

1. Impulse Counter
2. Frequency Meter
3. Timer

### IMPULSE COUNTER

**Decimal Point:** 0 to 3 (for display only)

**Scaling Multiplier:** 0.001 to 9.999

**Output Signal:** Timed signal (0.01 to 99.98 sec) or Latched signal (00.0) selectable. (99.99 setting gives inverted latched output- output activates at power on and deactivates when preset is reached)

**Polarity:** Negative (NPN) or positive (PNP) polarity of inputs. Polarity selected applies to all inputs.



### Input Modes:

**E1:** One count input (Input A) and one count direction input (Input B). If direction input is open, the counter adds, if it is activated the counter subtracts.

**E2:** Separate inputs, one up input (Input A) & one down input (Input B).

**E3:** Quadrature input, accepts two pulse inputs 90° ( $\pm 15\%$ ) out of phase for direction control.

**E4:** Quadrature (x2) input, counts leading and falling edge of input A.

### FREQUENCY METER

**Gate:** Gate time selectable from (0.01 to 99.99 sec) All pulses counted during this time will be displayed for one gate time (i.e. gate time of 1 will display Hz).

**Decimal Point:** 0 to 3 (for display only)

**Polarity:** Negative (NPN) or positive (PNP) polarity of inputs. Polarity selected applies to all inputs.

**Input Modes:** As described under Impulse Counter.

**Scaling Multiplier:** 0.001 to 9.999

**Output Signal:** Output activates for selected time (0.01 to 99.98 sec) when display reaches or exceeds preset value; If output time setting is 00.00, the output will activate when display reaches or exceeds the preset and deactivate when below preset. (99.99 output setting gives inverted latched output- output activates at power on and deactivates when preset is reached)

### TIMER

**Time Resolutions:** Times in sec., min. or hrs. with resolution in 0.001, 0.01, 0.1 or 1.0 (depending on decimal).

**Polarity:** Negative (NPN) or positive (PNP) polarity of inputs. Polarity selected applies to all inputs. (Gate controls timing)

**Output Signal:** Timed signal (0.01 to 99.98 sec) or Latched signal (00.0) selectable. (99.99 output setting gives run time control latched output- output activates only while timer is running and deactivates when preset is reached.)

**Specifications:**

**Operating Voltage:** (All voltages ± 10%)

- A: 115VAC 50/60Hz
- B: 220VAC 50/60Hz
- C: 11 to 30 VDC
- D: 24VAC 50/60Hz

**Power Consumption:**

- DC: 100 mA max.
- AC: 4 VA max.

**Display:** 7 segment LED 5 digit 0.295" (7.5 mm) high.

**Count Speed:** 30 Hz or 10 kHz (7.5 kHz for input mode E4 "Quad x2"); 1 kHz for autoreset without count loss (600 Hz for input mode E4 "Quad x2") separately dip-switch selectable for both inputs.

**Min. Pulse width for Control Inputs:** 5 msec

**Input Impedance:** Approx. 10 kOhm

**Input Sensitivity:**

- Logic "0": 0 to 1 VDC
- Logic "1": 4 to 30 VDC

**Control Output:**

Relay: SPDT 3A relay, 250 VAC / 300 VDC max. Switching current for DC min. 30 mA

Opto-Isolated Output: Open collector and emitter.

Max. Voltage: 30 VDC

Max. Current (ON state): 5 mA @ 0.4 V drop; 15mA @ 2.0 V drop

**Response Time:**

- Relay: Approx. 6 msec
- Opto-Isolated: Approx. 1 msec

**Output Power** (AC powered units): 24 VDC -40% / +15%, 80mA, unregulated

**Memory:** min. 10 years or 10<sup>6</sup> memory cycles

**Operating Temperature:** 32°F to + 122°F (0°C to +50°C)

**Noise Immunity:** EN 55011 class B and prEN 50082-2

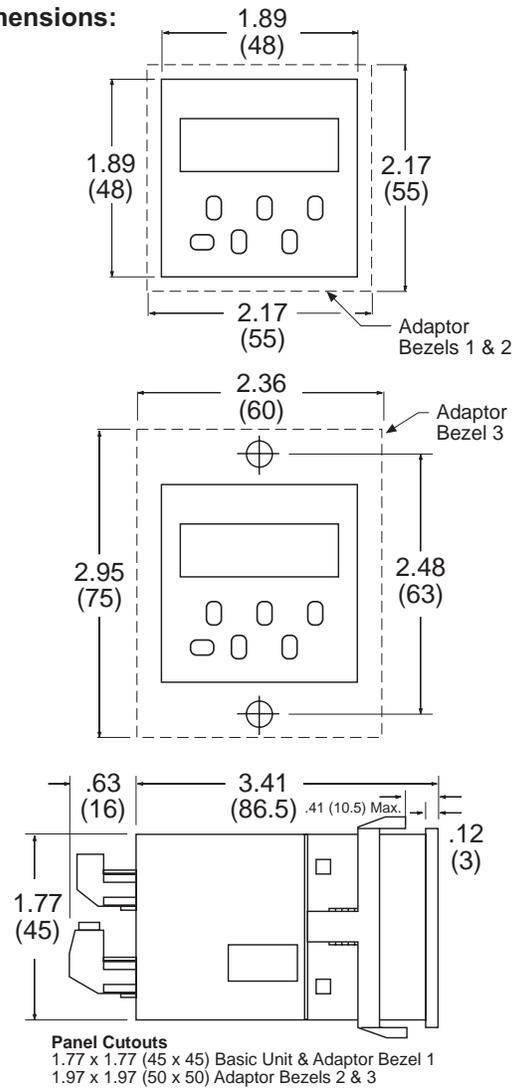
**Storage Temperature:** - 13°F to + 158°F (-25°C to +70°C)

**Weight:** Approximately 9 oz. (240g) (AC version with relay)

**Protection:** NEMA 4 /IP65 (front)

**Approvals:** UL File# E224909, CE Pending

**Dimensions:**



**Terminal Designations:**

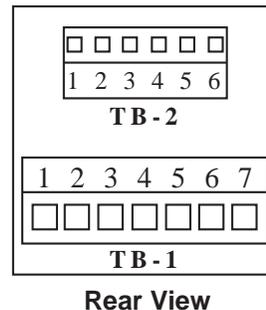
**AC Supply Wiring**

TB-1		TB-2	
Term. #	Description	Term #	Designation
1	+24 VDC Output	1	INPUT A
2	0 VDC (Ground)	2	INPUT B
3	Relay - C (Opto Emitter)	3	GATE INPUT
4	Relay - NO	4	RESET
5	Relay - NC (Opto Collector)	5	LATCH
6	AC Input	6	KEY
7	AC Input		

**DC Supply Wiring**

TB-1		TB-2	
Term. #	Description	Term #	Designation
1	No Connection	1	INPUT A
2	No Connection	2	INPUT B
3	Relay - C (Opto Emitter)	3	GATE INPUT
4	Relay - NO	4	RESET
5	Relay - NC (Opto Collector)	5	LATCH
6	(+) 11-30 VDC Supply	6	KEY
7	(-) 0VDC Supply (Ground)		

Adaptor Bezels 1, 2 & 3 Supplied



**How To Order:**

<b>EXAMPLE</b>	<b>CTF5</b>	<b>A</b>	<b>1</b>
<b>Series</b>			
<b>Operating Voltage</b>			
A = 115 VAC			
B = 230 VAC			
C = 11 to 30 VDC			
D = 24 VAC			
<b>Outputs</b>			
0 = Relay			
1 = Opto-Isolated collector and emitter			

# CTF16/17

## 6 Digit LED Preset Add/Subtr. Counter, Timer, Frequency Meter

### Features

- 6-Digit Preset Counter with Sign & Scale Factor
- Available with One or Two Presets
- Programmable as a Pulse Counter, Frequency Meter or an Operating Time Counter
- Wide-Range Power Supply 90-250 VAC
- Counting Speed up to 20 kHz
- Extremely Simple Use and Programming by Means of Only 4 Keys
- RS-232, RS-422 or RS-485 Serial Interface

### Applications:

Preset batch counting, length measuring, simple positioning, time control, speed control, rate control.

### Description:

The CTF16/17 is a LED preset counter, timer or frequency meter. The following features are programmable:

- Operating mode (counter, timer or ratemeter)
- Polarity of the inputs (NPN or PNP)
- Scale factor
- Output signals :continuous or pulse signal
- Frequency meter display mode : 1/s or 1/min
- Resolution in s, min, h or h:min:s
- Start and Stop for the time counter/hours meter

### Inputs

#### 2 counting inputs

The maximum frequency is 20 kHz (12 kHz for Quad Input); 30 Hz debounce setting for contact closure inputs.

### GATE

Inhibits count, controls timer

### RESET

Edge triggered, Resets the counter to zero when counting up, and sets it to the preselected value when counting down. (Same as front reset button)

### KEY

The keys are locked as long as this input is ON. The P preselection display key remains active.

### Outputs

1 or 2 potential-free relay or optocoupler outputs as ordered.

### Programming

The CTF16/17 are programmed by means of the 4 front keys. The display prompts simple and intuitive programming.

### Programmable are:

#### Input polarity

Positive (PNP) or negative (NPN). The selection is valid for all inputs.



PRESET COUNTERS

### Pulse or time counting modes

- Adding with counting start at 0
- Subtracting with set to preset (CTF16) (preset 2 for CTF17)
- Adding with automatic reset
- Subtracting with automatic set to preset (preset 2 for CTF17)

### Input types in pulse counter mode

Cnt. Dir	1 counting input; 1 counting direction input
uP. Dn	1 adding input; 1 subtracting input
quad	Phase discriminator to connect pulse sources with 2 signals shifted by 90°
quad2	Phase discriminator with double pulse processing, to connect pulse sources with 2 signals shifted by 90°

### Decimal places

Select one, two or three decimal places.

### Scale factor

Multiplying scale factor between 0,0001 and 99,9999.

### Output signal

Each output can be selected as an opening signal, a closing signal or as a positive or negative pulse signal.

### Time counter

Select time base of h, min, s or h:min:s. Set the resolution by selecting up to 3 decimal places.

### Frequency meter/Tachometer/Speed indicator

Display in 1/min or 1/s with automatic conversion.

### Interfaces

The devices can be fitted with the optional RS 232, RS 422 or RS 485 interfaces. These interfaces can be used to program the devices as well as for remote reading. They are simply controlled by ESC sequences.

### Explosion Proof Housing Option

- All functions corresponding to type 717 with relay output
- Sturdy, hard-coated aluminium housing with insert moulded connection cables (2 x 3 m)
- Protection type: EEx d IIC T6
- PTB approval no.: Ex-96. D. 1024

**Specifications**

Display: 6 digits, 7 segment LED's, height 8 mm  
 Presets: 2 preset values for model CTF17  
 1 preset value for model CTF16  
 Counting inputs: 2 counting inputs, 4 types of programmable inputs  
 Polarity of the inputs: programmable, common to all inputs  
 Input resistance: Approximately 10 kΩ  
 Max. frequency: 20 kHz, can be set to 30 Hz for contact closure inputs  
 Minimum pulse duration for control inputs: 5 ms  
 Input switching level: Log "0": 0 to 1V  
 Log "1": 4 to 30V  
 Pulse shape: any shape (Schmitt-trigger)  
 Output : Programmable output state (energised (N.C.) or de-energised (N.O.))  
**NOTE:** When high to low output selected (  $\square \square \square$  ), the output is activated when unit is powered and display is below preset. This may appear reversed.  
 Relay: CTF16: 1 SPDT  
 CTF17: 1 SPDT; 1 SPST  
 Switching power: 250 V @ 3A Max  
 DC Max 50 Watts, Min 30mA  
 Optocoupler: Off: 30 VDC max  
 On: 2V @ 15mA, 0.4V @ 5mA  
 Supply voltage: 90 to 250 VAC, 5VA max, or 10 to 30 VDC, 1W max  
 Supply voltage output for external sensors: 24 VDC, 100mA (AC versions)  
 Accuracy of speed indicator mode: < 0,1 %  
 Accuracy of timer mode: ± 50 ppm  
 Output response time: Relay: approximately 7 ms  
 Optocoupler: approximately 2 ms  
 Data storage: at least 10 years or 10<sup>6</sup> recording cycles  
 Interference immunity: EN 61000-3-3, EN 55011 class B and EN 50082-2 with shielded control lines  
 Operating temp.: -10°C..+50°C  
 Storage temp.: -25°C..+70°C  
 Weight: approximately 200 g. (AC version & relay)  
 Protection: NEMA4 (IP 65) Front Panel

**TERMINAL X1**

Terminal No.	AC Version	DC Version
1	No Connection; Relay Com (C) (emitter)*	
2	No Connection; Relay N.O. (collector)*	
3	Relay Output Common (C) † (Emitter for optocoupler output version)	
4	Relay Output N.O. †	
5	Relay Output N.C. † (Collector for optocoupler output version)	
6	90 to 250 VAC Supply Voltage	10 to 30 VDC Supply Voltage
7	90 to 250 VAC Supply Voltage	0 VDC (ground) Supply Voltage

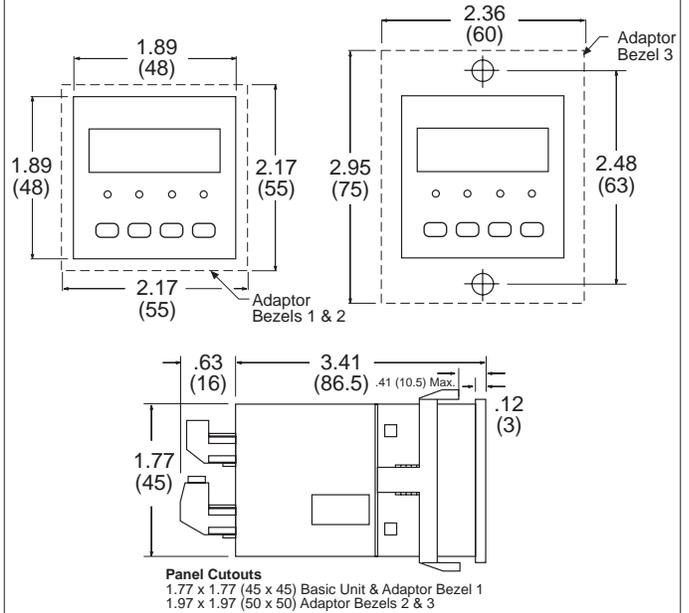
\* CTF17 Preset #1  
 † CTF17 Preset #2

**TERMINAL X2**

Terminal No.	AC Version	DC Version
1	+ 24VDC Out	No Connection
2	0 VDC (ground)	No Connection
3	Input A	
4	Input B	
5	Reset	
6	Gate	
7	Key	

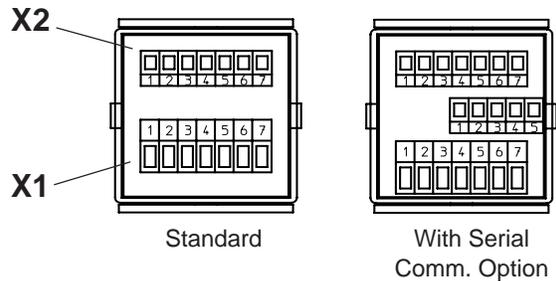
**Dimensions:**

**Panel Mount**

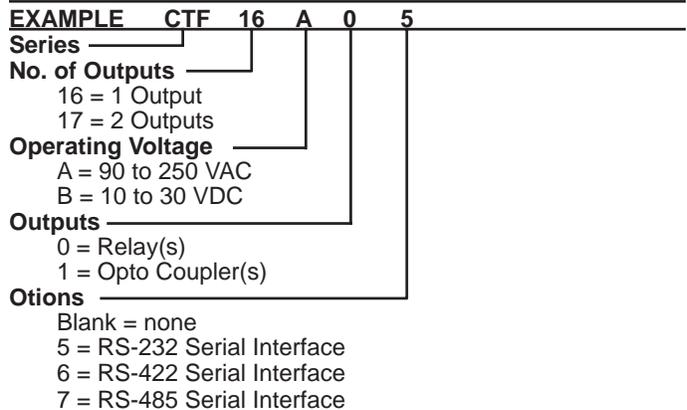


Adaptor Bezels 1, 2 & 3 Supplied

**Rear View**



**How To Order:**



# KEPTROL

## Counter, Timer or Ratemeter

### Features

- Counter, Timer or Ratemeter
- Counts Up To 100 kHz
- 8 Digit Display
- Input Scaling
- Batch Counter
- DC Output to Power Peripherals Sensors
- NEMA 4X / IP65 Sealed Front Panel

### Applications:

Metering, Rate Monitoring, Cut to Length, Coil Winding, Batch control, all in one programmable unit.

### Description:

Featuring 8 digits of bright .55 inch alpha-numeric display, the KEPTrol can accept up to 100,000 pulses per second of digital count or rate data, and time in keyboard selected ranges of 1/10,000 of a second to hours. The unit can multiply the input from 0.0001 to 99.9999 to easily understood units of measurement and give two control outputs at separate set points.

Selection of counter, timer or rate meter function as well as input scaling, timer frequency, preset levels, output timing and special security number are entered on the sealed front keypad by following instructions written on the display.

The unit operates from either 110 VAC /12 to 27 VDC or optional 220 VAC /12 to 27 VDC. If AC power is used, two built-in regulated 12 VDC ~100 mA power supplies are offered. They can be connected to provide + 12 VDC and - 12 VDC or + 24 VDC to drive external devices. CMOS logic is used to provide high noise immunity and low power consumption with EEPROM to hold data a minimum of 10 years if power is interrupted.

Integrating the KEPTrol with computers or programmable controllers is made easy by optional RS232 or RS422 interface. Up to 15 units can be addressed separately to set control points or access data through the I/O ports.

### Specifications:

**Display:** 8 digit .55" high, 15 segment red orange LED.

**Input Power:** A: 110 VAC  $\pm$  15% or 12 to 27 VDC. B: 220 VAC  $\pm$  15% or 12 to 27 VDC.

**Current:** Max. 280 mA DC or 5.3 VA at rated AC voltage.

**Output Power:** (on AC powered units only): + 12 VDC @100 mA. Separate isolated 12 VDC @100 mA to allow  $\pm$ 12VDC or +24 VDC, regulated  $\pm$  5% worst case.

**Memory:** EEPROM stores all program and count data for minimum of 10 years if power is lost.

**Approvals:** CE Approved



**Pulse Inputs:** Various inputs may be ordered from standard plug-in input cards.

2A: Simultaneous Pulses:

Use for count or rate modes only. Separate pulses on input A count up, pulses on input B count down without loss of count even if pulses come at the same time. Open or 0 to 1VDC (low), 3 to 30VDC (high), 10 kOhm impedance. Max speed 10KHz (min. on/off .05 msec) (Internal switch to select debounce filtering to max. speed of 40, 400, or 10K Hz) (Board #2102)

3A: **Standard.** High Impedance Up/down Control. Use for count, time and rate modes. Input A accepts all pulses for count, rate, time stop. Input B controls direction of count (low: counts down, high: counts up), starts timer. Open or 0 to 1 VDC (low), 3 to 30VDC (high) 10K Ohm impedance. 100 kHz max. speed (min on/off 5 sec., 13 $\mu$ sec, if direction is changed). Min 13  $\mu$ sec delay required after up/down level change before count pulse. May be used with KEP encoder 715-2.

3B: Same as 3A input but has 4.7K Ohm input pull up resistors to +5VDC on inputs A and B for pulsing with contact to ground or NPN open collector transistor.

3C: High Impedance Separate Up/down: Use for count or rate modes only. Same specs as input 3A but separate pulses on input A count up, pulses on input B count down. Inputs must be normally low. (If input A is high, input B counts up on positive edge. If input B is high input A counts down on positive edge). May be used with KEP encoder 715-1.

3D: Same as 3C input but has 4.7K Ohm input pull-up resistors to 5VDC on inputs A and B.

NOTE: Inputs 3A, 3B, 3C, 3D as well as debounce filtering to max. speed of 40, 400 or 100 kHz are selectable by internal switches on any series 3 input card.

4A: Optically Isolated Up/down Control 5 to 12VDC: Use for count, time and rate modes. Input A accepts all pulses for count, rate, time stop. Input B controls direction of count (low: counts down, high: counts up), starts timer. Open or 0 to 1.5VDC (low), 5 to 12VDC (high), 1.1K Ohm impedance. Max speed 1500 Hz (min. on/off .33 msec. Min. count delay after up/down change.

4B: Same as 4A, but input voltage is open or 0 to 2 VDC (low), 12 to 24 VDC (high), impedance 2.2K Ohm.

4C: Optically Isolated Separate Up/down, 5 to 12VDC: Use for count or rate mode only. Same specs as input 4A, but separate pulses on input A count up, pulses on input B count down. Inputs must be normally low. (If input A is high, input B counts up on negative edge If input B is high, input A counts down on positive edge).

4D: Same as input 4C but input voltage is open or 0 to 2 VDC (low) 12 to 24 VDC (high), impedance 2.2K Ohm.

NOTE Inputs 4A, 4B, 4C, 4D as well as debounce filtering to max. speed of 40 or 1500 Hz are selectable by internal switches on any series 4 input cards. (#2098)

9A: Quadrature Input: Use for count or rate mode only. Accepts pulses 90° out of phase for up/down counting. Open or 0 to 1VDC (low), 3 to 30 VDC (high), 10K Ohm impedance, 20 kHz max speed (min on/off .025 msec) (Internal switch to select debounce filtering to max. speed of 40, 400 or 20 kHz.) (Board #2135) May be used with KEP 716 encoder

1A: Quad (x2) 5-30 VDC

1B: Quad (x4) 5-30 VDC

**Reset:** Front push-button CLR and remote reset input requirements follow pulse input selected. High level reset overrides other inputs. Min. on time, 5 msec.

**Scaling:** Any input from an external source or the internal time base can be multiplied by any number from 0.0001 to 99.9999. Press C to see scale factor. To change scale factor, press CLR and key in new factor. Press ENT to load in the displayed factor.

**Preset:** Two levels (8 digits) or one preset (8 digits) and one batch preset (8 digits). The preset numbers can be displayed or updated at any time by pressing A (preset A) or B (preset B). Enter the flashing preset number or press CLR and key in a new number and ENT to enter it. Output time from 0.1 sec. to 9.9 sec. or latched till reset is selected by RELAY mode set up.

**NOTE** The RATE METER mode has a floating decimal point. If a preset with a decimal is needed in the RATE METER mode only, use D to key in a decimal when setting up preset numbers. Outputs are active at or above preset rate and "off" below preset rate.

**Control Outputs:** (each of 2 outputs).

1. NPN transistor version: (Standard) Open collector sinks max. 250 mA from max. 30 VDC when active. (when relay is used, 10 VDC is provided at transistor outputs through relay coil. If greater than 2 mA is used, relay will remain energized. Applying greater than 10 VDC may destroy unit. Transistor will sink 100 mA in "on" state.)

2. SPDT Relay version: 10A 120/240 VAC or 28 VDC

**Temperature:** Operating +32°F (0°C) to +130 °F (+54°C).

Storage: -40°F (-40°C) to + 200°F ( + 93°C)

**Mode Selection:** All following functions are selected by front keypad. Following prompts written on the display, choose the basic device type, relay output operation, outcard data interface and panel lockout security code.

**Ratemeter:** Accurate to 51/2 digits ± 1 display digit. It can be programmed to accept almost any number of pulses per unit of measurement, sample from 2 to 24 seconds maximum, perform weighted averaging from 0.0 to 9.9. [(old data x wt + new data ÷ wt. + 1)] and auto-range up to 6 digits of significant information. Two levels of preset are standard. Outputs are active at or above the preset rate and return to the rest state when reading drops below the preset rate.

**Counter:** 8 digits of count with 2 levels of preset or 1 level of count preset and 1 level of batch preset Counter is designed to advance on negative edge of pulse. Choose between reset to zero or set to preset. Other choices include; manual reset, auto recycle at preset A, alternate action (counts to preset A, activates output A, counts to preset B, drops out output A.) or batcher. In the batch mode, the unit counts to preset A, activates output A, recycles and advances separate batch counter one count. At a preset number of batches output B is activated until batch counter is reset. At any time the display can be made to flash the batch total by pressing ENT while the unit is running. Activating CLR while the batch total is flashing resets the batch counter and the B preset output.

**Timer:** Choose from 1 to 10,000 pulses per second or minute basic time base with accuracy to +.015% and scale base from 0.0001 to 99.9999 to time in seconds, minutes, hours or days. Timing is controlled by positive edge of signal by one of three ways selected on the keypad:

**Level:** Times while input B signal is high

**Pulsed:** One positive pulse on input B starts timer, second positive pulse on input B stops timer

**Start-Stop:** Positive pulse on Input B starts timer, positive pulse on input A stops timer.

Once the time base is selected and the timing started, the unit operates much as a counter. All the features listed under "Counter" are available with the timer. (See section under "Counter" operating modes)

**Relay:** Control output timing is selected by pressing D until the RELAY mode is selected and entered. Time duration from .1 to 9.9 seconds (or 00 for latch output) may be entered for A and B outputs. Once the output has been activated, unit must be reset before another output will occur. The control output timing is independent of the counter/timer reset which is selected under its setup modes. In the RATE MODE of operation the outputs are active at or above the preset rate and return to the rest state when the reading drops below the preset rate.

**Lockout:** Unauthorized front panel changes can be prevented by entering a user selected 4 digit code in the LOCK-OUT mode. The status of the unit can be observed but "LOCKOUT" appears if changes are attempted. Entering the code returns the unit to "LOCK OFF" status.

**Outcard:** RS232 or RS422 serial 2 way communication options are available. Up to 15 units can be linked together and addressed separately to transmit unit status or accept new set points in the standard ASCII format. Baud rates of 300, 600,1200, 2400, 4800 or 9600 as well as choice of odd, even, space or mark parity can be selected by keypad control.

Opt 1: RS 232 serial interface.

Opt 2: RS 422 serial interface.

**How To Order:**

**EXAMPLE** KP8 A 3A 2 A 2

**Series** KP8

**Operating Voltage**  
 A: 110 VAC ± 15% or 12 to 27 VDC  
 B: 220 VAC ± 15% or 12 to 27 VDC

**Control Inputs**  
 2A: Simultaneous, 3 to 30 VDC  
 10KHz max., Count and rate models only  
 3A: **Standard**, High impedance, Up/down control:  
 3 to 30 VDC, 100KHz max. Use for all models.  
 3B: As 3A, with 4.7KΩ pull up resistors.  
 3C: As 3A, with separate Up and Down inputs  
 3D: As 3C, with 4.7KΩ pull up resistors.  
 4A: Standard, Opto-isolated up/down control  
 5 to 12 VDC: 1500Hz max. Use for all models.  
 4B: As 4A, but to 12 to 24 VDC  
 9A: Quadrature, 3 to 30 VDC, 20KHz max.  
 Count and rate models only.  
 1A: Quad (x2) 5-30 VDC  
 1B: Quad (x4) 5-30 VDC

**Control Outputs**  
 1: Open collector (NPN)  
 2: SPDT relay 10A

**Input Speed**  
 A: 0-40 Hz (relay or snap action switch), inputs 2,3, 4, 9  
 C: 0-400 Hz (reed switch), inputs 2, 3, 9  
 D: 0-1500 Hz (opto-solid state), input 4  
 E: 0-10 KHz (solid state), inputs 2, 3, 9  
 F: 0-20 KHz (quad-solid state), input 9  
 G: 0-100 KHz (hi-speed solid state) input 3

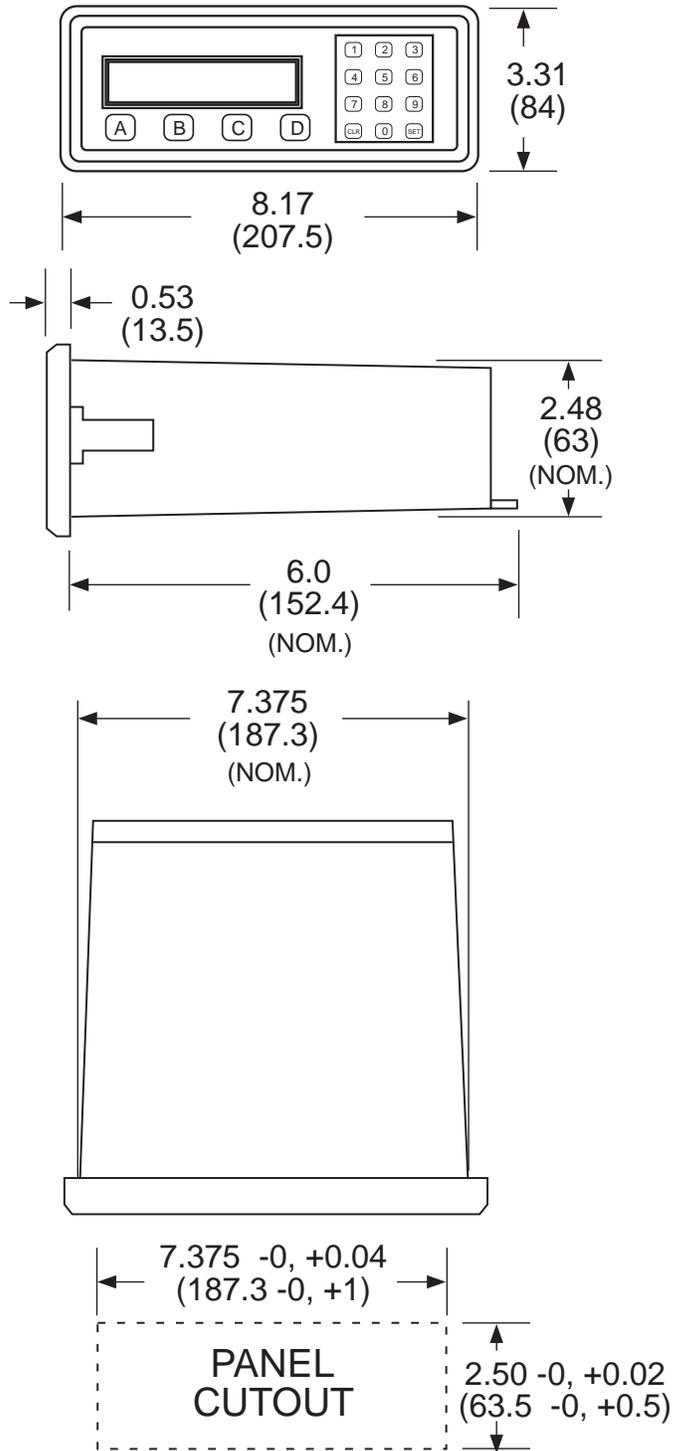
**Options**  
 1: RS232 serial interface  
 2: RS422 serial interface

**Terminations:**

- 1• Opto Input Common
- 2• Not Used
- 3• Input B (Cnt Dwn, Up/Dn Ctrl, Start)
- 4• Input A (Cnt Up, Rate, Time Stop)
- 5• Reset Input
- 6• Not Used
- 7• Not Used
- 8• Not Used
- 9• Not Used
- 10• Not Used
- 11• Ground (-DC)
- 12• Ground (-DC)
- 13• +12 Volts Out
- 14• +DC Power In
- 15• Isolate -12 Volts
- 16• Isolate +12 Volts
- 17• AC In
- 18• AC In
- 19• Preset B Transistor
- 20• Preset A Transistor

- R1• N.O. ——— A
- R2• N.C. ——— A
- R3• Common ——— A
- R4• N.O. ——— B
- R5• N.C. ——— B
- R6• Common ——— B

**Mounting:**



# POSITROL

## Low Cost, Pulse Input Position Monitor

### Features

- 2 Control Set Points with Selectable Start Point
- 5 Digit Floating Point Decimal Scaling Factor
- Display From -99999 to 999999
- Pulse Input - 30 kHz Maximum
- Separate Up and Down Inputs
- Quadrature & Pulse Input with Up/down Control
- NEMA 4X / IP65 Sealed Front Panel



### Application:

Any position monitoring application where 2 alarm set-points and a 6 digit LED display is needed, such as blade positioning, box making and many other machine shop and industrial applications.

### Description:

Featuring 6 digits of bright, 7-segment LED displays, the Positrol is a position monitor which accepts signal inputs up to 30 kHz. A 5 digit floating decimal scale factor allows a readout in true engineering units. The unit has two, programmable alarm set points from -99999 to 999999 and a selectable start point. These setpoints control two 5 Amp relays. A two stage panel lock prohibits menu changes from unauthorized personnel.

### Specifications:

**Display:** 6 digit, .55" high, 7 segment, red orange, LED.

#### Input Power:

110 VAC  $\pm$  15% or 12 to 15VDC.

220 VAC  $\pm$  15% or 12 to 15VDC.

Current: 300 mA DC max or 8.0 VA at rated AC voltage.

**Output Power:** (AC powered units only)

+ 12VDC @ 50mA **unregulated** -10 +50%

#### Temperature:

Operating: +32°F (0°C) to +130°F (+54°C).

Storage: -40°F (-40°C) to +200°F (93°C).

**Memory:** EEPROM stores data for ten years if power is lost.

**Inputs:** DC pulse input open or 0-1 VDC (low), 4-30 VDC (high), 30 kHz speed max.

### Reset:

Front Panel: resets display to view (start) value.

Remote: 4-30VDC positive edge, Resets display to view (start) value.

**Lockout:** Unauthorized front panel changes can be prevented by entering a user selected, 5 digit code. The lockout feature can be programmed to lock the entire front panel or lock the menu items and leave the presets and reset accessible. In either mode the locked items can be viewed but not changed.

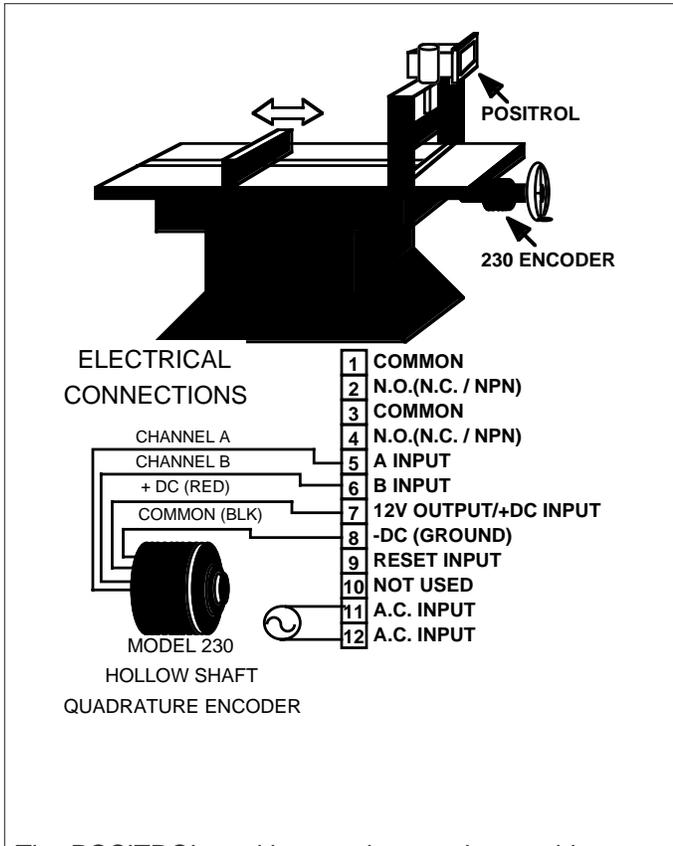
**Control Outputs:** 2 each N.O. Relays - 5 Amp @ 120/240 VAC or 28 VDC. (N.C. Relay contacts or NPN sink from 10 VDC to .5 VDC @ 100 mA available with solder jumpers). The output will remain active when the display is equal to or greater than the set point. If the display falls below the set point, the output becomes inactive.

**Set Points:** Two control set points are provided. The set points can be programmed for any number from minus 99999 to plus 999999. The Positrol will recognize new set point values without the need to reset the unit. The unit also has a starting point which can be viewed or changed by pressing the "view" button. When the reset is activated, the display will reset to the view (start) value.

**Shipping Weight:** 2 pounds.

**Approvals:** CE Approved

**Typical Application:**



The POSITROL position monitor can be used in many position applications. When two units are used, both X and Y axes positions can be monitored. The application below involves monitoring of the X axis only.

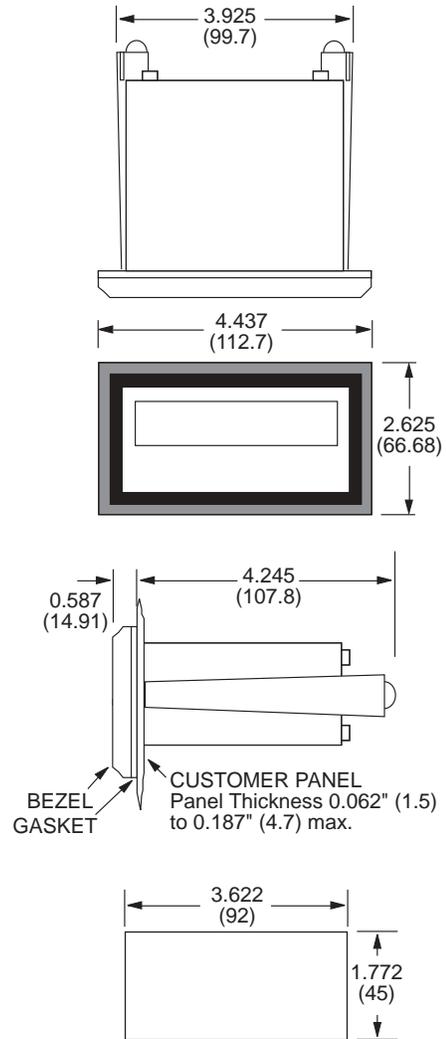
In this application the STOP position on a sheet metal shear must be monitored. A KEP model 230 quadrature encoder was placed on the screw drive shaft. The Encoder outputs 100 pulses per revolution. Each revolution of the screw drive equals a .15 inch movement of the STOP. To calculate the scale factor simply divide 100 by .15 ( $100 \div .15 = 666.66$  pulses per inch. This would be the scale factor if the display was to be read in inches.

In this application, the STOP movement must be accurate to .01 inches. Therefore the factor 666.66 must be divided by 100 ( $666.66 \div 100 = 6.6666$  pulses per .01 inch. Enter 6.6666 for the scaling factor.

The unit has two alarm set points which activate two relays. The unit also has a programmable preset starting point. At any time the preset start point can be viewed or changed by pressing the view button. The two relay outputs can be used to signal alarms when the desired position has been reached.

The POSITROL is the perfect solution for position monitoring applications where a low cost, scalable monitor is needed.

**Dimensions:**



**How To Order:**

<b>SAMPLE:</b>	PM2	A	3
<b>Series</b>	PM2 Position Monitor		
<b>Operating Voltage</b>	A= 110 VAC $\pm$ 15% or 12 to 15 VDC B= 220 VAC $\pm$ 15% or 12 to 15 VDC		
<b>Inputs</b>	3 = Separate Up / Down Inputs 5 = One Count Input, One Up / Down Control 9 = Quadrature		

**Accessories**

Separate non keyboard panel order #34235  
Separate keyboard panel - order #34237

# SHIFT-TROL

## Low Cost, Pulse Input Productivity Shift Monitor

### Features

- Monitor Up to 4 Separate Shifts
- Separate 5 Digit Preset Counter
- Separate 5 Digit Scaling Factors For Shifts and Preset Counter
- Pulse Input - 10 kHz Maximum
- EEPROM Memory Stores All Program & Data Values For 10 Yrs.
- 1/8 DIN Cutout
- NEMA 4X / IP65 Sealed Front Panel

### Application:

Any piece-work application where several production shifts must be monitored. The Shift-trol shift monitor is especially useful in the Textile industry.

### Description:

Featuring 6 digits of bright, 7-segment LED displays, the Shift-trol is a shift monitor which accepts signal inputs up to 10 kHz. The 5 digit dividing scale factors allow readouts in true engineering units. The unit has two, programmable alarm set points. These setpoints control two 5 Amp relays. A two stage panel lock prohibits menu changes from unauthorized personnel.

### Specifications:

**Display:** 6 digit, .55" high, 7 segment, red orange, LED.

#### Input Power:

A) 110VAC  $\pm$  15% or 12 to 15VDC.

B) 220VAC  $\pm$  15% or 12 to 15VDC.

C) 24VAC  $\pm$  15% or 12 to 15VDC.

Current: maximum 300 mA DC or 8.0 VA at rated AC voltage.

**Output Power:** (AC powered units only)

+12VDC @ 50mA **unregulated** -10 +50%

#### Temperature:

Operating: +32°F (0°C) to +130°F (+54°C).

Storage: -40°F (-40°C) to +200°F (93°C).

**Shift Counters:** 5 digit display with a 5 digit dividing scale factor. The unit can monitor up to 4 separate shifts and can be ordered with a selectable fifth shift, grand total of shifts or a run time meter. Pressing the view button allows the operator to alternately view each shift, the preset counter, the ratemeter and the selected fifth shift, grand total or run time.

#### Input Signals:

4 to 30 VDC pulses (open or 0-1V low; 4-30V high).

MIN. ON/OFF PULSE WIDTH: (Pin 5)

High CPS: .05 msec. 10 kHz max.)

Low CPS: 12.5 msec. (40 Hz max.)



**Preset Counter:** 5 digit display with a 5 digit dividing scale factor. Two, 5 digit, programmable setpoints are available for output control. Display flashes when either output is active.

**Ratemeter:** Accurate to 4 1/2 digits. The ratemeter displays the RPM (rate per minute) of the raw input data.

**Memory:** EEPROM stores data for ten years if power is lost.

#### Reset:

Front Panel: resets displayed value and updates averaged rate to new sample.

Two Level Remote: 4-30VDC positive edge (Min. on: 12 msec.);  
1. (Pin 9) Resets preset counter and control output only. 2. (Pin 6)-"Input B": Resets displayed value and updates averaged rate to new sample.

**Lockout:** Unauthorized front panel changes can be prevented by entering a user selected, 5 digit code. The lockout feature can be programmed to lock the entire front panel or lock the menu items and leave the presets and reset accessible. In either mode the shifts can be changed and the locked items can be viewed but not changed.

**Serial Communications:** RS232 or RS422 serial communication options are available. Up to 99 units can be networked to a computer and individually accessed. Information can be retrieved as well as sent to any single unit in the loop. A programmable print list is provided for strobed data transmission to printers and other peripheral devices.

#### Control Outputs:

2 each N.O. Relays - 5 Amp @ 120/240 VAC or 28 VDC. (N.C. Relay contacts or NPN sink from 10 VDC to .5 VDC @ 100 mA available with solder jumpers). The output will activate when the display is equal to or greater than the set point.

**Shipping Weight:** 2 pounds.

**Approvals:** CE Approved

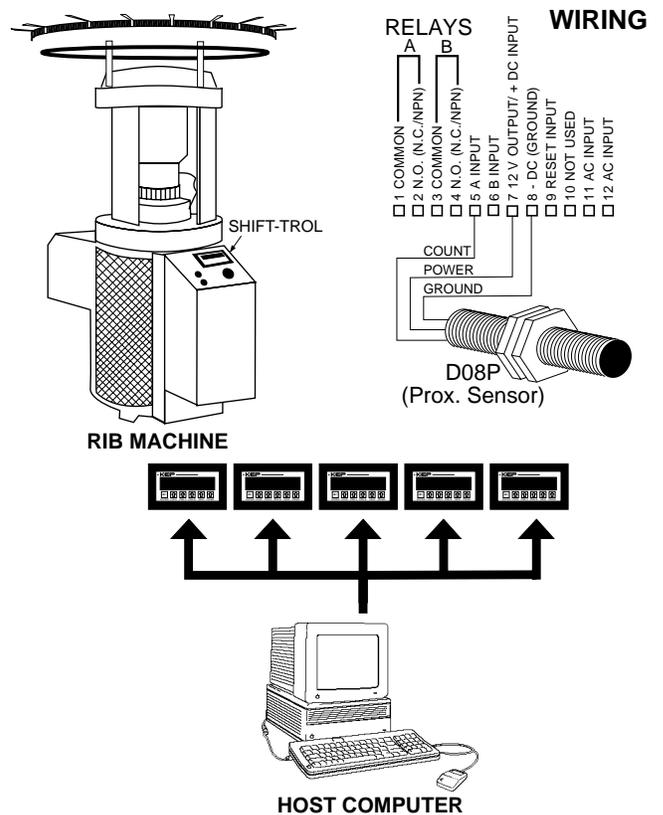
**TYPICAL APPLICATION:**

**NEED:**

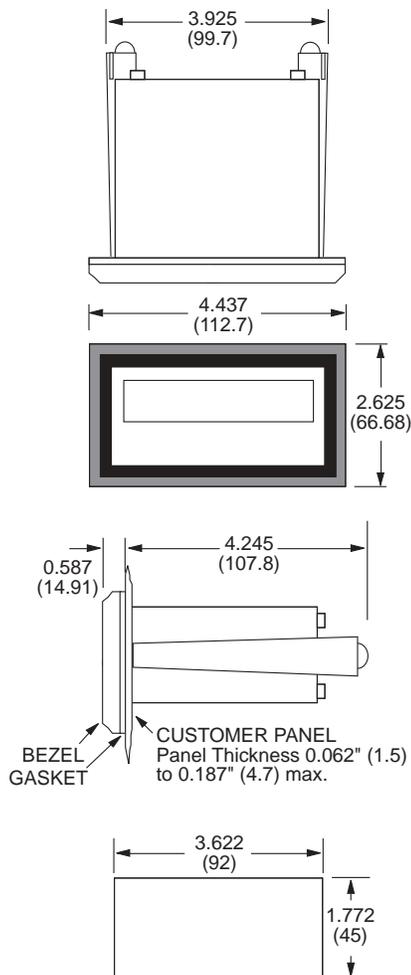
A company in the textile industry has a rib machine for which four shifts and machine run time must be monitored. To achieve optimum production, the monitoring system must also include the speed of the machine as well as a preset counter (doff counter). This system will be installed in several rib machines. The individual systems must be networked together allowing a host computer to access processing and data information.

**SOLUTION:**

The company purchased the Shift-trol (ST3A1) and the D08P proximity sensor. The prox. sensor was mounted to sense each rotation of the machines shaft. It takes 579 rotations of the shaft for one yard of material to be produced. Therefore the scaling factor for the shifts was set at 579. The preset counter (doff counter) is to read in tenths of hanks. Therefore the scaling factor for the preset counter was set at 27792 (579 x 48; "48 yards in a tenth of a hank"). The Shift-trols were ordered with RS232 communication and were linked to a host computer. Each Shift-trol was assigned a unique ID number so each work station can be individually addressed. All of the process and data information can be accessed and recorded by the host computer.



**DIMENSIONS:**



**How To Order:**

EXAMPLE: ST3	A	1
<b>Series</b> _____		
<b>ST0:</b> 3 shifts, no scaling, 1 separate preset counter with 1 control output		
<b>ST1:</b> 3 shifts, scaling, 1 separate preset counter with 1 control output		
<b>ST2:</b> 3 shifts, scaling, 1 separate preset counter with 2 control outputs		
<b>ST3:</b> 4 shifts, scaling, 1 separate preset counter with 2 control outputs, 1 separate RPM ratemeter of unscaled input data, selectable: Grand Total, 5th Shift or Run Time.		
<b>ST4:</b> 3 shifts, scaling, 1 separate preset counter with 2 control outputs, 1 separate ratemeter with separate scaling, selectable: Grand Total, 4th Shift or Run Time.		
<b>Operating Voltage</b> _____		
A= 110 VAC ± 15% or 12 to 15 VDC B= 220 VAC ± 15% or 12 to 15 VDC C= 24 VAC ± 15% or 12 to 15 VDC		
<b>Options</b> _____		
1 = RS232 Communications 2 = RS422 Communications		

**Accessories**

- Separate non keyboard panel order #34235
- Separate keyboard panel - order #34237

# KALTROL-SP

Self Powered, Preset Counter  
Replaces Electro-Mech. Counters

PRESET COUNTERS

## Features

- Internal Battery Powered (8 years)
- Programmable N.O. or N.C. Relay Output
- Replaces Electro-Mechanical Units
- 6 Digit LCD Display
- Main & Lower LCD Displays Indicate Counter and Preset Values without External Power
- Add or Subtract Count Control
- Optically Isolated Count and Reset Inputs

## Applications:

Batch counting and control, coil winding and wire cutting, length measurement, packing-line control, stop/start control and numerical position control.

## Specifications:

**Display:** 2 lines of 6 digits, black on silver background. Main display .275" (7mm); indicates count value. Bottom display .157" (4mm); shows preset set point, "output on" and "low battery" indicators.

**Preset Point:** Single preset, user selectable: count up with output at preset (add), or count down with output at 0 (sub).

**Reset:** Manual, electrical and automatic. User selectable for reset to zero (add) or reset to the preset value (sub).

### Inputs: (Count & Reset)

Count Speed: Max. 35 Hz (min. 14 mSec On/Off)

Reset: Edge Triggered, Minimum pulse 50 mSec

Optocoupled (STD) KAT-SP:

Low: Open or 0 to 2V

High: 12-250 VAC/VDC

Input Impedance: 100 kΩ

Switch Closure (Option S) KAT-SPS:

Low: 0 to 0.8V

High: Open or 2 to 5 VDC

Sink Current 5 mA, (DO NOT EXCEED 5 VDC)

**Programming:** Via six front-panel digit keys (one key assigned to each digit) and one front-panel reset key.

**Output:** Relay (N.O. or N.C.) self latching, contacts rated at 2A @ 30VDC, 0.5A @ 240VAC resistive load. In the manual reset mode (loop off), the output will remain latched until reset. In the auto-reset (loop on) mode the output will remain "on" for a user selectable time delay (100 to 500 msec.).

**Batteries:** Two internal, customer replaceable 3V lithium batteries provide power and data retention for up to 8 years (calculated at 5 x 10<sup>6</sup> power operations @ 25°C).

**Battery Monitor:** Subsidiary display shows LO-BAT when batteries require replacement.

**Noise Immunity:** To VDE 843, Part 4, Severity 3

### Temperature Range:

Operating: +14°F to +122°F (-10°C to +50°C)

Storage: -4°F to +140°F (-20°C to +60°C)

**Protection:** Front Panel is NEMA 4/IP65 sealed

**Weight:** Approx. 80 g

**Approvals:** CE Approved



## Operating The Counter:

### Setting or Resetting

Press the red SET button or apply a pulse to the reset input to set the counter to zero (add) or the preset (sub).

### Presetting

The preset is displayed on the lower line of the display. To set the preset, use the 6 keys assigned to the 6 digits. The unit must be reset to accept the new preset value.

### Overflow and Underflow

In the adding mode the overflow is 999999 to 0; In the subtracting mode it is 0 to 999999. The output signal remains unaffected.

### Lo-Bat Indicator

When the battery charge is too low, "Lo-bat" will appear on the lower line of the display and flash in 2 second intervals. When "Lo-bat" is indicated, the batteries should be replaced as soon as possible.

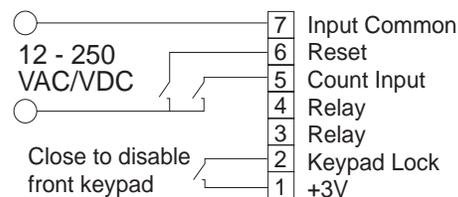
### Changing the Batteries

Push the battery cover back and remove the batteries. Insert the replacement batteries making certain that the polarity is correct (observe "-" terminal on PCB).

**Note:** If the battery replacement takes longer than 7 minutes, the count, preset and program parameters will be lost. If this occurs, the unit will automatically enter the programming mode upon battery installation.

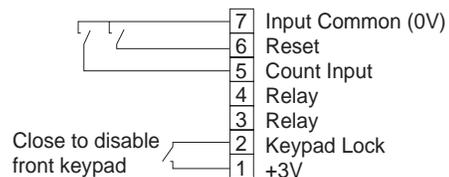
## KAT-SP Wiring Connections:

(Standard KAT-SP Opto Input)



## KAT-SPS Wiring Connections:

(Optional KAT-SPS Switch Closure Input)



**Entering Programming Mode:**

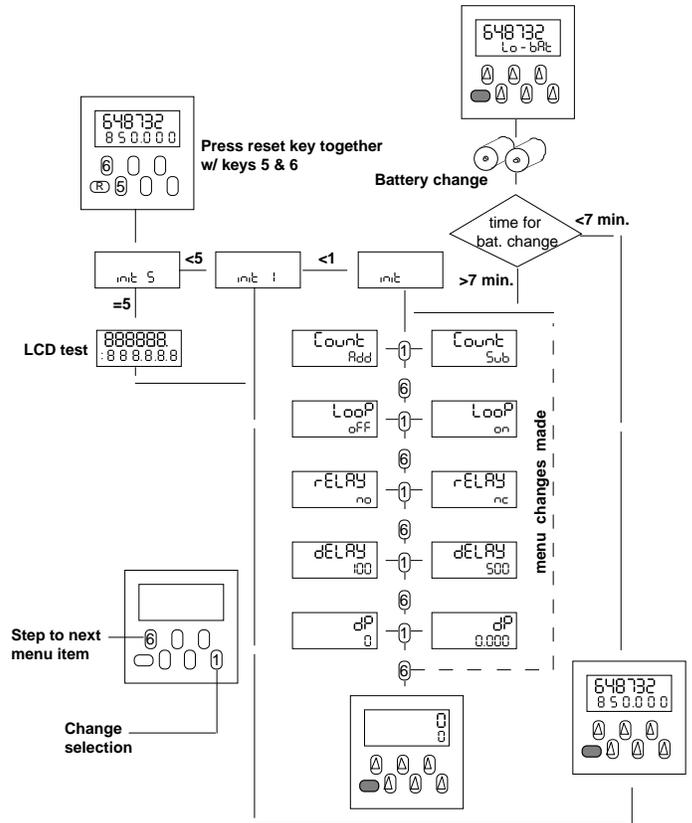
Press the reset key together with the keys of decade 5 and 6 to enter the programming mode. On the lower line of the display the message "INIT" appears together with a down counter subtracting from 5 to 0 seconds. If the keys are released when the counter equals 5, the display will enter an LCD test. Releasing the keys at any time when the counter is greater than one, the display will return to the operating mode. If the keys are released after reaching zero, the programming mode will become active.

**Setting the Operational Parameters:**

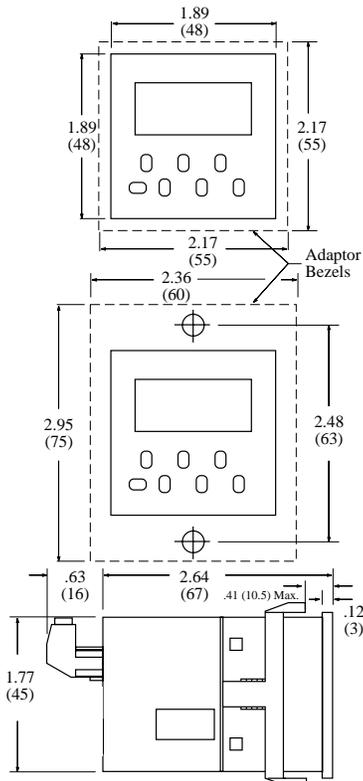
Key 1 allows the user to choose requested functions within the parameters (i.e. add/subtract). Key 6 selects the displayed choice and advances to the next selection. After the last parameter "dp", the program jumps to the beginning. To exit the programming mode, the user must step through all the parameters (from beginning to end) with NO CHANGES at all.

**NOTE:** Whenever the programming mode is entered, the program jumps to the beginning, the previous parameters will be lost and the count and preset will be zeroed. If a battery change takes longer than 7 minutes, the display will automatically advance to the programming mode.

**Programming Flowchart:**



**Dimensions:**



**Panel Cutout:**

Bezel Size	Cutout
1.89 x 1.89 (48 x 48)	1.77 x 1.77 (45 x 45)
2.17 x 2.17 (55 x 55)	1.97 x 1.97 (50 x 50)
2.95 x 2.36 (75 x 60)	1.77 x 1.77 (45 x 45)
	1.97 x 1.97 (50 x 50)
	w/ Screw Holes

**Adaptor bezels supplied:**

2.17 x 2.17 (55 x 55) or 2.95 x 2.36 (75 x 60)

**Menu Prompts:**

- Count Add      Counter will count up and output at preset
- Count Sub      Counter will count down from preset and output at zero
- Loop on          Counter will Auto-reset at preset (add); zero (sub).
- Loop off        Counter will continue to count past preset (add); zero (sub).
- rELAY nc        Relay is normally closed (opens at preset)
- rELAY no        Relay is normally opened (closes at preset)
- dELAY 100-500    The output delay (duration) in msec., ignore if Loop off.
- dp                Decimal Point location 0 to 0.000

**How To Order:**

- KAT-SP** (opto input)
- KAT-SPS** (switch closure input)
- N7** - Explosion proof housing (see accessories section)
- KATSP-BAT** Replacement Battery (2 required)

# 903K & 904K

## LCD Preset Add/Subtr. Counter, Timer, Frequency Meter

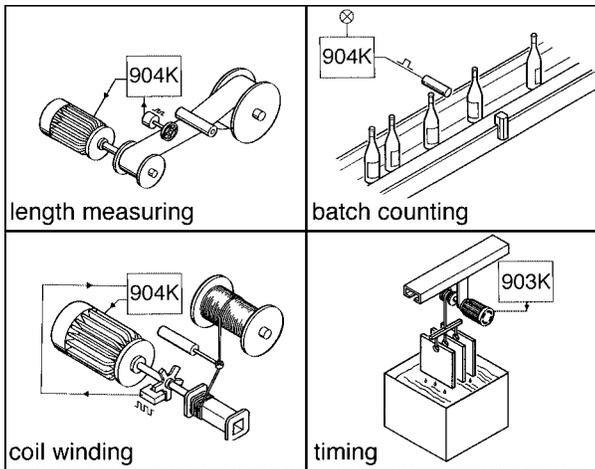
### Features

- 6 Digit Counter, Timer or Frequency Meter
- 2 Preset Values (Type 903K 1 Preset)
- Input Scaling (0.0001 to 9.9999) Multiplier
- 2-Line LCD Display
- Count & Preset Range of -999999 to 999999
- Add or Subtract Count Control
- AC or DC Operation
- Secondary Preset Batch Counter (904K)
- 24VDC to Power Peripherals



### Applications:

Preset batch counting, length measuring, simple positioning, time control, speed control, rate control.



### Description:

The 903K/904K Series is a LCD preset counter, timer or frequency meter. The following features are programmable:

- operating mode, polarity of inputs, input mode, multiplying factor, decimal point.
- output signals to be permanent or timed
- automatic reset
- gate time when programmed as a frequency meter
- timer resolution (s, min, h or h:min:s)

### Inputs:

#### INP A, INP B

Count inputs. Max. count frequency 30 Hz or 10 kHz; separately selectable for both of these inputs.

#### Gate:

Level input; no counting while this input is activated.

#### Reset:

Edge triggered input; it is connected in parallel to the red reset key and sets the counter to zero (adding mode) or to the preset value (subtracting mode).

#### Key:

Level voltage input locks keypad.

### Outputs:

2 potential-free outputs (Type 903: 1 output), versions with relay or optocoupler available.

### Programming:

Types 903 and 904 are programmed by 4 front panel keys secured by a side dip switch. Easy setup is assured by selection of menu prompts on the display. The changing of presets by the front panel keys can be inhibited by external "Key" input.

### Input Polarity:

Positive (PNP) or negative (NPN). The selected polarity applies to all inputs in common.

### Operating modes, Impulse Counter and Timer:

- adding, starting at zero, manual or automatic reset
- subtracting, starting at the preset value (Type 903) respect. at preset value 2 (Type 904), manual or automatic reset.

### Input modes, Impulse Counter and Frequency Meter:

- E1: 1 count input, 1 count direction input
- E2: 1 count input up, 1 count input down
- E3: quadrature input
- E4: quadrature input with pulse doubling

### Decimal places:

The values may be displayed without, with one, two or three decimal places.

### Scaling factor:

A scaling multiplier of 0.0001 ... 9.9999 may be programmed to display desired units of measure.

### Output signal:

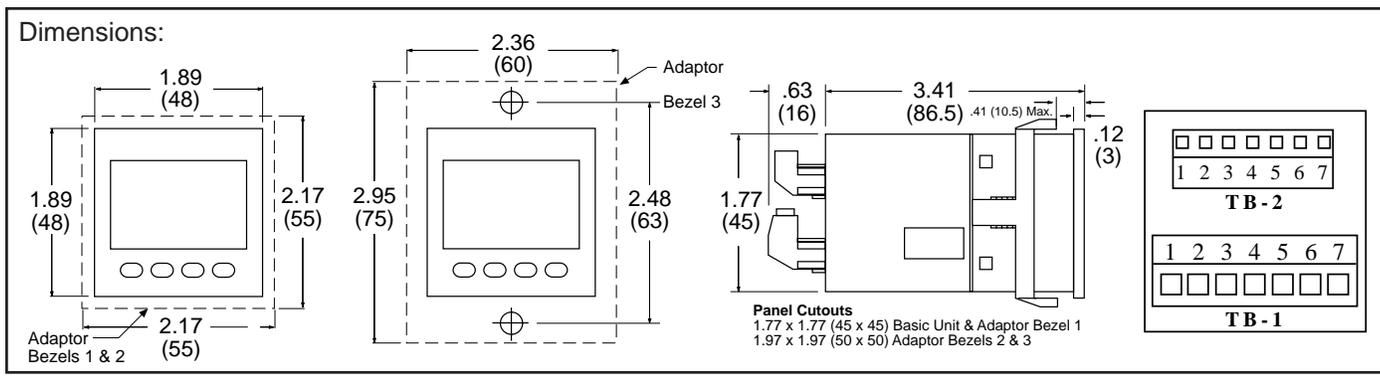
Selectable as a NO contact, NC contact, positive, negative, latched or timed (0.01 s to 99.99 s).

### Gate time (Frequency Meter):

Selectable from 0.01 s to 99.99 s.

### Hour Meter:

Timing in h, min or s, with a resolution of 0.001, 0.01, 0.1, 1.0 or h:min:s.



### 903K Wiring

#### AC Supply Wiring

TB-1		TB-2	
Term. #	Description	Term #	Designation
1	No Connection	1	+24VDC Output
2	No Connection	2	0VDC (Ground)
3	Relay - C (Opto Emitter)	3	Input A
4	Relay - NO	4	Input B
5	Relay - NC (Opto Collector)	5	Reset
6	AC Input	6	Gate
7	AC Input	7	Key

#### DC Supply Wiring

TB-1		TB-2	
Term. #	Description	Term #	Designation
1	No Connection	1	No Connection
2	No Connection	2	No Connection
3	Relay - C (Opto Emitter)	3	Input A
4	Relay - NO	4	Input B
5	Relay - NC (Opto Collector)	5	Reset
6	(+) 11-30 VDC Supply	6	Gate
7	(-) 0 VDC Supply (Ground)	7	Key

### 904K Wiring

#### AC Supply Wiring

TB-1		TB-2	
Term. #	Description	Term #	Designation
1	Relay 1 - C (Opto Collector1)	1	+24VDC Output
2	Relay 1 - NO (Opto Emitter1)	2	0VDC (Ground)
3*	Relay 2 - C (Opto Emitter2)	3	Input A
4	Relay 2 - NO	4	Input B
5*	Relay2 - NC (Opto Collector2)	5	Reset
6	AC Input	6	Gate
7	AC Input	7	Key

#### DC Supply Wiring

TB-1		TB-2	
Term. #	Description	Term #	Designation
1	Relay 1 - C (Opto Collector1)	1	No Connection
2	Relay 1 - NO (Opto Emitter1)	2	No Connection
3*	Relay 2 - C (Opto Emitter2)	3	Input A
4	Relay 2 - NO	4	Input B
5*	Relay2 - NC (Opto Collector2)	5	Reset
6	(+) 11-30 VDC Supply	6	Gate
7	(-) 0 VDC Supply (Ground)	7	Key

\* The wiring termination of pins 3 & 5 is correct here and on the unit termination label. Pins 3 & 5 may be reversed on some older datasheets.

**Technical Data:**  
**Display:** 6 digit, 2-line, 7 segment LCD with sign  
**Preset:** Type 904 two preset values  
 Type 903 one preset value

**Supply voltage:** 115 VAC, 230 VAC, 48 VAC or 24 VAC (tolerance  $\pm 10\%$ ) or 11 ... 30 VDC

**Count inputs:** 2 count inputs, 4 input modes programmable.

**Input polarity:** programmable (PNP or NPN)

**Input resistance:** 10 kohm

**Max. count frequency:** 10 kHz (Switch selectable 30Hz or 10kHz)

**Min. pulse length of the control inputs:** 5 ms

**Input sensitivity:** Logic "0": 0 to 1 VDC  
 Logic "1": 4 to 30 VDC

**Pulse shape:** variable (Schmitt Trigger characteristic)

**Output:** (Programmable output state)  
 relay (250 V @ 3A)  
 or optocoupler (30VDC/15mA @ 2V, 5mA @ 0.4V)  
 903: 1 output : SPDT  
 904: 2 outputs: R1 N.O., R2 SPDT

**Transmitter voltage:** 24 VDC, 80 mA  
 24 VDC, 60 mA for version with backlit LCD (optional)

**Data retention:** min. 10 years or  $10^6$  memory cycles

**Noise immunity:** EN 50082 part 2

**Noise transmission:** EN 55011 class B

**Operating temperature:** 0...+50°C

**Housing:** 48 x 48 mm DIN

**Protection:** IP 65 (front)

**How To Order:**

<b>EXAMPLE</b>	<b>904K</b>	<b>A</b>	<b>0</b>	<b>A</b>
<b>Series</b>				
903K = Single Output				
904K = Dual Outputs				
<b>Operating Voltage</b>				
A = 115 VAC				
B = 230 VAC				
C = 11 to 30 VDC				
<b>Outputs</b>				
0 = Relay				
1 = Opto-Isolated collector and emitter				
<b>Options</b>				
- Blank if None				
A = Backlit LCD Display (904K only)				

# TR-545 Series

## Totalizer and Ratemeter

### Features

- Totalizer and Rate meter
- Separate scaling factor for counter and ratemeter
- Ratemeter displays frequency or RPM
- Simply press key to switch between counter and ratemeter
- Display range: 0 to 999999
- Screw terminal connections



### Description:

The TR-545 is a totalizer and ratemeter. It accepts DC pulse inputs up to 20kHz. It is a perfect solution for all applications requiring the monitoring of rate and total.

### Specifications:

Supply voltage: 10 to 30 V DC, with reverse polarity protection  
90 to 260 V AC 50/60 Hz  
mains hum suppression

Power consumption: max. 2 W/6 VA

Display: 6-digit, red 7-segment LED's  
height 14 mm

Data backup: EEPROM

Housing: housing for control panel 96 x 48 mm acc. to DIN 43 700;  
RAL 7021, dark grey

Polarity of Inputs: programmable, npn or pnp for all inputs

Input resistance: appr. 10 k $\Omega$

Input frequency: 20 kHz, can be damped to 30 Hz

Reset time: 5 ms

### Level of inputs:

DC-version  
Low: 0 to 0.2 x UB [V DC]  
High: 0.6 x UB to 30 V DC

AC-version  
Low: 0 to 4 V DC  
High: 12 to 30 V DC

DC Output: 24 V DC  $\pm$ 15 %/100 mA (AC powered units only)

Accuracy: Ratemeter: <0,1 %

Ambient temperature: -10 to +50°C

Storage temperature: -25 to +70°C

EMC: according to EC EMC directive 89/36/EWG

Interference emissions: EN 50081-2/EN 55 011 class B

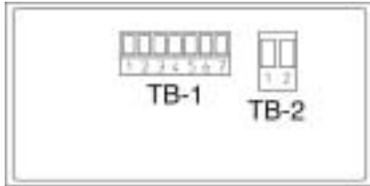
Interference resistance: EN 6100-6-2

Protection: NEMA4/IP65 (front panel)

Weight: appr. 150 g

## Wiring Connections

### Rear View



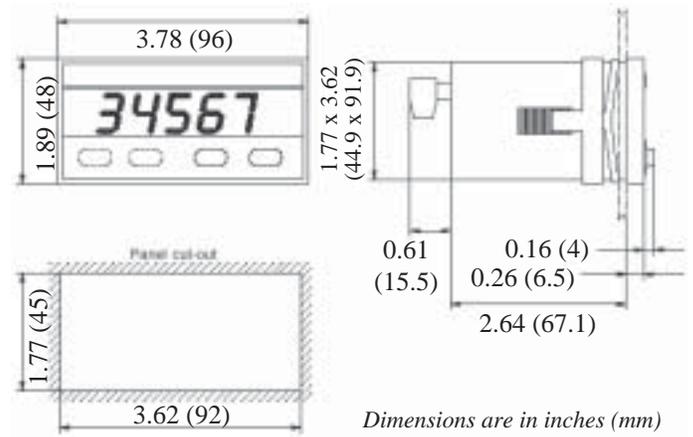
### TB-1 Measurement Inputs

Pin	AC-Version	DC-Version
1	n.c.	
2	n.c.	
3	Reset	
4	n.c.	
5	INP	
6	GNDout	n.c.
7	+24 Vout	n.c.

### TB-2 Supply Voltage and Outputs

Pin	AC-version	DC-version
1	90 ... 260 V AC	0 V DC (GND)
2	90 ... 260 V AC	10 ... 30 V DC

## Dimensions



### Order Code

Example: TR545.012 0 00

Series: \_\_\_\_\_  
 TR-545 = Totalizer & Ratemeter

Operating Voltage: \_\_\_\_\_  
 0 = 90 to 260 VAC  
 3 = 10 to 30 VDC

Options: \_\_\_\_\_  
 00= None

# MRT (MINITROL)

## Low Cost, Pulse Input Totalizer/Ratometer

### Features

- CSA Listed
- Separate Scaling Factors For A & B Inputs
- Display Rate & Total
- Pulse Input - 10 kHz Max.
- RS422/RS232 Serial Communication
- Modbus RTU RS422/RS485/RS232
- NEMA 4X / IP65 Front Panel
- Separate Add/Subtract Simultaneous Inputs
- Quadrature & U/D Direction Control Inputs

### Application:

Any rate, total or blending application where 2 preset alarms and scaling are required.

### Description:

The MINITROL is a 6 digit totalizer / ratemeter with two level, 5 digit preset alarm control of total or rate. Inputs A & B have separate scaling K-factors. The totalizer can be programmed for "A" subtract "B", "A" add "B" or A & B as separate totalizers, with display and control of the "net" total and rate of "A". The MINITROL is also available in 4 other versions. MC2: a two preset totalizer with scaling, MR2: a high/low alarm ratemeter with scaling; The "MC": a totalizing counter only, and the "MR": a rate meter display only. If only one input is required, the unit will display the total and rate from that one channel. The MINITROL can accept up to 10,000 pulses per second. It has a 5 digit floating decimal scale factor allowing total readout in true engineering units and rate per second, minute or hour.

Input "A" simultaneously drives a ratemeter which can be programmed to display the basic frequency (rate per second) or factored to show rate per minute or rate per hour. Simply push the "VIEW" button to see either total or rate without losing a count. Two separate 5 A relay contacts can be set to operate at either rate or total presets in a latch or auto-recycle mode with output timing from 0.1 to 99.9 seconds.

Two control outputs can be assigned to either the totalizer or ratemeter and can automatically recycle at the batch or stay latched until reset.

Up to 99 units can communicate to a host computer on a single RS232 or RS422 loop.

When two inputs are received (A & B), the unit can either add or subtract the two inputs or display the two inputs as separate totalizers.



- 30mV Magnetic Pickup Inputs
- 4-20mA or 0-20mA Analog Output

### Specifications:

**Display:** 6 digit, 0.55" High LED

#### Input Power:

110 VAC  $\pm$  15% or 12 to 15 VDC

220 VAC  $\pm$  15% or 12 to 15 VDC

24VAC  $\pm$  15% or 12 to 15 VDC

**Current:** 250 mA DC max. or 6.5 VA AC

**Output Power:** (AC powered units only)

+12 VDC @ 50 mA, unregulated -10 + 50%

#### Temperature:

Operating:

+32°F (0°C) to +130 F (+54°C)

Storage:

-40 F (-40°C) to +200°F (93°C)

**Humidity:** 0-90% Noncondensing

**Memory:** EEPROM stores data for 10 years if power is lost.

#### Inputs:

- 3: High Impedance DC pulse input 4-30 VDC (high), Open or 0-1 VDC (low), 10 K $\Omega$  imp. 10 kHz max. speed. Accepts simultaneous inputs. May be used with KEP 711 series or 715-1 encoders or PD & D series sensors.
- 3M: Mag. Input, Input A only, accepts 30mV input (50 V max. P/P) signals 10 K $\Omega$  imp. 5 kHz max. (Input B, 4-30V)
- 3MB: Mag. Input, Inputs A & B, accepts 30mV input (50 V max. P/P) signals 10 K $\Omega$  imp. 5 kHz max.
- 5: 4-30 V Count pulses on Input A, 4-30 V Direction Control input (level) on Input B. May be used with KEP 715-2 Encoder.
- 5M: 30 mV Count pulses on Input A (50 V max. P/P) 4-30 V Direction Control input (level) on Input B.
- 9: Quadrature, accepts 4-30 V pulses with 90° phase shift for direction detection. May be used with KEP 716 encoder.
- 9MB: Quadrature, accepts 30 mV (50 V max. P/P) pulses with 90° phase shift for direction detection.

**Approvals:** CSA File# LR91109-7, CE Compliant

**Reset:**

Front Panel:

Resets displayed value and control output

Remote:

4-30 VDC negative edge

resets Totalizer "A" and control output

**Control Outputs:**

Relays:

2 each N.O. Relay; 5 Amps 120/240 VAC or 28 VDC. (N.C. relay contacts and NPN transistor output available with solder jumpers. Transistor output is internally pulled up to 10 VDC through relay coil, sinks from 10 VDC to .5 V @ 100 mA)

Analog Output:

An optional 4-20mA (0-20mA) output is available for the Minitrol series. The output can be programmed to track rate or total. This feature is available by adding suffix A to the part number. Connections are via a 2 terminal pluggable screw connector.

Programming is accomplished by using the front panel in conjunction with rear dip switches.

Accuracy:  $\pm 0.25\%$  FS worst case.

Compliance Voltage: 3 to 30 VDC non inductive.

**Scaling Factor (K-Factor):** In the standard unit, a user programmable K-Factor is used to convert the input pulses to engineering units. The 5 digit K-Factor dividers, with decimal keyed into any position, allow easy direct entry of any K-Factor from 0.0001 to 99999. Separate factors may be entered for the 2 separate input channels.

**Presets:** Two control outputs are provided. To set relay values, press "menu" button until "Relay" appears on the display, the A and B outputs can be assigned to the ratemeter (high/low), one preset for rate and one for total, or two presets on the A and B totalizers. A 5 digit value can be entered for both presets and the decimal point location is the same as the counter. The outputs can be set to energize from 0.1 to 99.9 seconds or latch (0.0). If a value other than 0.0 is entered, the totalizers will auto reset at the preset. In the A-B or A+B versions, the relays will be assigned to either net total or A rate.

**Lockout:** Unauthorized front panel changes can be prevented by entering a user selected 5 digit code in the "LOC" mode. The front panel can be completely locked out or the presets can remain accessible.

**Ratometer:** Accuracy: 0.01% FS ( $\pm 1$  display digit).

The rate display updates once per second. The rate meter can be programmed to accept almost any number of pulses per unit of measurement, sample from 2 to 24 seconds maximum, and auto-range up to 5 digits of significant information. In the "RPS" mode, the ratemeter displays in units per second, and in the "scale" mode, units per hour or per minute. The unit will display the rate of the A Input only.

**Totalizer:** The two 6-digit totalizers can count at 10 kHz max. Each can have a 5-digit dividing scale factor. The totalizer advances on the positive edge of each pulse. Count up or down modes available, as are quadrature inputs from encoders for position or flow measurement. The unit can be programmed to view the net value of "A+B" or "A-B", or A and B as separate totalizers.

**RS232/RS422 with KEP Protocol:**

If the serial interface option is supplied, a number of units can be linked together. (The terminal addressing the unit must be capable of driving all loads in the loop.) Unit status and new set points can be communicated by serial communication. Mode changes, however, must always be made on the front panel.

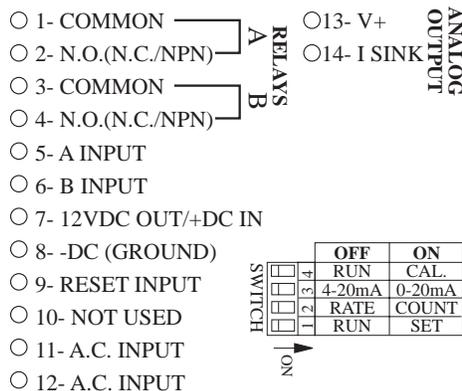
Data is received and transmitted over standard EIA RS232 or RS422 levels. Unit number, baud rate and parity are entered in the "Program Setting" set up mode and remain in memory even if power is off.

**RS232/RS422/RS485 with Modbus RTU Protocol:**

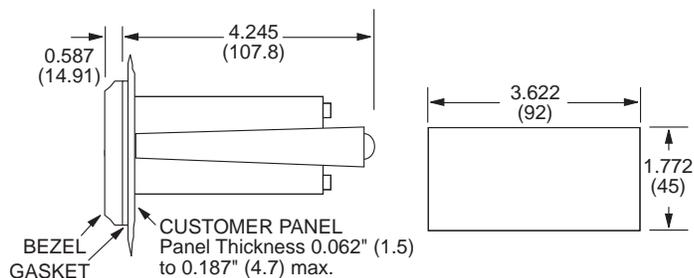
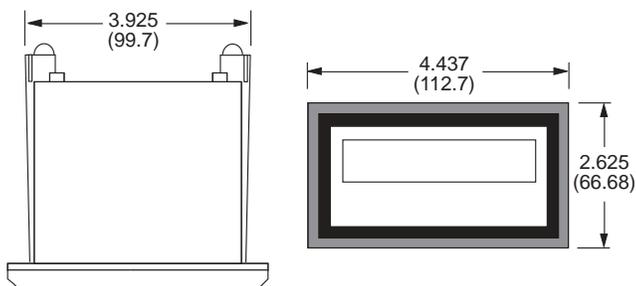
The serial port can be used for serial printing or also for data acquisition. The unit can assign addresses up to 247 units (The terminal addressing the unit must be capable of driving all loads in the loop.) The unit can communicate with a master device through a Modbus-RTU protocol. The data given for each parameter is in IEEE float format comprising of 2 words. The unit can be connected in a network.

- Device ID: 01-247
- Baud Rates: 300, 600, 1200, 2400, 4800, 9600
- Parity: None, Odd, Even
- Protocol: Modbus RTU (Half Duplex)

**Termination:**



**Mounting:**



**How To Order:**

**MINItrol (MRT, MC2, MR2)**

<b>Example:</b>	<b>MRT</b>	<b>A</b>	<b>3</b>	<b>1 A</b>
<b>Series:</b>				
<b>MRT=</b>	6 digits, counter / ratemeter with presets and scaling.			
<b>MC2=</b>	6 digits, counter only with presets and scaling.			
<b>MR2=</b>	5 digits, rate only with presets and scaling.			
<b>Operating Voltage:</b>				
<b>A=</b>	110 VAC ± 15% or 12 to 15 VDC			
<b>B=</b>	220 VAC ± 15% or 12 to 15 VDC			
<b>C=</b>	24 VAC ± 15% or 12 to 15 VDC			
<b>Count Inputs:</b>				
<b>3 =</b>	Standard, 4-30 VDC simultaneous inputs.			
<b>3M =</b>	Mag. Input, Input A only, 30mV input (Input B, 4-30V)			
<b>3MB =</b>	Mag. Input, Inputs A & B, 30mV input			
<b>5 =</b>	4-30 V pulses on Input A, 4-30 V Direction Control input on Input B.			
<b>5M =</b>	30 mV pulses on Input A, 4-30 V Direction Control input on Input B			
<b>9 =</b>	Quadrature, accepts 4-30 V pulses			
<b>9MB =</b>	Quadrature, accepts 30 mV pulses (A & B)			
<b>Options (Multiple Options Not Available)</b>				
<b>1=</b>	RS232 Communications			
<b>2=</b>	RS422 Communications			
<b>3=</b>	Modbus RTU RS232			
<b>4=</b>	Modbus RTU RS422/RS485			
<b>A=</b>	Analog Output (4-20/0-20 mA)			

**Accessories**

Separate non keyboard panel order #34235  
 Separate keyboard panel - order #34237

**MINItrol (MR, MC)**

<b>Example:</b>	<b>MC</b>	<b>H</b>	<b>A</b>	<b>3</b>	<b>M (MR ONLY)</b>	<b>1</b>
<b>Series:</b>						
<b>MR=</b>	5 digits, rate display only no presets, no scaling					
<b>MC=</b>	6 digits, dual input, bi-directional counter only, no presets, no scaling					
<b>Input Speed:</b>						
<b>L =</b>	Low speed input debounce filter 40 Hz max.					
<b>H =</b>	High speed input (0 to 9.99 kHz)					
<b>Operating Voltage:</b>						
<b>A=</b>	110 VAC ± 15% or 12 to 15 VDC					
<b>B=</b>	220 VAC ± 15% or 12 to 15 VDC					
<b>C=</b>	24 VAC ± 15% or 12 to 15 VDC					
<b>Count Input:</b>						
<b>3 =</b>	Standard, 4-30 VDC simultaneous inputs.					
<b>3M =</b>	Mag. Input, Input A only, 30mV input (Input B, 4-30V)					
<b>3MB =</b>	Mag. Input, Inputs A & B, 30mV input					
<b>5 =</b>	4-30 V pulses on Input A, 4-30 V Direction Control input on Input B.					
<b>5M =</b>	30 mV pulses on Input A, 4-30 V Direction Control input on Input B					
<b>9 =</b>	Quadrature, accepts 4-30 V pulses					
<b>9MB =</b>	Quadrature, accepts 30 mV pulses (A & B)					
<b>Rate Time Base: MR ONLY</b>						
<b>S=</b>	RPS (rate per second)					
<b>M=</b>	RPM (rate per minute)					
<b>H=</b>	RPH (rate per hour)					
<b>Options: (Multiple Options Not Available)</b>						
<b>1=</b>	RS232 Communications					
<b>2=</b>	RS422 Communications					

**Accessories**

Separate non keyboard panel order #34235  
 Separate keyboard panel - order #34237

# DRT (Dual rate/totalizer)

## 2 Separate Rate/Total Displays with Combination Function

### Features

- Displays A,B,&C Rate & A,B,&C Total
- Separate Scaling Factors For A & B Inputs
- "C" Displays A+B, A-B, A÷B, & A÷A+B
- RS422/RS232 Serial Communication
- Modbus RTU RS422/RS485/RS232
- Pulse Input - 10 kHz Max.
- Security Lockout
- NEMA 4X / IP65 Front Panel
- 30mV Magnetic Pickup Inputs



COUNTERS/RATEMETERS

- 4-20mA or 0-20mA Analog Output
- CSA Listed

### DESCRIPTION:

The DRT (Dual Rate Totalizer) is a dual 5 digit Ratemeter 6 digit Totalizer in a 1/8 DIN package. User selects 1 of 6 displays to show A,B or C rate and A,B or C total. Inputs A and B have separate scaling to read in engineering units.

A 4-20mA (0-20mA) output of the C rate or total is optional.

The user can press the VIEW button to see 6 separate items total A, total B, total C, rate A, rate B, rate C. Negative values are displayed with a negative symbol (- 12345). For the C value, the user can choose from the following combination of A&B inputs: TOTAL; with a choice of A+B or A-B; RATIO with choice of A÷B(x100) to show percent of A to B quantity or A÷[A+B(x100)] to show percent of A to total quantity.

Two independent presets are standard. User selects whether output A is activated by total or rate value of input A or selected C. Output B can be activated by total or rate value of input B or selected C. Outputs activated by A or B total can be set to latch or autorecycle with an adjustable output duration from 00.1 to 99.9 sec. For rate, ratio, or C total outputs pull in when value is equal or above the preset and drop out when value is below the preset minus the selected 0 to 999 hysteresis.

### SPECIFICATIONS:

#### DISPLAY:

6 digit, 0.55" High LED

#### INPUT POWER:

110 VAC ± 15% or 12 to 15 VDC

220 VAC ± 15% or 12 to 15 VDC

24VAC ± 15% or 12 to 15 VDC

#### CURRENT:

250 mA DC max. or 6.5 VA AC

#### OUTPUT POWER: (AC powered units only)

+12 VDC @ 50 mA, unregulated -10 + 50%

#### TEMPERATURE:

Operating:

+32°F (0°C) to +130 F (+54°C)

Storage:

-40 F (-40°C) to +200°F (93°C)

#### HUMIDITY:

0-90% Noncondensing

### MEMORY:

EEPROM stores data for 10 years if power is lost.

### INPUTS:

3: High Impedance DC pulse input 4-30 VDC (high), Open or 0-1 VDC (low), 10 KΩ imp. 10 kHz max. speed. Accepts simultaneous inputs. May be used with KEP 711 series or PD & D series sensors.

3M: Mag. Input, Input A only, accepts 30mV input (50 V max. P/P) signals 10 KΩ imp. 5 kHz max. (Input B, 4-30V)

3MB: Mag. Input, Inputs A & B, accepts 30mV input (50 V max. P/P) signals 10 KΩ imp. 5 kHz max.

### RESET:

Front Panel: Resets displayed value and control output

Remote: 4-30 VDC negative edge resets all counters, "A" counter or "B" counter (user selectable).

### K FACTOR/SCALING

The DRT has two separate K-Factors that are used to convert the input pulses to engineering units. The 5 digit K-Factor dividers, with decimal keyed into any position, allow easy direct entry of any K-Factor from 0.0001 to 99999. Separate factors may be entered for the 2 separate input channels.

### CONTROL OUTPUTS:

Relays:

2 each N.O. Relay; 10 Amps 120/240 VAC or 28 VDC.

(N.C. relay contacts and NPN transistor output available with solder jumpers. Transistor output is internally pulled up to 10 VDC through relay coil, sinks from 10 VDC to .5 V @ 100 mA)

Analog Output:

An optional 4-20mA (0-20mA) output is available for the DRT. The output can be programmed to track rate or total of the C display. This feature is available by adding suffix A to the part number. Connections are via a 2 terminal pluggable screw connector.

Programming is accomplished by using the front panel in conjunction with rear dip switches.

Accuracy: 50uA worst case.

Compliance Voltage: 3 to 30 VDC non inductive.

Approvals: CSA File# LR91109-7, CE Approved

**PRESETS**

Two control outputs are provided. To set relay values, press "menu" button until "Relay" appears on the display, the A and B outputs can be assigned to the A, B or C displays. A 5 digit value can be entered for both presets and the decimal point location is the same as the counter. The outputs can be set to energize from 0.1 to 99.9 seconds or latch (0.0). If a value other than 0.0 is entered, the counters will auto reset at the preset (for A&B counters).

**LOCKOUT**

Unauthorized front panel changes can be prevented by entering a user selected 5 digit code. The front panel can be completely locked out or the presets can remain accessible.

**RATEMETER**

Accurate to 4 1/2 digits (±1 display digit). The ratemeter uses 1/tau with 8 digit math, can sample from 2 to 24 seconds maximum, and auto-range up to 5 digits of significant information. In the "RPS" mode, the ratemeter displays in units per second, and in the "scale" mode, units per hour or per minute. The unit will display the rate of the A&B Inputs.

**TOTALIZER**

The two 5-digit totalizers can count at 10Khz speed. Each has a separate 5-digit dividing scale factor. The totalizers advance on the positive edge of each pulse. Besides being able to step

through the total and rate values of A & B inputs, the user can see a selected combination of total and rate of A+B, A-B, (A+B)X100 (percent of A to B), A÷(A+B)X100 (percent of A to total). The unit can be programmed to view the Total/Rate value of "A+B" & "A-B", or "A÷B" & "A÷(A+B)".

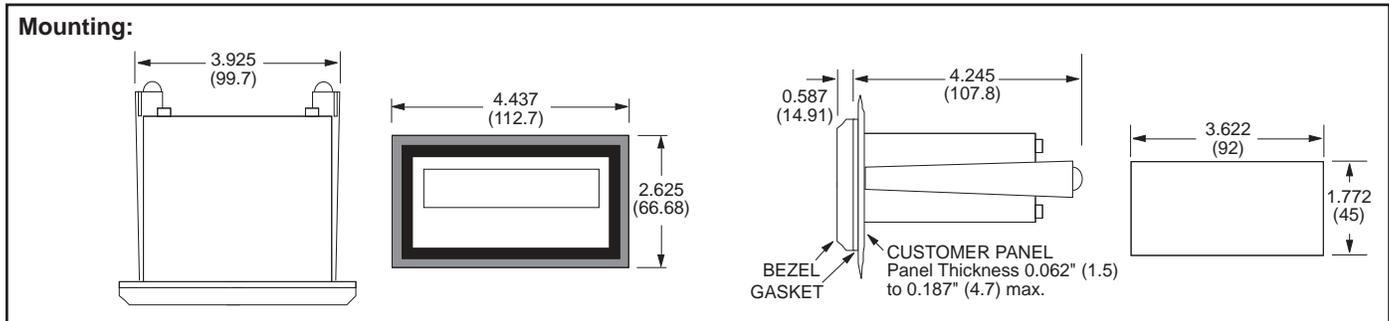
**RS232/RS422 with KEP Protocol:**

If the serial interface option is supplied, multiple units can be linked together. (The terminal addressing the unit must be capable of driving all loads in the loop.) Unit status and new set points can be communicated by serial communication. Mode changes, however, must always be made on the front panel. Data is received and transmitted over standard EIA RS232 or RS422 levels. Unit number, baud rate and parity are entered in the "Program Setting" set up mode and remain in memory even if power is off.

**RS232/RS422/RS485 with Modbus RTU Protocol:**

The serial port can be used for serial printing or also for data acquisition. The unit can address up to 247 units (The terminal addressing the unit must be capable of driving all loads in the loop.) The unit can communicate with a master device through a Modbus-RTU protocol. The data given for each parameter is in IEEE float format comprising of 2 words. The unit can be connected in a network.

- Device ID: 01-247
- Baud Rates: 300, 600, 1200, 2400, 4800, 9600
- Parity: None, Odd, Even
- Protocol: Modbus RTU (Half Duplex)



**Terminals:**

- 1- COMMON
  - 2- N.O.(N.C./NPN)
  - 3- COMMON
  - 4- N.O.(N.C./NPN)
  - 5- A INPUT
  - 6- B INPUT
  - 7- 12VDC OUT/+DC IN
  - 8- -DC (GROUND)
  - 9- RESET INPUT
  - 10- NOT USED
  - 11- A.C. INPUT
  - 12- A.C. INPUT
  - 13- V+
  - 14- I SINK
- RELAYS**  
A  
B
- ANALOG OUTPUT**
- |   |        |        |
|---|--------|--------|
|   | OFF    | ON     |
| 1 | RUN    | CAL.   |
| 2 | 4-20mA | 0-20mA |
| 3 | RATE   | COUNT  |
| 4 | RUN    | SET    |
- SWITCH**  
ON

**Ordering Information**

**Example:** DRT A 3 1

**Series:** DRT = 6 digits, counter / ratemeter with presets and scaling.

**Operating Voltage:**  
 A = 110 VAC ± 15% or 12 to 15 VDC  
 B = 220 VAC ± 15% or 12 to 15 VDC  
 C = 24 VAC ± 15% or 12 to 15 VDC

**Count Inputs:**  
 3 = Standard, 4-30 VDC simultaneous inputs.  
 3M = Mag. Input, Input A only, 30mV input (Input B, 4-30V)  
 3MB = Mag. Input, Inputs A & B, 30mV input

**Options:** (Multiple Options Not Available)  
 A = Analog Output (4-20/0-20 mA)  
 1 = RS232 Communications  
 2 = RS422 Communications  
 3 = Modbus RTU RS232  
 4 = Modbus RTU RS422/RS485

**Accessories:**

- Separate non keyboard panel order #34235
- Separate keyboard panel - order #34234

# RTP

## Two Separate Ratemeters, Totalizers With 2-Line LCD Display

### Features

- Two pulse and three control inputs
- Displays: A Rate, A Total, B Rate, B Total, A+B Rate, A+B Total, A-B Rate, A-B Total, Grand Total
- Separate Scaling Factors For A & B Inputs
- Two relay outputs with LED Indication
- RS232/ RS485 port for serial communication and printing
- Security lockout
- 4-20 mA output (optional)

### DESCRIPTION:

The RTP is a presettable Ratemeter and Totalizer from two pulse inputs. It can show rate and total at the same time on the 2 X 16 backlit LCD display. Both inputs can have up to 16 point linearizing k factors. The unit can be connected in a network for Data Acquisition.

### SPECIFICATIONS:

- INPUT POWER:** AC: 85 to 265 VAC; 6.5 VA  
DC: +24 VDC ; 250 mA max.
- THRESHOLD:** High: 4-24 VDC; Low: < 1Vdc or open
- INPUT A:** Count Input, 5 kHz max.
- INPUT B:** Count Input, 5 kHz max.
- INPUT C:** Control Input
- INPUT D:** Control Input
- INPUT E:** Control Input (Not Used with RS485)
- MAG INPUT(3MB):** Inputs A & B, accepts 30mV input (30 V max. P/P) signals 10 K $\Omega$  imp. 5 kHz max.
- NOTE:** AC powered units have isolated inputs. DC units share -DC with input common.
- OUTPUT POWER:** +20VDC @50 mA (unreg), +/- 15%
- DISPLAY:** 2 lines of 16 characters, backlit LCD (character size: 2.95mm x 5.55mm)
- BEZEL:** NEMA 4/IP65 rated membrane keypad
- INDICATORS:** Two LED's to indicate control output status. (Red = Output A, Green = Output B)
- MEMORY:** NVRAM retains data on power failure
- TEMPERATURE:** Operating : 0 to 50 degrees C  
Storage : -40 to 90 degrees C
- HUMIDITY:** 10% to 90% ( Non condensing )
- SIZE:** Bezel: 103mm X 55 mm; Depth: 97 mm
- PANEL CUTOUT:** 92 mm X 45 mm (1/8 DIN size cutout)
- IMMUNITY TO ESD:** Level 3 per IEC1000-4-2
- IMMUNITY TO TRANSIENTS:** Level 3 per IEC1000-4-4
- RADIATED SUSCEPTIBILITY:** Level 3 per IEC1000-4-3
- EMISSIONS:** EN55011 CISPR A



- NVRAM to retain data on power failure
- NEMA 4 / IP65 Front Panel

### PULSE INPUTS

The RTP can accept two pulse inputs (A&B). It computes rate and total of A, B, A+B and A-B. For both inputs the user can define up to 16 points of "k" factors. This allows linearization of the displayed rate, which is useful in improving the accuracy of the flowmeter.

The rate is computed within 300 ms per input. To stabilize the rate display, the user can select normalizing factor, which allows weighted average to be shown. Moreover, for rate displays, a time delay of up to 25 seconds can also be selected.

### CONTROL INPUTS

The RTP has three Control Inputs, i.e. Input C, Input D and Input E (Only C & D with RS485 option). Each input can be configured to start/stop each counter or reset each counter and Control Output. These inputs can also perform different control actions like printing on serial port, lock unit and freeze display.

### RESET OPTIONS

The entire unit, i.e. all counters and control outputs, or Counter A, Counter B, Counter A+B, Counter A-B, Control O/P A and Control O/P B can be individually programmed to be reset on pressing the front panel RST key and also by a positive edge signal to any of the Control I/Ps C, D and E.

### SERIAL COMMUNICATION

The serial strobed port can be used for serial printing of Total or Rate data with descriptors. The unit can also communicate with a master device through a Modbus-RTU protocol. The data given for each parameter is in IEEE float format comprising of 2 words. The unit can be connected in a network. Order Option 1 is RS-232 level format; Order Option 2 is RS-422/485 level format.

**CONTROL OUTPUTS**

RELAY: 2 N.O. relays of 5 A and 250 V

**ANALOG OUTPUT:**

Type: 4-20 mA output.

Accuracy: ± 50µA worst case.

This Analog O/P can be programmed to track any parameter.

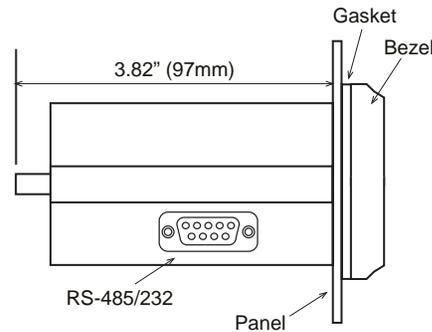
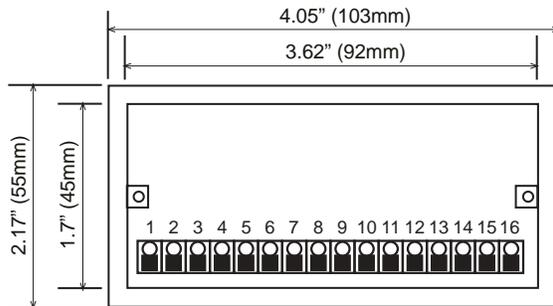
Reverse tracking O/P is also available.

**PRESETS:** The unit supports five counters, i.e. Counter A, Counter B, Counter A+B, Counter A-B and Grand Total. The counters can either be reset to zero or disabled. Relays can be activated by any of the Total or Rate values. If a Total preset activates the relay, the user can select an output duration of 0.1 to 99.9 seconds with instant auto reset to "0". A 00.0 duration keeps the relay activated until externally reset. If both presets are assigned to

same counter, with Relay A duration set to 00.0 and Preset A lower than Preset B, Relay A pulls in at Preset A and drops out when Preset B (having a duration other than 00.0) pulls in. Counter recycles immediately, and Relay B stays activated for the selected duration.

If activated by rate, the relay pulls in at High Preset or above and remains on until rate falls below Low Preset.

**LOCKOUT:** The unit program and presets can be protected with a lock code to prevent unauthorized front panel changes. This code can be assigned with a maximum of 4 digits and is user selectable. It can be entered through front panel LOCK key or by configuring any of the Control I/Ps to "Lock unit". Alternate entry of the lock code or pulses to that I/P will lock or unlock the unit.



**Terminal Designations:**

**AC POWER**

- 1 • AC1 (85 TO 265VAC)
- 2 • AC2 (85 TO 265VAC)
- 3 • RELAY B
- 4 • COMMON
- 5 • RELAY A
- 6 • COMMON
- 7 • (+) 20VDC OUT (50mA)
- 8 • (-) 20VDC OUT (50mA)
- 9 • ANALOG O/P (+)
- 10 • ANALOG O/P (-)
- 11 • CTRL I/P E
- 12 • CTRL I/P D
- 13 • CTRL I/P C
- 14 • PULSE I/P B
- 15 • PULSE I/P A
- 16 • INPUT GND

**DC POWER**

- 1 • (+) 24 VDC POWER
- 2 • (-) 24 VDC POWER
- 3 • RELAY B
- 4 • COMMON
- 5 • RELAY A
- 6 • COMMON
- 7 • NOT USED
- 8 • NOT USED
- 9 • ANALOG O/P (+)
- 10 • ANALOG O/P (-)
- 11 • CTRL I/P E
- 12 • CTRL I/P D
- 13 • CTRL I/P C
- 14 • PULSE I/P B
- 15 • PULSE I/P A
- 16 • INPUT GND

**Communication Port Terminal Designations:**



- 1 • Transmit B (-)
- 2 • Receive B (-)
- 3 • N.C.
- 4 • N.C.
- 5 • Ground
- 6 • N.C.
- 7 • N.C.
- 8 • Receive A (+)
- 9 • Transmit A (+)



- 1 • N.C.
- 2 • Transmit
- 3 • Receive
- 4 • N.C.
- 5 • Ground
- 6 • Strobe
- 7 • N.C.
- 8 • N.C.
- 9 • N.C.

**Ordering Information**

Example: RTP A 3 1

Series: RTP= Pulse Input Ratemeter/Totalizer

Operating Voltage:  
 A= 110 VAC ± 15%  
 B= 220 VAC ± 15%  
 C= 24 VDC

Input:  
 3= Standard, 4-30 VDC simultaneous inputs  
 3MB= Mag. Input, inputs A & B 30mV input (24VDC Power units only)

Options:  
 1= RS-232, 3 Control Inputs (not available with RS-485)  
 2= RS-485/Modbus-RTU, 2 Control Inputs (not available with RS-232)  
 A= 4-20 mA Out (Can be ordered with options 1 or 2)

Accessories  
 NEMA 4X wall mount enclosure available, see NEMA-1/8DIN  
 XHV 7/4 Explosion Proof Housing available, see XHV7/4

KEYPAD FUNCTIONS		
KEY	Run Mode	Program Mode
PROG	Enter The Programming Mode	Toggles between menus
VIEW	VIEW key scrolls through the selected viewing parameters	Left key shifts digits in number entry/characters in message mode
PRE A	PRE A key allows Preset A to be changed if unit is not locked	Up key increments digits/characters
CLR PRE B	PRE B key allows Preset B to be changed if unit is not locked	CLR key clears the numeric field
ENT LOCK	Lock Key allows the entry of a lock code to lock/unlock the unit	ENT key saves changes and steps to next menu
RST	RST Key resets counters (with/without confirmation)	Unit comes out of programming at any level

# INTELLECT-69

## Ratemeter / Totalizer From Analog Inputs

### Features

- High/Low Scaling From Front Panel
- 2 Set Points Assignable To Rate Or Total
- Display Rate (pressure, level, watts, etc.), Peak & Valley and Integrated Total
- 0-5V, 0-10V, 1-5V, 4-20mA or 0-20mA Analog Input
- NEMA 4X/IP 65 Front Panel
- +24V Output For Peripherals
- RS422/232 Serial Communications



- 4-20mA Output
- Square Root Extraction

### Description:

The Intellect-69 is an integrating totalizer/ratemeter which accepts analog signal inputs. The unit can be field programmed to accept 4-20mA, 0-20mA, 0-5V, 0-10V or 1-5V signals. An optional Square Law input is available for inputs that require square root extraction. A 4-20mA output option is available to control strip recorders or other peripherals. Two assignable set points are standard for two stage shut off. The high and low scaling settings are programmable from the front panel. By pressing the "view" button, the unit will display: integrated total, rate, peak or valley. Press the "lock" key once to freeze the display. RS422 or RS232 serial communications are available options for data communication with a host computer.

### Specifications:

**Display:** 6 digit, .55" high, 7 segment, red orange, LED.

**Input Power:** 110, 220 VAC  $\pm$  15% or 12 to 24VDC.

Current: max. 300 mA DC or 10.0 VA at rated AC voltage.

**Output Power:** (AC powered units only) + 24VDC @ 50mA regulated  $\pm$ 5%

### Temperature:

Operating: +41°F (5°C) to +130°F (+54°C).

Storage: -40°F (-40°C) to +200°F (93°C).

**Humidity:** 0-90% Noncondensing

**Memory:** EEPROM stores data for 10 years if power is lost.

### Reset:

Front Panel: resets displayed values and control outputs.

Remote: 4-30VDC positive edge, resets totalizer and control outputs.

### Input:

Standard: Linear 4-20mA, 0-20mA, 0-5V, 0-10V or 1-5V selectable from the front panel.

Optional: Square Law 4-20mA, 0-20mA, 0-5V, 0-10V or 1-5V is available for inputs that require square root extraction.

**Input Impedance:** Current: 100 $\Omega$ ; Voltage: 115K $\Omega$

**Overvoltage Protection:** 50 V

**Overcurrent Protection:** 50 mA

**Resolution:** 14.5 Bits

**Approvals:** CE Approved, CSA (File No. LR91109),

**Calibration:** The unit does all of the calibrations internally. There are no potentiometers to adjust and the unit never needs to be removed from the case.

### Control Outputs:

Standard: Open collector sinks 250mA from 30VDC when active.

Optional: 2 each Form C SPDT 5 Amp @ 120/240 VAC or 28 VDC. (Open collector outputs are also supplied with 10VDC provided at transistor outputs through relay coil. If greater than 2mA is used, relay will remain energized. Applying greater than 10 VDC may destroy unit. Transistor will sink 100mA in "ON" state.)

**Set Points:** Two control set points are provided. The set point outputs can be assigned to rate or total. The unit comes standard with two open collector control outputs. Two 5 Amp, Form C relays are optional. The outputs are programmable from .01 to 599.99 sec or latched until reset when assigned to the total and a hysteresis (alarm range) when assigned to the rate.

**Rate Display:** Updates 5 times per second, Accurate to 4.5 digits. Set "low" greater than "high" for inverted display (LINEAR ONLY). A user programmable low cutoff inhibits indications at low flow rates.

**Totalizer:** Integrates from the rate reading and accumulates up to 6 digits of total count. A totalizer divider allows the total to be divided by 1, 10, 100 or 1000. This feature is especially useful for users who deal with high total volumes.

**Analog Output:** The unit can be ordered with an optional 4-20mA output which is proportional to the instantaneous rate. (The normalizing averaging factor does not affect the analog output) The high and low settings are programmable from the front panel. Set "low" greater than "high" for inverted output. A sinking driver generates a corresponding linear current through the external devices. The output updates with each update of the rate. Accuracy is  $\pm$ .25% FS worst case. Compliance voltage must be 3 to 30 VDC non inductive. (The unit can provide the DC source as long as the drop across the devices being driven does not exceed 21V).

**Programming:** Decimal points, Scaling from 0 to 59999 units per selected time base, set points, input type, security lock code, and assigning outputs are all programmable from the front panel.

**Housing:** Standard 1/8 DIN, high impact ABS plastic case (NEMA 4X/IP65 front panel).

**Shipping Weight:** 2 lbs.

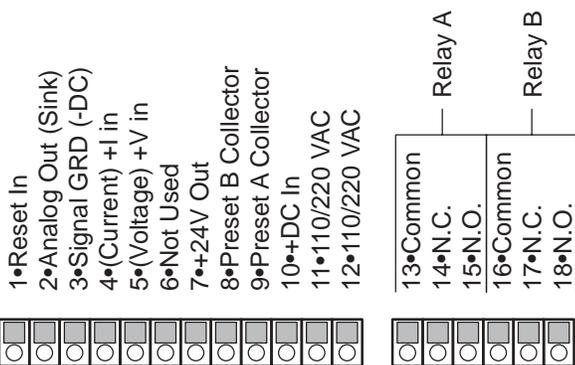
**Accuracy:**

RANGE	% FS ERROR (worst case)	% FS ERROR (typical)
0-20 mA	0.1%	.05%
4-20 mA	0.1%	.05%
0-10 VDC	0.2%	0.1%
0-5 VDC	.25%	.15%
1-5 VDC	.25%	.15%

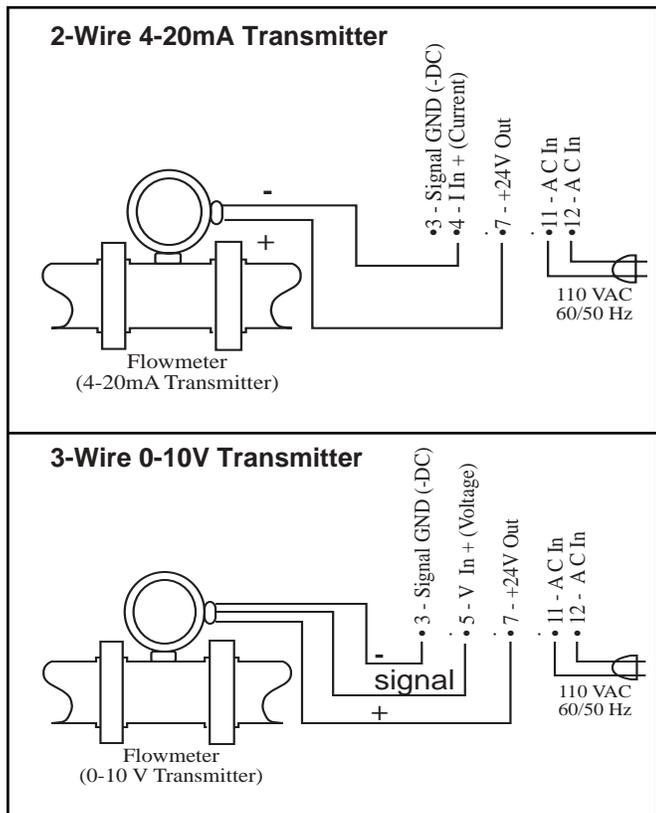
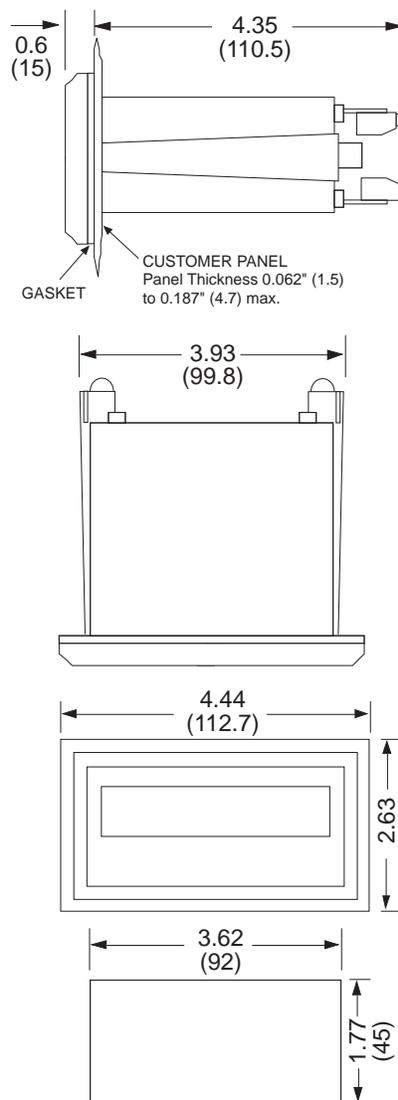
Square Law: (above 5% of bottom range) 0.1%  
(5V inputs .4%) Worst case over complete range: 2%

**Temperature Stability:** Will not drift more than 20 parts per million per °C from 5°C to 54°C

**WIRING:**



**Dimensions:**



**Ordering Information**

**Example:** INT69RT A L 1 A C1

**Series:** INT69RT= Ratemeter / Totalizer  
INT69R= Ratemeter Only  
INT69T= Totalizer Only

**Operating Voltage:** A= 110 VAC ± 15% or 12 to 24 VDC  
B= 220 VAC ± 15% or 12 to 24 VDC

**Inputs:** L= Linear (standard)  
S= Square Law (optional)

**Control outputs:** 1= 2 - Open Collector Outputs (standard)  
2= 2 - 10 Amp Form C Relays (optional)

**Options (Multiple Options Available)**  
A= Analog Output (4-20 mA)  
D= Rate per Day, Hour or Minute  
C1= RS 232 communications  
C2= RS 422 communications  
CSA= CSA Approved Unit (pending) ..... (consult factory)

**Accessories**  
XHV - Explosion proof housing (see accessories section)  
NEMA-1/8DIN- NEMA 4X enclosure (see accessories section)  
Separate non keyboard panel order #34235  
Separate keyboard panel - order #34234

# PMT-555 Series

## Process Monitor and Totalizer from Analog Inputs

### Features

- Large keys allow easy operation and programming
- Display Hold or reset input for the totalizer or for the limit values
- Key lock input
- Programmable 24 point linearization
- Integration function (totalizer) for the integration (sum calculation) of the measured values (e.g. throughput measurement => Fill-up level) with own scaling and programmable input threshold
- RS-232, RS-422, RS-485 Option
- Current or voltage input



COUNTERS/RATEMETERS

- 2 setpoints with programmable hysteresis and 2 relays or optocoupler outputs
- 10 VDC and/or 24 VDC output power supply

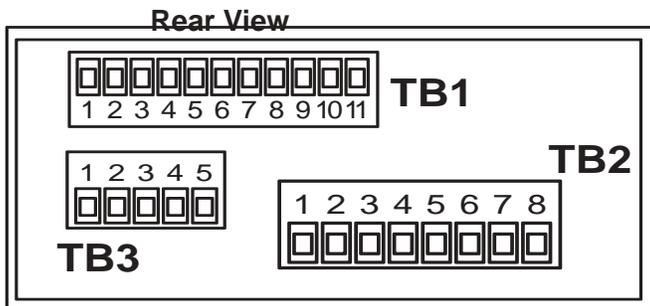
### Description:

The PMT-555 process monitor/totalizer is ideal for applications that require an LED process/totalizer display from voltage or current inputs. The unit can accept 4-20mA, 0-20mA, 0-10V, 2-10V or -10 - +10V signals. Two assignable set points are standard.

### Specifications:

Supply voltage:	10 to 30 V DC, galvanically isolated with reverse polarity protection 90 to 260 V AC 50/60 Hz mains hum suppression	Current input:	0-20 mA, 4- 20 mA voltage drop max. 2 V limit 50 mA
Power consumption:	max. 2 W/6 VA	Voltage input:	0-10 V, 2-10 V, (-)10 - (+)10 V limit $\pm 30$ V input resistance > 1 M $\Omega$
Display:	5-digit , red 7-segment LED's height 14 mm	Control inputs:	High: 4-30 V DC Low: 0-2 V DC
Measuring rate:	1 measurement/second	Resolution:	14 bits
Data backup:	EEPROM	Accuracy:	< 0.1 % $\pm 1$ digit at 20 °C, automatic null balance
Housing:	housing for control panel 96 x 48 mm acc. to DIN 43 700; RAL 7021, dark grey	DC output:	10 V DC $\pm 2\%$ , 30 mA(DC powered units) 10 V DC $\pm 2\%$ , 30 mA and 24 V DC $\pm 15\%$ , 50 mA (AC powered units)
Ambient temperature:	-10 to +50°C	Outputs:	2 Form C Relays max. 300 V DC/250 V AC current: max. 3 A, min. 30 mA DC or optocoupler output, NPN 30 V, 15 mA
EMC:	according to EC EMC directive 89/36/EEC		
Interference emissions:	EN 50081-2/EN 55 011 Class B		
Interference resistance:	EN 6100-6-2		
Protection:	IP65 (front)		
Weight:	app. 190 g		

## Wiring Connections



### TB1 Measurement Inputs

Pin	Description	Pin	Description
1	Current input 0 ... 20 mA, 4 ... 20 mA	7	Reference ground control inputs
2	Analog GND	8	Display-Hold/Reset input
3	Voltage input 0 ... 10 V, 2 ... 10 V -10 ... 10 V	9	Auxiliary voltage GND
4	n.c.	10	+10 V DC, 30 mA auxiliary voltage
5	n.c.	11	+24 V DC, 50 mA auxiliary voltage only for AC version
6	"Key" key lock		

### TB2 Supply Voltage and Outputs

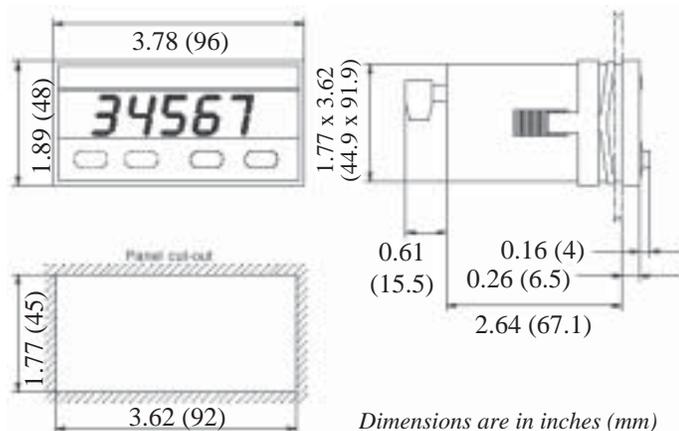
Pin	Relays output	Optocoupler Output (PNP)	Output
1	common (C)	Emitter	2
2	norm. open (NO)	Collector	
3	norm. closed (NC)	Collector	
4	common (C)	Emitter	1
5	norm. open (NO)	n.c.	
6	norm. closed (NC)	Collector	

Pin	DC version	AC version
7	10 ... 30 V DC	90 ... 260 V AC
8	0 V DC (GND)	90 ... 260 V AC

### TB3 Serial Interface

	RS232	RS485	RS422
1	GND	-	-
2	RxD	DO+/RI+	RI+
3	TxD	DO-/RI-	RI-
4	-	-	DO+
5	-	-	DO-

## Dimensions



### Order Code

Example: **PMT555.01 0 00**

Series: \_\_\_\_\_

**PMT-555** = Process Monitor & Totalizer  
w/ 2 Presets/Relays

Operating Voltage: \_\_\_\_\_

**0** = 90 to 260 VAC

**3** = 10 to 30 VDC

Options: \_\_\_\_\_

00 = without interface

05 = RS232

06 = RS422

07 = RS485

# HR76

## Hour Meter

### Features

- 6-digit hour meter for round panel cut out
- Low cost
- High shock resistance
- Low power consumption
- Small dimension
- magnified figures
- waterproof
- Protection: NEMA4/IP 65
- Data retention if power is lost
- UL-approval

### Applications:

general timing, utility vehicles, construction machines, generators, fork-lift trucks, car washes, outside areas

### Specifications:

Electrical connection:	Flat pins 0.8 x 6.3
Power consumption:	AC max. 0.4 VA 12 V DC: max. 0.08 W 48 V DC: max. 0.7 W
Rated voltages:	115/230 V AC, $\pm 10\%$ , 50/60 Hz, 10 ... 80 V DC
On time:	100 %
Display:	6 (99999.9 h)
Time mode:	adding
Height of figures:	3.5 mm
Colour of figures:	white on black
Reset:	no
Ambient temperature:	-30 ... +65 °C
Mounting position:	any
Protection:	NEMA4/IP 65
Housing:	Plastic
Weight:	HR 76.1: 56 g HR 76.2: 54 g
Options:	Accuracy: < 0.02% over the full range
Approvals:	UL

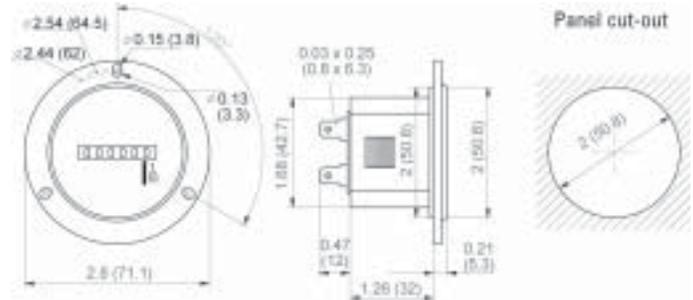


HR76.1

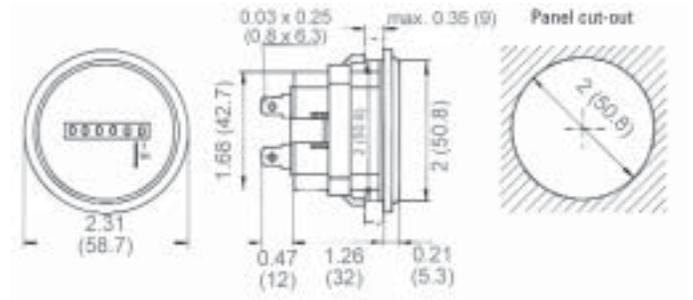
HR76.2

### Dimensions:

HR76.1



HR76.2



### How To Order

**EXAMPLE: HR76**

Series

- HR76.1
- HR76.2

Operating Voltage

- 1 = 10-80 VDC
- 2 = 115 VAC
- 3 = 230 VAC

# HK17

## Miniature Time Meter

### Features

- Interchangeable with "Hobbs Minimeter"
- Low Cost
- 5 Hour Digits, .150" High, White on Black and Two Decimal Digits Red on Black
- Operation Indicator Wheel
- DC Accuracy = .05%
- Power Required = .2 Watt (DC), 2VA (AC)
- Temperature: -15°C to 50° C (5° F to 122° F)
- NEMA 4X/IP65 Sealed Front

### Applications:

A high reliability instrument perfect for recording the operating time for maintenance, testing, leasing and warranty programs on all types of machinery.

### Description:

Small in size and price, but rugged and durable, this AC or DC powered hour timer is driven by a synchronous motor. Many voltages are available. Four industry standard mounting styles are available. The unit is provided with easy connect, screw terminal connectors on .031" x .250" flat pins. This minimeter is especially designed for use on lighting systems, computers, business machines, control panels, generators, compressors and pumps. Useful also for service records on machinery such as industrial refrigerators, oxygen purifiers, printers or off-road vehicles.

### Specifications:

**Digit Size:** 0.150" x .067" (3.8 x 1.7 )

### Display:

Hours: white digits on black

Decimals: red digits on black

### Voltages:

24, 110, 220 VAC ± 10% 50 or 60 Hz

12 to 24, 36 to 80, 110 VDC ± 15%

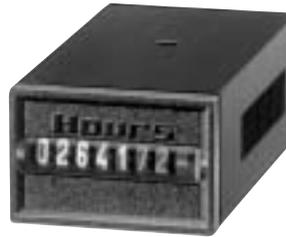
### Power Consumption:

Approx 2 VA at 230 VAC

Approx. .2 Watts at 12 VDC

**Termination:** Flat tabs .031 x .250" with screw terminal.

**Reset:** None



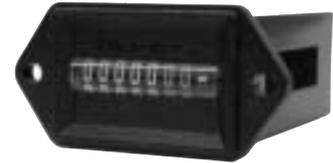
HK17.00



HK17.10



HK17.20



HK17.40

### Drive:

Synchronous motor with AC

Stepping motor with DC

### Operation Indicator:

AC: Fast rotating wheel with red stripes

DC: 1/100 h-display rotates every 36 sec. by one number.

**Temperature:** - 15°C to + 50°C (+5°F to + 122°F)

**Housing:** NEMA 4X(IP65) front panel (gasket not supplied, RTV type sealer recommended), plastic case

**Weight:** 1.4 ounces (40 g)

**Approvals:** CE Approved, UL Listed; File# E128604

### How To Order

**EXAMPLE:** HK17 4 0 110V 60 1

### Series

HK17

### Case

- 0 = Rear mount
- 1 = Screw mount
- 2 = Spring clip
- 4 = Side flange
- 5 = Large spring clip
- 6 = Large side flange

### Reset

- 0 = Non reset

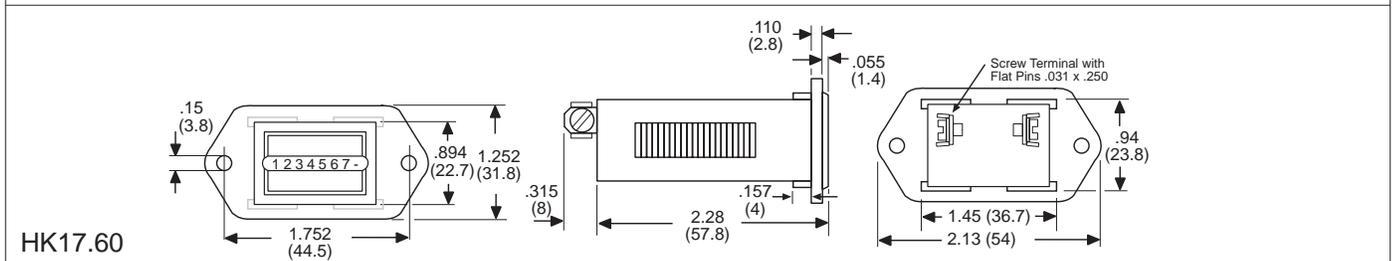
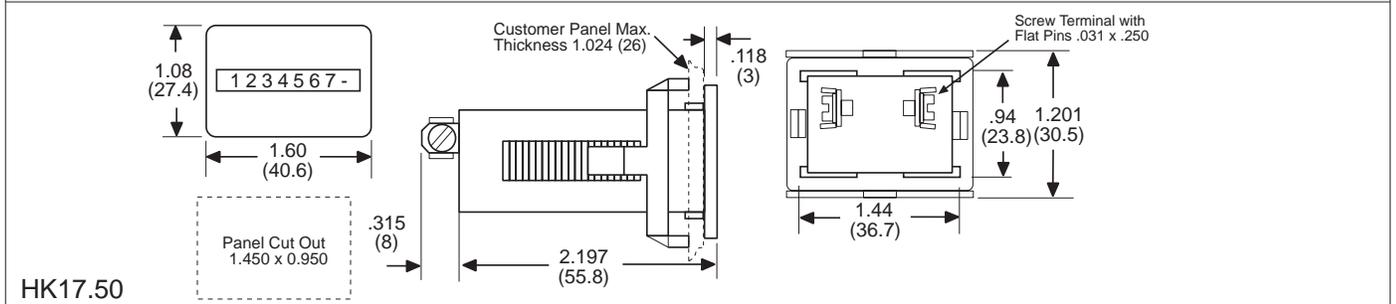
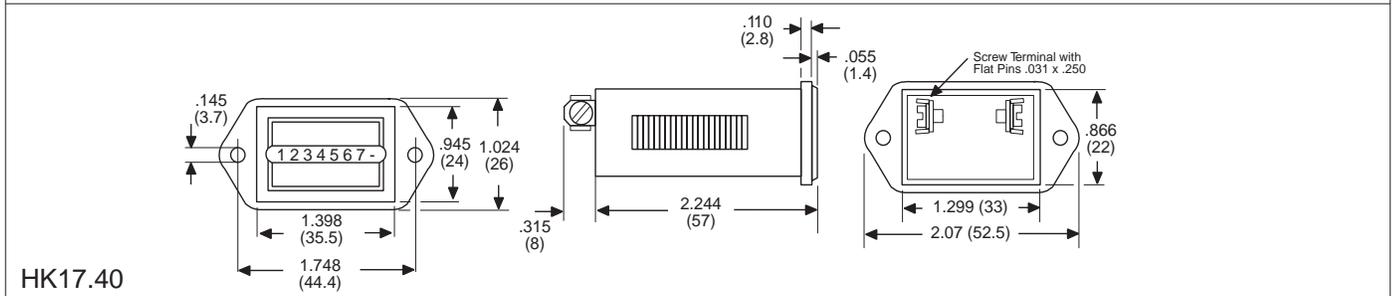
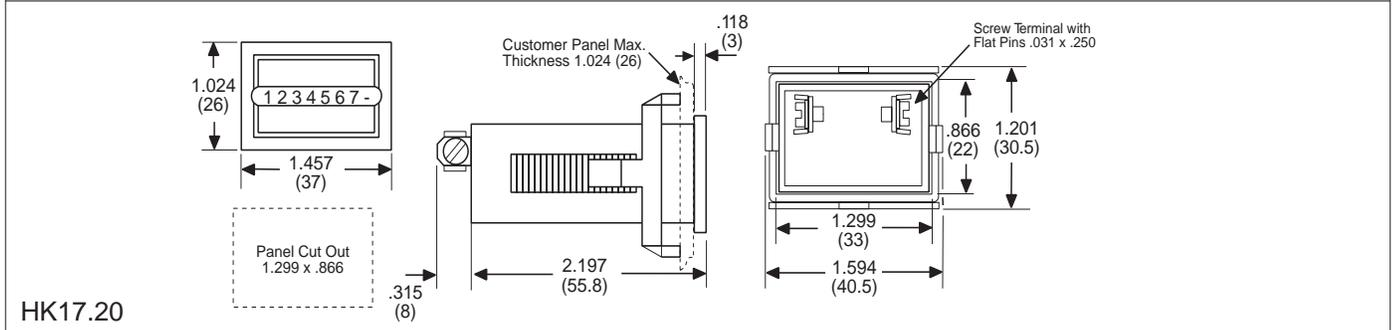
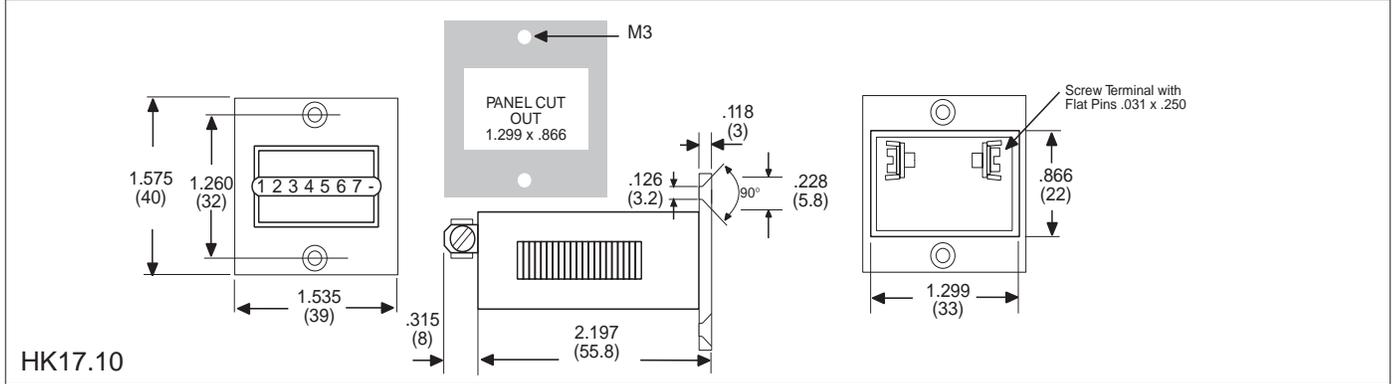
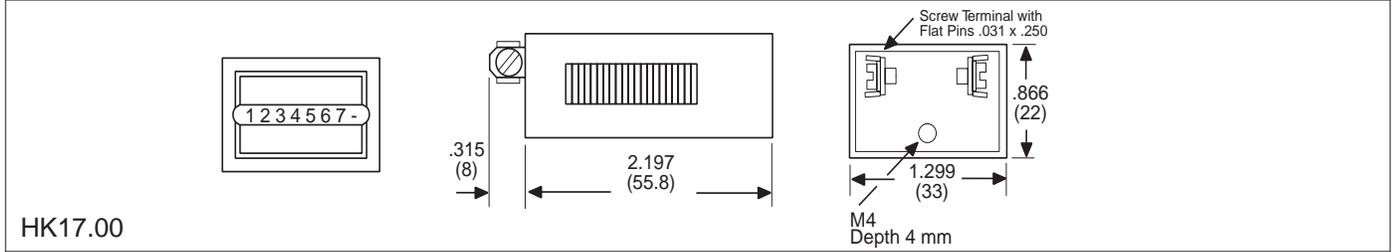
### Operating Voltage

- 12VDC (12 to 24 VDC)
- 36VDC (36 to 80 VDC)
- 110VDC (110 VDC ± 15%)
- 24V 60 (50 for 50Hz) (AC Voltages ±10%)
- 110V 60 (50 for 50Hz) (AC Voltages ±10%)
- 220V 60 (50 for 50Hz) (AC Voltages ±10%)

### Options

- 1 = .031" x .250" tab without screw terminal
- 2 = Case sealed in back

**Mounting:**



TIERS

# HK46 / HK47

## Miniature Hour Meters

### Features

- 6 or 7-digit Micro Hour Meters; Displays 1/100 h
- Low Cost
- High Shock Resistance
- Low Power Consumption; Suitable for Battery Operation
- Small Dimensions
- Magnified Large Figures
- Wide Operating Voltage 4.5..35 VDC
- PCB-mount (HK 47.80)



- solderable and wash proof (HK 47.80)
- protection to IP 65
- long service life

### Specifications:

<b>Drive:</b>	Quartz controlled impulse counter
<b>Impulse duration:</b>	32 ms; every 36 s = 0.01 h (Power on times < 36 s are not counted)
<b>Electrical connection:</b>	HK 46.20/HK 47.20: Flying leads AWG 22, appr. 150 mm long (red +, black -) HK 46.80/HK 47.80: solder pins 0.4 x 1.2 mm dia.
<b>Display:</b>	HK46: 9999.99 h; HK47: 99999.99 h
<b>Figures:</b>	white on black, 4 mm high
<b>Supply voltage:</b>	4.5 ... 35 V DC
<b>Residual ripple:</b>	< 1 %
<b>Current consumption:</b>	< 1.5 mA (average)
<b>Power consumption:</b>	at UB = 5 V DC typ. 82 mW at UB = 12 V DC typ. 135 mW at UB = 24 V DC typ. 135 mW max. 170 mW (count impulse every 36 s with an impulse duration of 32 ms)
<b>Reset:</b>	no reset
<b>Ambient temperature:</b>	-10 ... +60 °C
<b>Storage temperature:</b>	-20 ... +70 °C
<b>Mounting position:</b>	any
<b>Protection</b>	IP 66 at HK46.80/HK 47.80
<b>to EN 60529:</b>	IP 66 (only front) at HK46.20/HK 47.20
<b>Conforms to CE requirements acc. to:</b>	EN 61000-6-2 EN 55011 class B
<b>Housing:</b>	PC transparent; HK 47.80
<b>Weight:</b>	13 ... 15 g

### How To Order:

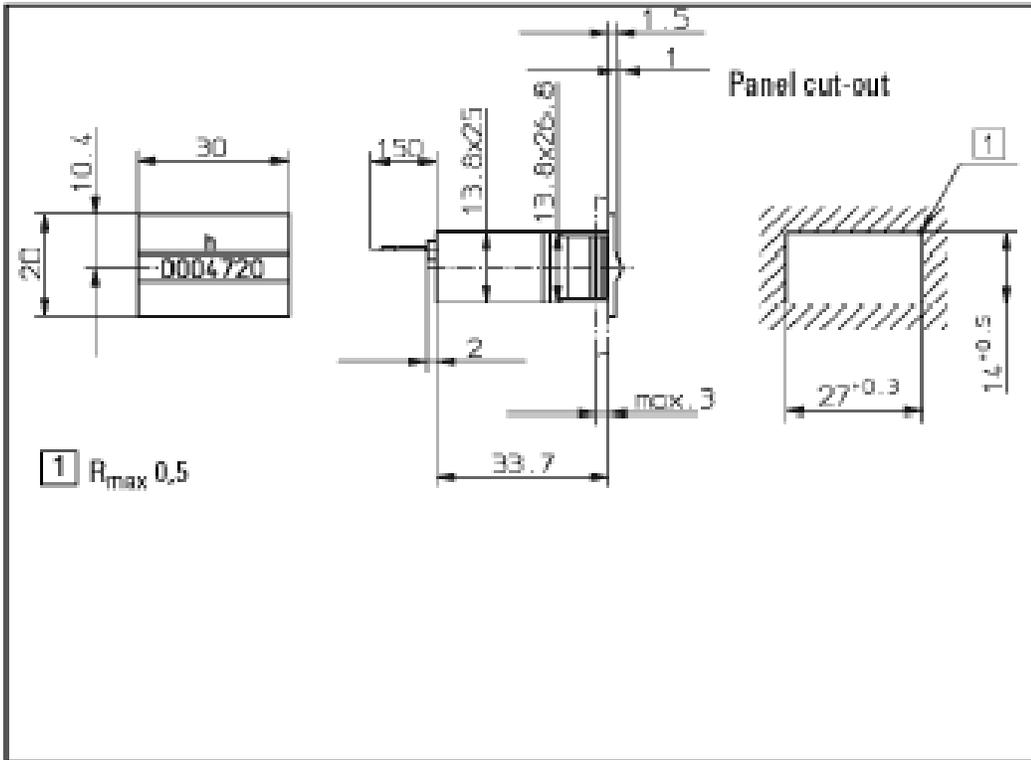
**EXAMPLE:** HK4 6 .20 .35

<b>Series</b> _____	_____	_____	_____
HK4 (basic series)			
<b>Digits</b> _____	_____	_____	_____
6 = 6 digits 7 = 7 digits			
<b>Style</b> _____	_____	_____	_____
.20 = plastic case, display on narrow side, wire leads, flush mount (snap in), magnifying lens .80 = plastic case, display on narrow side, solder pins, PCB mount (wash proof), magnifying lens			
<b>Options</b> _____	_____	_____	_____
.35 = flat pins with .02" x .11" push on connectors			

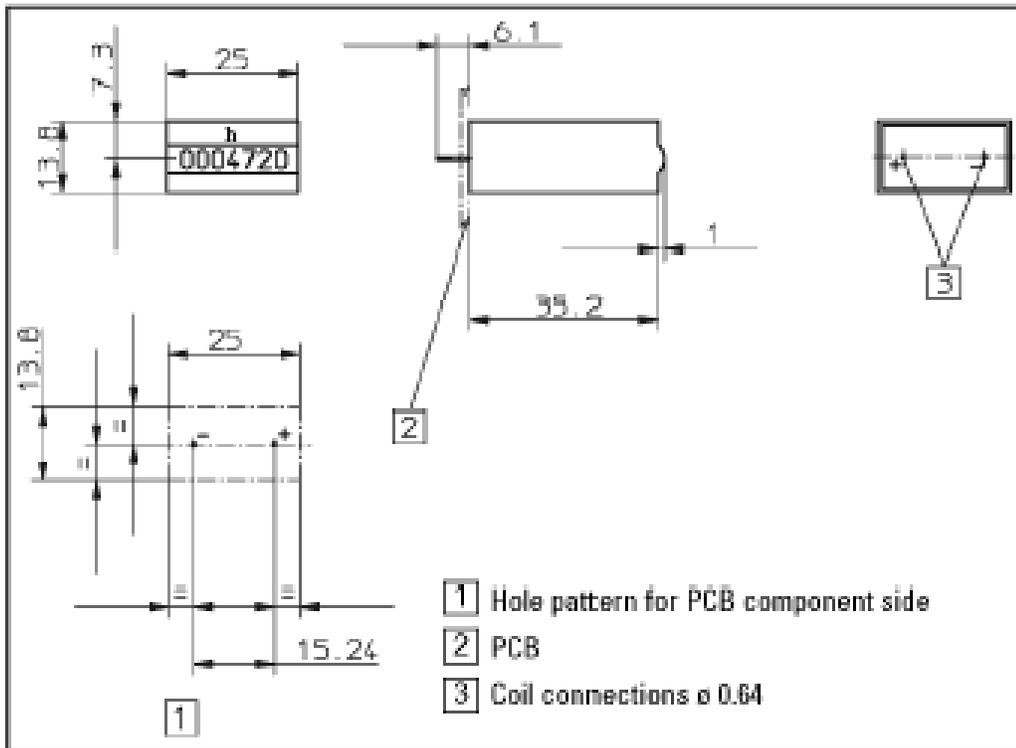
### Special Options (add to end of part number)

- 0 = Low power DC versions (30mW), 10CPS
- ET= Extended Temperature -30°C to +85°C

HK46.20/HK 47.20



HK46.80/HK 47.80



# HK07

## Miniature Hour Meters

### Features

- Super Low Power
- Hours & 1 /100th Resolution
- 7 Digits with Magnifying Lens .16" (without magnifying lens .11 ")
- 7 Mounting Styles, Including PCB Mount Models
- Tiny Size
- Low Cost



### Applications:

Printed circuit board warranty. Warranty monitoring where low power consumption is required, usually in battery operated devices.

### Description:

The HK Series hour meters use a quartz crystal oscillator that generates an impulse every 36 seconds or 0.01 of an hour. The coil is triggered for 32 ms. Max power consumption is needed only after every 36s. The rest of the time the power consumption is max. 2mA. This allows battery operation and use on electronic PC Boards. On times less than 36s are not counted. A very high shock resistance guarantees accurate timing under abnormal conditions.

### Specifications:

**PCB Mount Models:** silver-plated solder pins 0.016" x 0.047"

**Display:** 99999.99 H

**Digits:** Hours, white on black; Decimals, red on black

**Rated voltage:** 5, 12, 24VDC  $\pm 10\%$

**Residual ripple:** max. 5%

**Average power consumption:** approx. 10 mW on 5VDC; approx. 24 mW on 12VDC; approx. 48 mW on 24VDC.

**Max. power consumption:** every 36s with an impulse length of 32ms approx. 55mW on 5VDC; approx. 120 mW on 12VDC; approx. 250 mW on 24VDC

**Ambient temperature:** +14° F to +185° F (-10°C to +85°C).

### Solderable and wash proof versions:

HK 07.90, HK 07.91 and HK 07.92

### Electric Connections on flush and base mount models:

approx. 6" long wire leads (red + ); (black - )

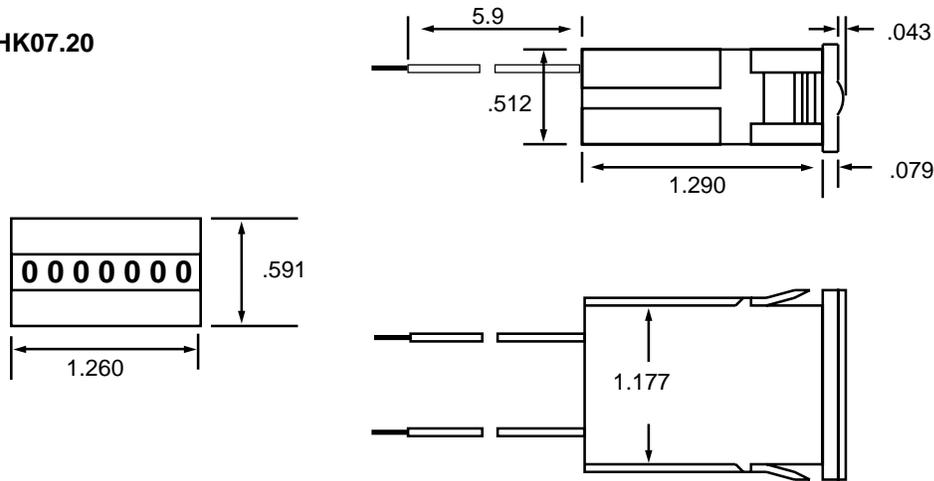
**Accuracy:** .005%

**Approvals:** CE Approved

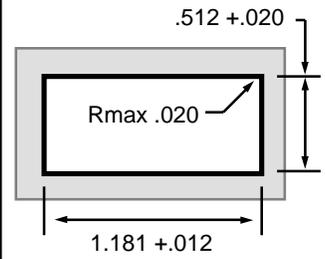
AVAILABLE TYPES TYPE	HEIGHT OF HOUSING	FIGURES	ELEC. DISPLAY	CONNECTION	VOLTAGE $\pm 10\%$ DESCRIPTION (Specify)
HK 07.20 plastic	.16"	on narrow side	flying leads	flush mount / snap-in	5, 12, 24 VDC
HK 07.40 steel Sheet	.16"	on broad side	solder pins	PCB-mount	5, 12, 24 VDC
HK 07.50 steel sheet	.16"	on narrow side	solder pins	PCB-mount	5, 12, 24 VDC
HK 07.80 plastic	.16"	on narrow side	solder pins	PCB-mount	5, 12, 24 VDC
HK 07.90 plastic	.16"	on broad side	solder pins	PCB-mount-wash proof	5, 12, 24 VDC
HK 07.91 plastic	.11"	on narrow side	solder pins	PCB-mount-wash proof	5, 12, 24 VDC
HK 07.92 plastic	.16"	on narrow side	solder pins	PCB-mount-wash proof	5, 12, 24 VDC
AHK 07.00 plastic	.16"	on narrow side	flying leads	base mount	5, 12, 24 VDC

**Dimensional Diagrams:**

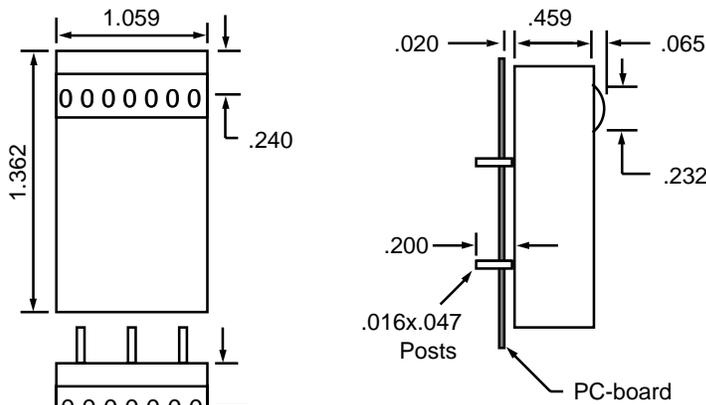
**HK07.20**



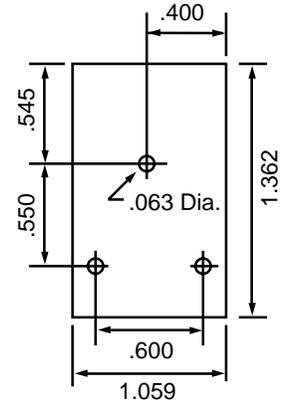
**Panel Cutout**



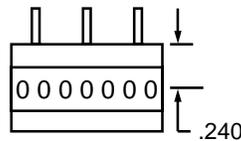
**MAG. LENS  
HK07.40**



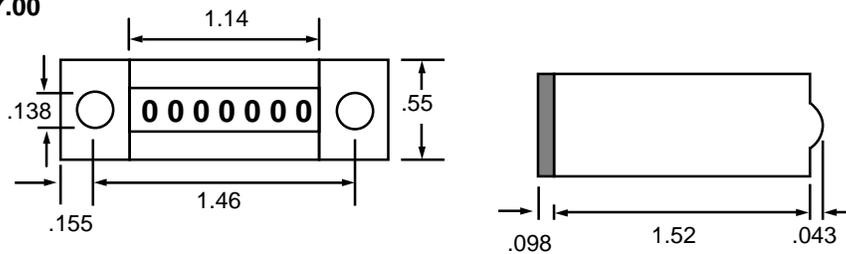
**Punching diagram for PCB  
(component side)**



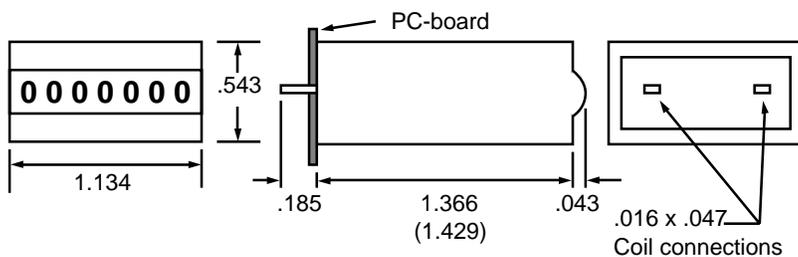
**MAG. LENS  
HK07.50  
HK07.91**



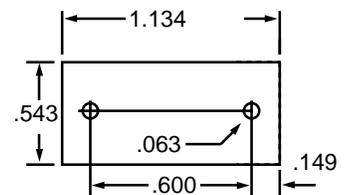
**AHK07.00**



**HK07.80  
(HK07.92)**



**Punching diagram for PCB  
(component side)**



# H57

## Low Cost Hour Meter

### Features

- UL Listed, CE Certified
- Low Cost
- 7 Digit Display (99999.99 Hours)
- AC or DC Voltages
- Small Case

### Description:

These meters are mainly used for monitoring the running time of machines, apparatus and instruments as well as for recording maintenance time, warranty time or rental use time. A synchronous motor operating through a gear train drives the number wheels for the display of full hours 1/10 h and 1/100 h. On AC-versions, the main supply (50 or 60 Hz) is used as frequency standard. On DC-versions the exact frequency generated by means of a quartz crystal. A rugged and completely insulated plastic housing provides substantial protection against environmental influences.

### Specifications:

**Termination:** Flat tabs .031 x .250" with screw terminal  
**Voltages:** 24, 110, 220, 440 VAC +15%, 50 Hz or 60Hz  
 12 to 24, 36 to 80, 110 VDC  $\pm$  10 %  
**Test Voltage:** 2000V, 50 Hz  
**Ambient temperature:**  
 -15° to +50°C on AC; -20° to +60°C on DC  
**Power Consumption:**  
 Appr. 2 VA at 220 VAC; Appr. 180 mW at 12 VDC  
**Hour range:** AC Units: 99999.99 hours  
 DC Units: 999999.99 hours

**Height of Figures:** 4 mm

### Color of Figures:

Hours: white on black, Decimals: red on black

**Color of Housing:** Black

**Operation indicator:** Fast rotating, white

**Approvals:** UL Listed: File # E128604X, CE Approved

**Weight:** AH57: 84g; H57 48g

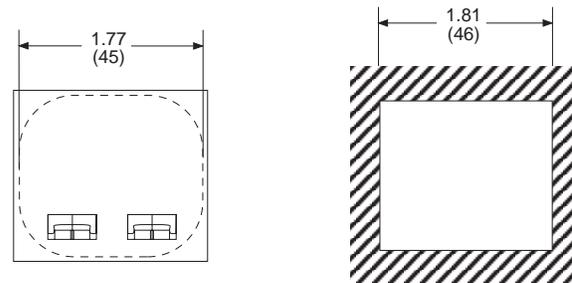
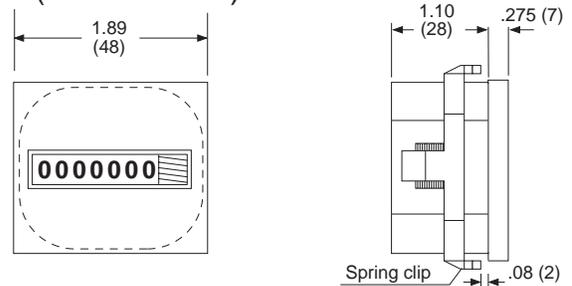
### How To Order:

EXAMPLE:	H57	24VAC	60Hz
<b>Series</b>	H57 = Panel Mount AH57 = Base Mount H57.55 = Extended 2.16" x 2.16" Bezel for 2" diameter cutout H57.72 = Extended 2.83" x 2.83" Bezel for 2" diameter cutout		
<b>Voltages</b>	12, 24, 36, 80, 110 VDC 24, 40, 110, 220, 440 VAC		
<b>Frequency</b> (AC units only)	50 or 60Hz (Specify)		
<b>Accessories</b>	DR-4 = 4 DIN Rail (DIN 46277)		

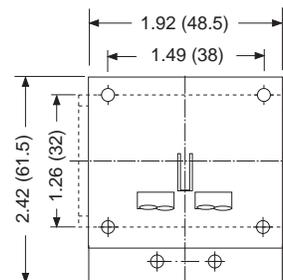
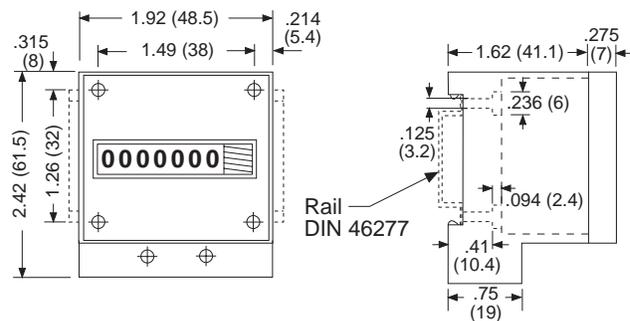


### Dimensions:

#### H57 (Panel Mount)



#### AH57 (Base Mount) & DIN Rail Mount



# HC77

## Combination Hour Meter & Totalizer

### Features

- Dual 7 digit display w/characters magnified to .157" (4mm)
- Low Cost
- Isolation protection to VDEO435.
- AC or DC Voltages



### Description:

This combination meter comprises a running time totalizer and an adding counter with a separate 7 digit display for each. In the standard version, the two meters are connected in parallel; the totalizer counts the number of pulses while the time meter totalizes the connect time. The time meter displays to hundredths of an hour (36 second intervals). A red visual indicator shows that the unit is operating. The unit is supplied with a clamp clip attachment for mounting and 2.16" x 2.16" (55mm) and 2.16" x 2.16" (72 x 72 mm) bezels are available as accessories. On AC models, the main supply (50 or 60 Hz) is used as the frequency standard. On DC models, the frequency is quartz crystal controlled.

### Applications:

- ☛ Heating and utility system monitoring
- ☛ Machine run time monitoring and maintenance
- ☛ Refrigeration systems
- ☛ Water treatment equipment
- ☛ Compressors
- ☛ Industrial washing equipment

### Specifications:

**Termination:** Flat tabs .031 x .250" with screw terminal

**Voltages:** 24, 110, 220 VAC +15%, 50 Hz or 60 Hz  
12 to 24, 36 to 80, 110 VDC ± 10 %

#### Power Consumption:

Appr. 2.5 VA at 220 VAC; Appr. 220 mW at 12 VDC

#### Ambient temperature:

-15° to +50°C on AC; -20° to +60°C on DC

**Environmental Protection:** IP42, DIN 40 050 from front

**Hour range:** AC Units: 99999.99 hours  
DC Units: 999999.99 hours

**Count range:** 9999999 counts

**Display:** Dual display with characters magnified to 0.157" (4mm) high.

#### Color of Figures:

White on black for hours, red on white for decimal hours  
White on black for totalizing counter.

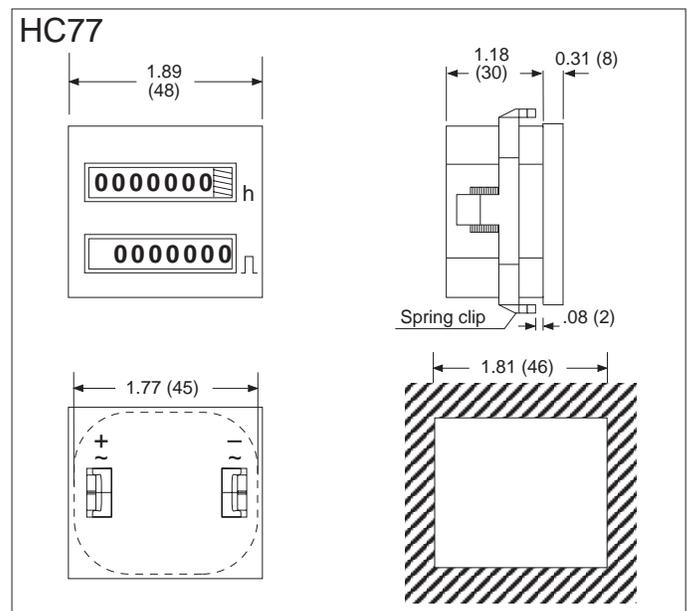
**Color of Housing:** Black

**Operation indicator:** Fast rotating, red

**Weight:** 2.3 Oz. (65g)

**Approvals:** CE Approved, UL Listed; File# E128604

### Dimensions:



### How To Order:

**EXAMPLE:** HC77 24VAC 60Hz SC

#### Series

HC77 = Panel Mount  
HC77.55 = Extended 2.16" x 2.16"  
Bezel for 2" diameter cutout  
HC77.72 = Extended 2.83" x 2.83"  
Bezel for 2" diameter cutout

#### Voltages

12VDC (12 to 24 VDC)  
36VDC (36 to 80 VDC)  
110VDC (110 VDC ± 15%)  
24V (AC Voltages ±10%)  
110V (AC Voltages ±10%)  
220V (AC Voltages ±10%)

**Frequency** (AC units only)  
50 or 60Hz (Specify)

#### Options:

SC = Separate Connections

# HC67

## Combination Hour Meter & Totalizer

### Features

- Dual 7 digit display w/characters magnified to 0.157" (4mm)
- Synchronous Motor Drive
- Isolation protection to VDEO435.
- AC Voltages



### Description:

This combination counter consists of a running time meter and an adding counter. These two meters are connected in parallel, the adding counter registering the total number of events and the time meter the total operating time of the device. Due to high shock resistance, a reliable count is guaranteed.

### Applications:

- ☛ Heating and utility system monitoring
- ☛ Machine run time monitoring and maintenance
- ☛ Refrigeration systems
- ☛ Water treatment equipment
- ☛ Compressors
- ☛ Industrial washing equipment

### Hour Meter:

Counting range: 99999.99 h

The coil of an impulse counter receives a drive pulse from a divider circuit every 36 seconds = 0.1h (quartz accuracy). On-times < 36 s are not counted.

**Adding Counter:** Counting range: 9999999 pulses.

### Specifications:

**Termination:** Flat tabs .031 x .250"

**Voltages:** 110, 220 VAC +10%, 50 Hz or 60 Hz

**Power Consumption:** Appr. 1.7 VA at 220 VAC

**Operating temperature:** +14° to 140° F (-10° to +60°C)

**Environmental Protection:** IP51 (front side in built-in state)

**Count range:** 99999.99 hours; 9999999 counts

**Display:** Dual 7 digit display with characters magnified to 0.157" (4mm) high.

### Color of Figures:

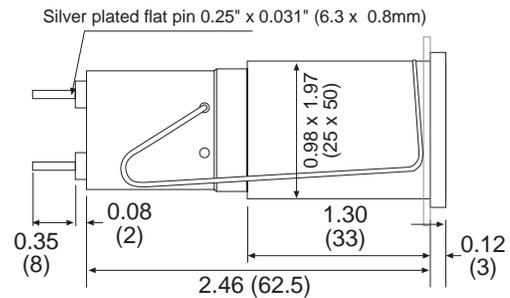
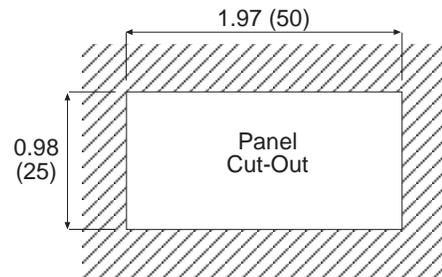
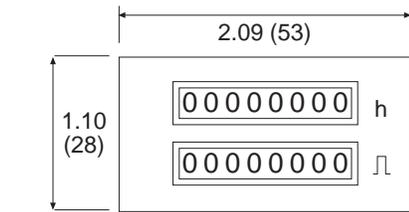
White on black for hours, red on white for decimal hours  
White on black for totalizing counter.

**Color of Housing:** Black

**Weight:** 2.3 Oz. (65g)

**Approvals:** CE Approved

### Dimensions:



### How To Order:

EXAMPLE:	HC67	110VAC	60Hz
<b>Series</b>	HC67		
<b>Voltages</b>	110V (AC Voltages ±10%) 220V (AC Voltages ±10%)		
<b>Frequency</b>	50 or 60Hz (Specify)		

# M Series

## Multi-Resolution Elapsed Timers

### Features

- All Standard Voltages
- Electric, Manual, or Non-Reset Available
- Varied Resolutions Available
- Varied Mounting Styles
- Many Options Available

### Description:

The M Series hours, minutes and seconds timer offers more voltages, reset options and more resolutions than any other electromechanical timer made today. Driven by a solid state circuit, with control line input that insures .05% accuracy, these timers provide instrument level performance.

### Specifications:

**Display:** 5 or 6 digit with reset 5 or 8 digit without reset

**Digit:** .160" high (each time designation has color-coded wheels for easy display)

**Operating Voltage:** 6, 12, 24, 48, 110VDC; 12, 24, 110, 220VAC

**Accuracy:** AC-based on line frequency, DC-crystal oscillator rated at .05% accuracy

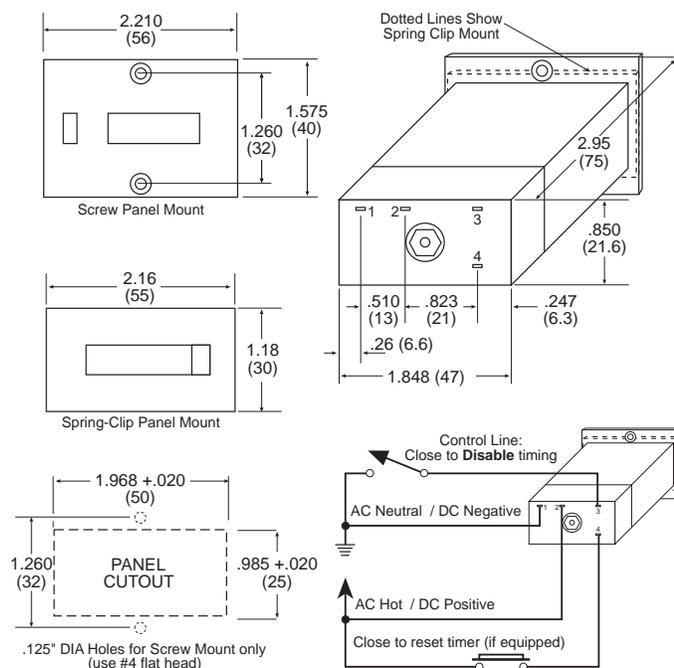
**Power Consumption:** 2.5 W typ., 9 W required for reset

**Supply Voltage:** ±10% of rated voltage

**Supply Ripple:** 10% maximum (DC units only)

**Temperature:** +32° F to +112° F (0° C to +45°C) operating

### Mounting:



### How To Order

**EXAMPLE:** MTH 16. 1 1 12VDC V

#### Series

#### AC with Reset:

- MTH16. (Hours 1/100)
- MTM15. (Minutes 1/10)
- MTS16. (Seconds only)
- MTHMS16. (Hrs, Min, Sec)
- MTHM15. (Hrs, Min 1/10)

#### AC without Reset:

- MTH18. (Hours 1/100)
- MTM17. (Minutes 1/10)
- MTS18. (Seconds only)
- MTHMS16. (Hrs, Min, Sec)
- MTHM15. (Hrs, Min 1/10)

#### DC with Reset:

- MLTH15. (Hours 1/100)
- MLTM15. (Minutes 1/10)
- MLTS16. (Seconds only)
- MLTHMS16. (Hrs, Min, Sec)
- MLTHM15. (Hrs, Min 1/10)

#### DC without Reset:

- MLTH17. (Hours 1/100)
- MLTM17. (Minutes 1/10)
- MLTS18. (Seconds only)
- MLTHMS16. (Hrs, Min, Sec)
- MLTHM15. (Hrs, Min 1/10)

#### Mounting:

- 1 = Screw panel
- 2 = Spring clip
- 0 = Rear Mount (for F1K1 Option Only)

#### Reset:

- 0 = Non-reset
- 1 = Manual
- 2 = Electric
- 3 = Manual and electric

#### Voltage (specify)

- DC - 6, 12, 24, 48, 100
- AC - 12, 24, 110, 220

#### Available Options:

- TB - terminal block
- V - manual reset guard
- US - spade key reset
- ML - magnifying lens
- HT - extended temperature (+32°F to +140°F)
- F1 - screw panel mount frame w/ socket box (cutout W2.15" x H1.20")

#### Enclosures:

- F1DK - transparent polycarbonate cover, keylock, tamper-proof.
- F1DV - transparent polycarbonate cover, knob closure
- F1K1 - silicone cover, 0 mount style

#### Enclosures:

- N7 - explosion proof
- N4 - weatherproof
- N12 - dust and oil tight

TIMERS

# HB26 Series

## Hour Run Meter with Reset

### Features

- **REPLACES HB16 SERIES**
- Operation Indicator: Fast Rotating Gear Wheel
- Driven By A Synchronous Motor
- Wide Variety Of Operating Voltages
- Small Size
- Long Life
- Low Cost

### Applications:

- Engine Hour Meters
- Rental Equipment
- Maintenance Timer

### Description:

This 6 digit hour meter is the perfect timer when low cost, small size and high quality are important. It is available in AC or DC voltages with manual reset. Highly visible white on black hour digits including red on black decimal digits. Unit is also pluggable into socket box 945.2.

### Specifications:

**Color of Housing:** Black

**Digits:** 6, .177" (4.5mm) high

**Display:** 9999.99h for AC models, 99999.9h for DC models

**Hours:** white figures on black

**Decimal digits:** red figures on black

**Reset:** Manual reset

**Operating Voltages:** 24, 115, 230 VAC, +/- 10% 50/60 Hz  
12-24, 36-80, 115 VDC +/-15%

**Termination:** Wire leads .078" x .019<sup>2</sup> (2mm x .5mm<sup>2</sup>) NYFAZ 19.685" long (.5m)

**Temperature:** 14°F to 122°F (-10°C to 50°C)

**Power Consumption:** Appr. 2 VA at 230 VAC, Appr. 80mW at 12 VDC, Appr. 270mW at 24 VDC

**Weight:** 2.116 ounces (60 grams)

**Protection:** IP 42 front side, sealing cover K1: IP 54 front side, Transparent cover Dv and Dvs: IP 55 front side

**Approvals:** CE Approved

### Options:

Spade Key Reset (US, Secret Reset (SR))

Flexible sealing cover: K1

Flat pins .031" x .110" (.8mm x 2.8mm)  
with push-on connectors

Flat pins .031" x .248" (.8mm x 6.3mm)  
with-out push-on connectors

### Accessories:

Socket box: 945.2

Flexible sealing cover: K1 black

Front bezels: F1 black

Dummy housing .984 x 1.968 (25 x 50mm) grey, black



### How To Order:

**EXAMPLE:** HB26 1 1 110VAC 60HZ

#### Series

6 digit hour meter

#### Mounting

0 = Non flange

1 = Screw panel mount

2 = Spring clip

3 = Large screw panel

#### Reset

0 = none

1 = panel reset

#### Voltage

24, 115, 230 VAC (±15%)

12-24, 36-80, 115 VDC (±15%)

#### Frequency (AC only)

50 or 60 Hz

### Available Options (add to end of part number)

K1 - Silicone cover #3 mount style

F1 - Frame - with socket box 945.2

0 Mount only

945.2 - Socket box

F1DVS - Frame with locking cover & 945.2 socket box

F1DK - Frame with knob closure cover & 945.2 socket box

FL - 6" (253mm) Wire Leads

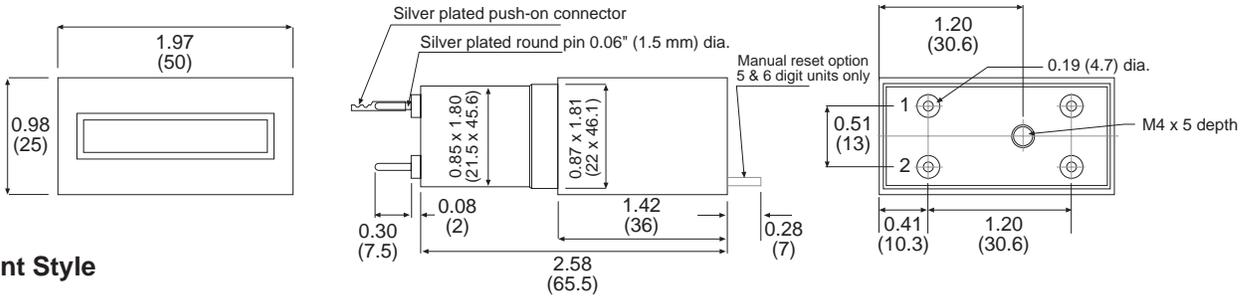
US - Spade Key Reset

TB - Terminal Block

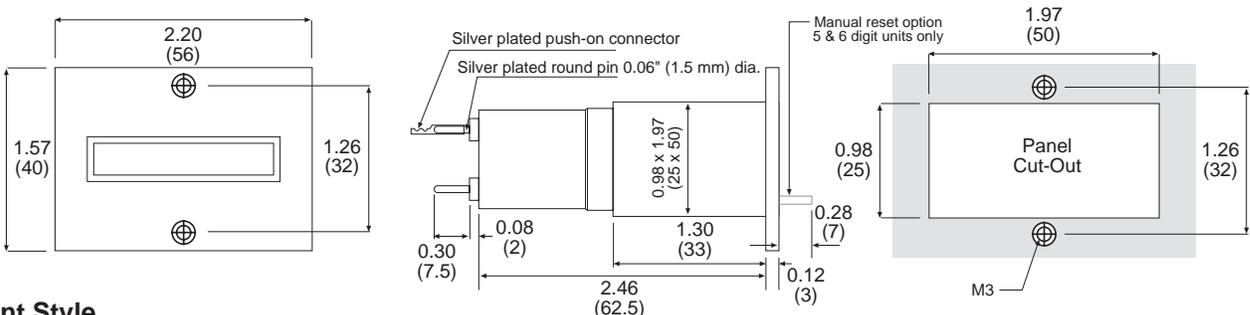
SR - Secret Reset

**NOTE: The HB26 replaces the HB16**

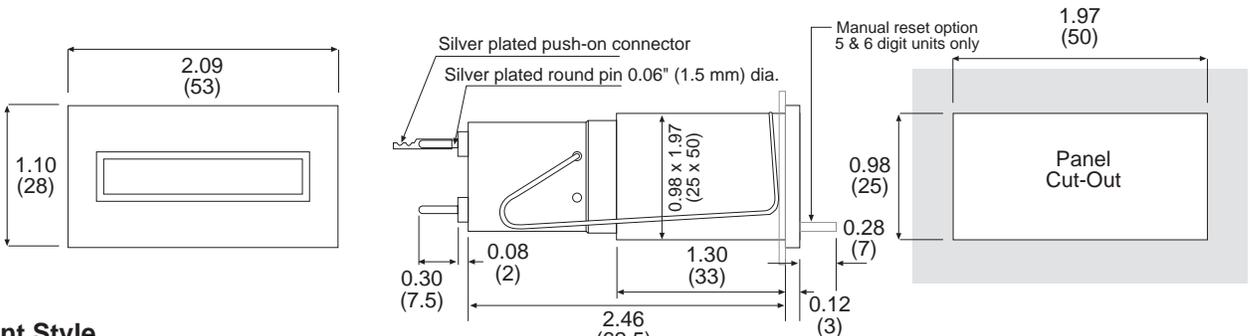
**0 Mount Style**



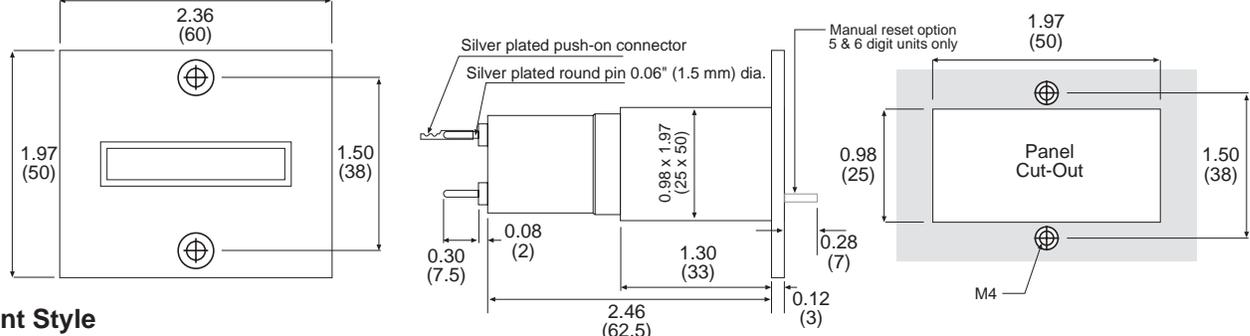
**1 Mount Style**



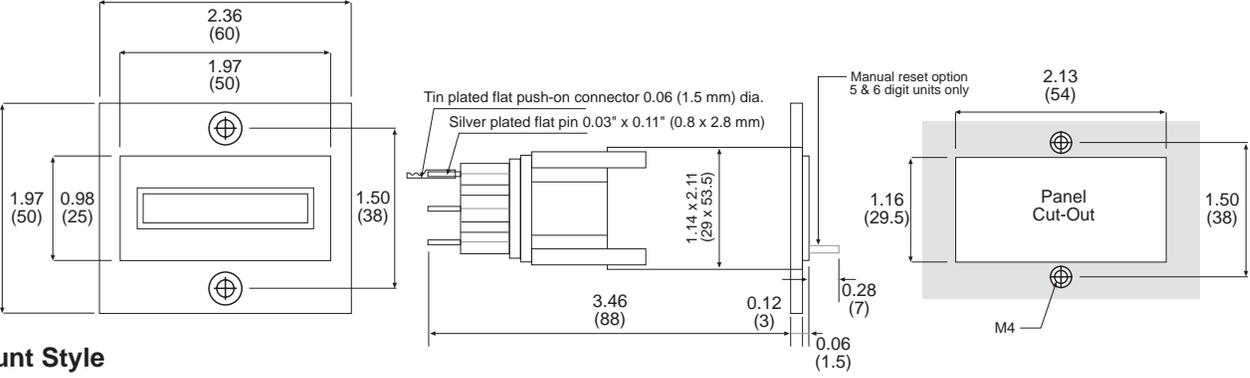
**2 Mount Style**



**3 Mount Style**



**F1Mount Style**





# KAL-DIN TIME

## Battery Powered Time Indicator

### Features

- Multi-Resolution Time Ranges:  
Sec., Min. & Sec, Hrs & Min. or Hrs & 1/100ths
- Battery Powered
- 8 Digit LCD Display
- Remote & Front Panel Reset
- NEMA 4X / IP65 Front Panel

### Applications:

For timing industrial processes, machine down time / on time indicator, event timing, monitor testing time.

### Description:

The KAL-DTIME1 and KAL-DTIME2 are 8 year, lithium battery powered, elapsed timers with the following resolutions: minutes and seconds (KAL-DTIME1) or, hours and minutes, or hours and 1/100ths (KAL-DTIME2). The front panel meets NEMA 4X/IP65 standards. The display has 8 large digits each 0.276" high.

### Specifications:

**Power:** Internal Lithium Battery (life 8 years calculated).

**Display:** 8 digit, LCD, 0.276" high.

**Accuracy:**  $\pm 0.003\%$  @ 25°C

Temperature Drift: .035 PPM/°C<sup>2</sup>

Aging: 3 PPM/Year max.

**Temperature Range:** 14 to 140°F (-10 to 60°C)

### Signal Inputs:

Pin 4 — Contact Closure Time; Negative level active  
Low: <0.7 VDC, High: open or 3 to 18 VDC

Pin 3 — Reset-Contact closure to common resets, level triggered, min. pulse width 12mS.

Pin 2 — Reset Enable; link to common (Pin 1) to enable front reset.

Pin 5 — Timing Mode Select;  
KAL-DTIME1 - Min. & Sec.  
KAL-DTIME2 - Hours & 100ths

### LEFT OPEN

KAL-DTIME1 - Seconds

KAL-DTIME2 - Hours & Minutes

**Approvals:** UL File: E135458, CSA File: LR96702,  
CE Approved

**Material:** ABS Plastic

**Weight:** 1.7 oz.

**Battery Life:** 8 years (calculated)

**Connection:** 5 pin, plug in connector with 9" leads supplied with timer.

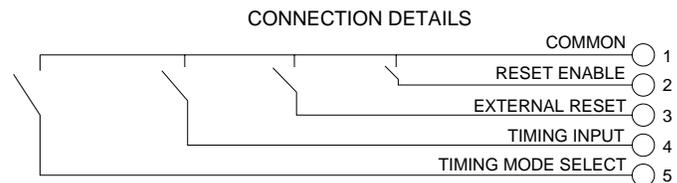
**Sealing:** Front Panel sealed to NEMA 4X/IP65

**Mounting:** Spring clip mount provided. Optional two screw mounting and/or competitor retro-fit available.

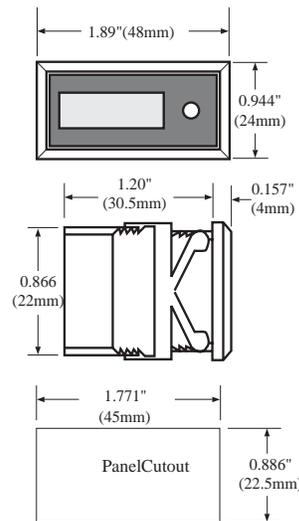
**Note-** A 5-240 VAC or DC pulsing module is available as "KAL-DTIME AC/DC."



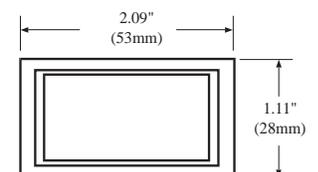
### Hookup:



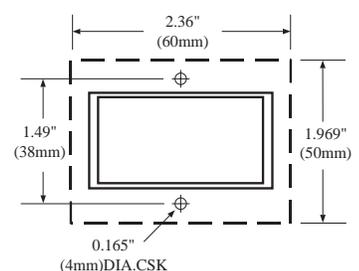
### Mounting:



### Adaptors (included) KAL-DP1X2



### KAL-DP1



NOTE: KAL-DP1x2 and KAL-DP1 panels are included

**TERMINAL BLOCK MODULE**

**Description -- KAL-D TB**

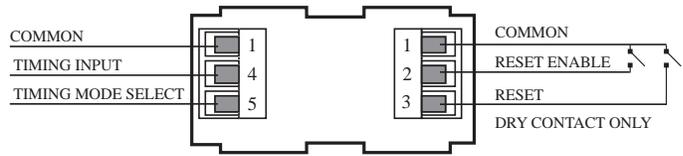
(For screw terminal connection with standard pulse characteristics)

Pin numbers shown on terminal block correspond to wire lead numbers.

Two Pins #1 are internally connected.

**DO NOT CONNECT KAL-D TB TO AC VOLTAGE**

**Terminal Block (TB) Adaptor Connections**



**5-240 VOLT INPUT MODULES**

**Description -- KAL-D AC/DC (Counter)  
KAL-DTIME AC/DC (Timer)**

The KALD AC/DC Module enables the KALD to accept 5-240 VAC/DC input signals. (The KAL-DTime AC/DC is used for the KAL-DTIME series). The module snaps into the back of the counter. The circuitry allows various voltage pulses to be used for counting and provides optoisolation of 2500V.

**KAL-D AC/DC (Counter)  
SPECIFICATIONS:**

**Signal Inputs:**

18 Hz max. (15 msec. pulse width min.)

5 to 48 VAC/DC

Low: < 1.5 VAC/DC or open

High: 5 to 55 VAC/DC

48 to 240 VAC/DC

Low: <15 VAC/DC or open

High: 48 to 264 VAC/DC

**Input Impedance:**

5 to 48 VAC/DC - 10K ohms

48 to 240 VAC/DC - 58.5K ohms

**Reset:**

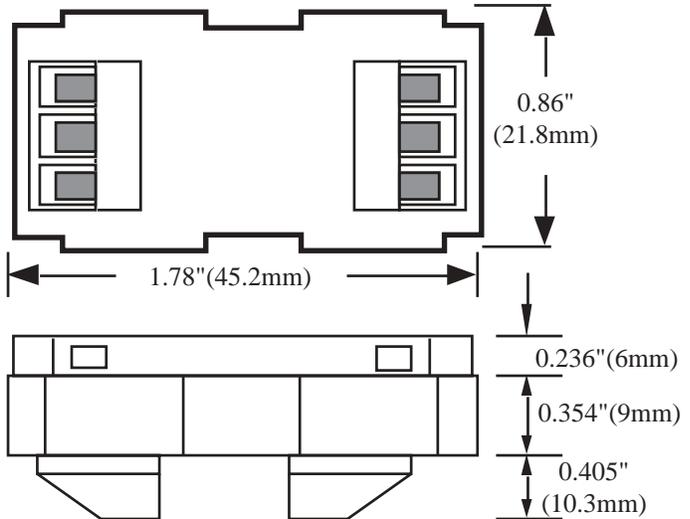
Dry contact closure only.

15msec. min. pulse.

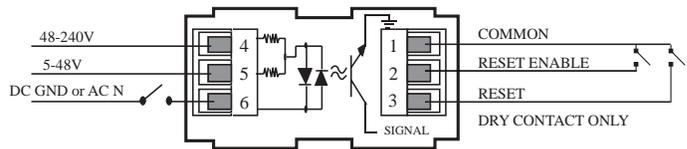
**Temperature Range:**

Same as KAL-D series

**Dimensions for AC/DC Adaptor and Terminal Block**



**AC/DC Adaptor Connections**



**NOTE:** Jumper terminal 5 to terminal 6 to raise the low threshold to 25V for triac inputs or when low voltage does not reach 0V. Connect input to terminals 4 & 6.

It may be necessary to place a 10 kΩ 7W resistor across terminals 4 & 6 to bring voltage below 25V.

**How To Order:**

Part Number	Description
KAL-DTIME1 .....	Sec., or Min. & Sec. Timer
KAL-DTIME2 .....	Hours & 100ths or Hrs. & Min. Timer
KAL-DTIMEAC/DC .....	5-240V AC/DC input module
KAL-DTB .....	Terminal block adaptor

**Accessories**

N7 - Explosion proof housing (see accessories section)

E200 - Outdoor Enclosure (see accessories section)

# 134K-135K

## Battery Powered Hour Meters with LCD Display

### Features

- Low price and high efficiency
- Large (8 mm) 8-digit LCD display,
- Optional backlighting
- Different time ranges from 0.1 second to 100,000 hours
- 0.1 second synchronization makes it suitable for very short activation times
- High voltage input for 10 to 260 V AC/DC voltage pulses
- Very high accuracy: 100 ppm
- NEMA4/IP65 Front Panel
- Screw terminals, RM 5 mm



- Lifetime of the battery approximately 8 years
- Locking of the reset key
- Operating temperature  $-10$  to  $+60$  °C

### Technical data

**Power supply:** non-replaceable lithium battery (lifetime approximately 8 years at 20°C)

**Backlighting:** external electrical source 24 V DC  $\pm 20\%$ , 50 mA

**Display:** LCD, 8 decades, 8 mm high characters

**Display range:**  $-9999999$  to  $99999999$ , with overflow display

**Reset:** manual and electrical

#### Timing inputs:

##### A. Standard DC Input (max. 30 V DC)

NPN or PNP

##### Switching level:

NPN: Low: 0 to 0.7 V, High: 3 to 30 V DC

PNP: Low: 0 to 0.7 V, High: 4 to 30 V DC

##### B. High Voltage Input (10 to 260 V DC/AC)

**Timing input:** Optocoupler input, max. 30 Hz

**Min. pulse time:** 16 ms

**Switching level:** Low: 0 to 2 V DC/AC, High: 10 to 260 V DC/AC

##### C. Timing range switching (Mode)

**Time Range:** see order table

##### Contact input:

Open Collector NPN (switching at 0 V DC)

##### Switching level:

NPN: Low: 0 to 0.7 V, High: 3 to 5 V DC

##### D. Reset Input (only DC and high voltage)

##### Minimum pulse time:

DC: 50 ms, high voltage: 16 ms

##### Contact input DC\*:

NPN: Low: 0 to 0.7 V, High: 3 to 30 V DC

##### High voltage input: 10 to 260 V DC/AC

##### E. Electrical reset key locking (for DC and AC)

Input not active: Reset key locked

##### Contact input:

Open Collector NPN (switching at 0 V)

##### Switching level:

NPN: Low: 0 to 0.7 V, High: 3 to 5 V DC

##### Interference emissions:

EN 55011 Class B, EN 61000-6-2 EN 61010 Section 1 (only AC versions)

**Housing:** dark grey RAL 7021

##### Operating temperature:

$-10$  to  $+55$  °C

##### Ambient temperature:

$-10$  to  $+60$  °C

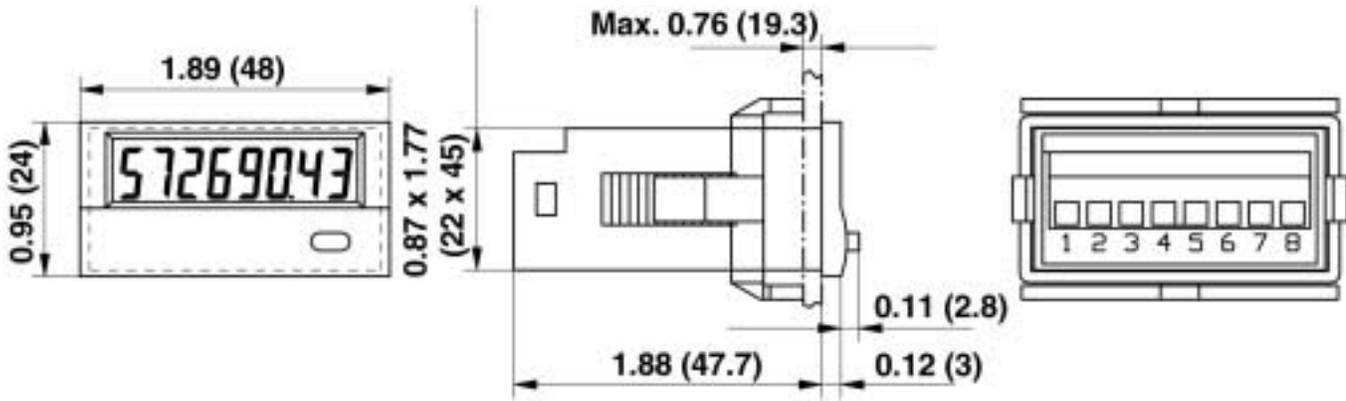
##### Storage temperature:

$-20$  to  $+70$  °C

**Protection:** NEMA4/IP65 front

**Weight:** approximately 50 g

**Dimensions:**



**Order Table**

Type	Mode	Time range	Inputs			
			INP A		INP B	
134K.012.8x0	Timer	99999h 59 m / 99999.99 h	—		0 ... 0.7 V DC	NPN
134K.012.8x1			—		4 ... 30 V DC	PNP
134K.012.8x3			10 ... 260 V AC/DC	AC/DC	10 ... 260 V AC/DC	AC/DC
135K.012.8x0	Timer	9999 h 59 m 59 s / 9999999.9 s	—		0 ... 0.7 V DC	NPN
135K.012.8x1			—		4 ... 30 V DC	PNP
135K.012.8x3			10 ... 260 V AC/DC	AC/DC	10 ... 260 V AC/DC	AC/DC

X: 5 = no backlight  
 X: 6 = with backlight

**Accessories**

N7 - Explosion proof housing (see accessories section)  
 E200 - Outdoor Enclosure (see accessories section)

# XL-10

## Battery Powered Elapsed Time Indicator

### Features

- 6 Digit Display
- 5-260 VDC or VAC Count Inputs
- Switch Closure Inputs
- Programmable Resolution
- 10 Year Battery Operation
- 2-Wire Hook-Up
- Backlit Display (optional)
- Heated (optional)



TIMERS

### Description:

The XL-10 timer series offers a wide variety of time bases, crisp, sharp liquid crystal display digits and a built-in power source designed to last 10 years. Digits .5" high readout in hours, minutes or seconds and tenths or hundredths of any basic time resolution. An extruded aluminum housing provides good looks and a rugged frame perfect for most industrial applications. Best of all, simple 2 wire installation makes replacing older electro-mechanical timers a snap. In short, the XL-10 timer brings state of the art technology to electromechanical applications at a price that is designed to fit your budget.

### Specifications:

#### Timing Range:

Hours, hours and 1/10ths, 1/100ths. Minutes, minutes and 1/10ths, 1/100ths. Seconds, seconds and 1/10ths.

#### Power Supply:

Built-in lithium battery designed for 10 years life. No external power source required.

#### Mounting:

Wall or Panel Reset: Key operated or push-button.

#### No. of Digits:

6 liquid crystal display.

#### Temperature:

No external power source needed for use in applications to -20°C. Optional heater operates from an external 12 to 28 Volt source, permitting operation to -40°C.

#### Backlighting:

For use where ambient light is insufficient or night viewing is required. This optional feature is powered by a separate 110 VAC and use of this feature in no way affects the lithium battery which powers the timer itself.

#### Termination:

10" long color coded wire leads.

#### Initiation:

Pulse, momentary, switch closure, voltage level or single dry switch. Pulse activation requires 10 m/s min. pulse width. 5-11 volts AC/ DC or 12-260 volts AC/DC may be used for pulse activation.

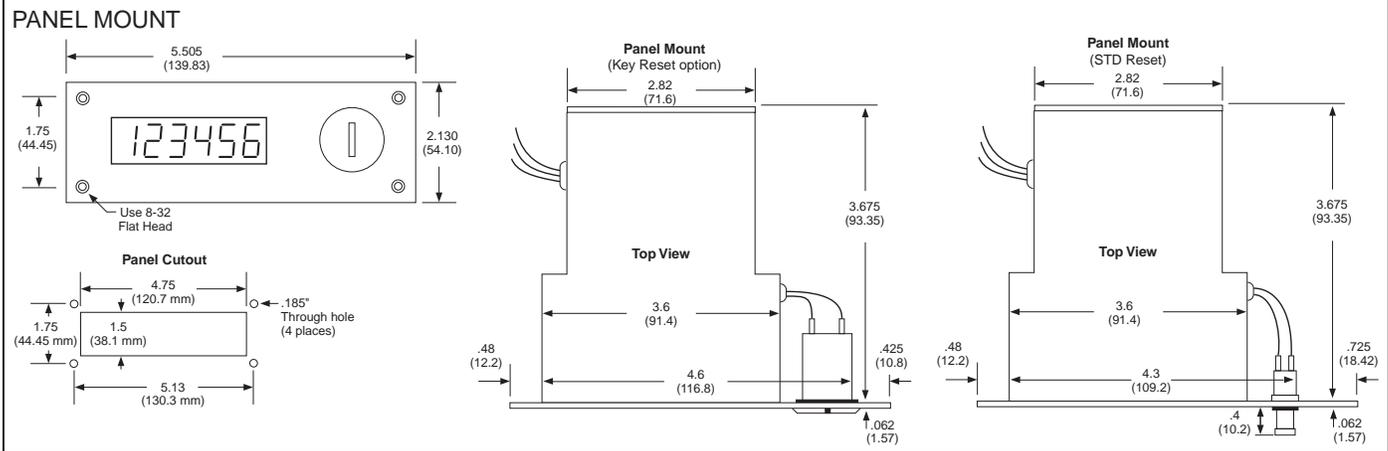
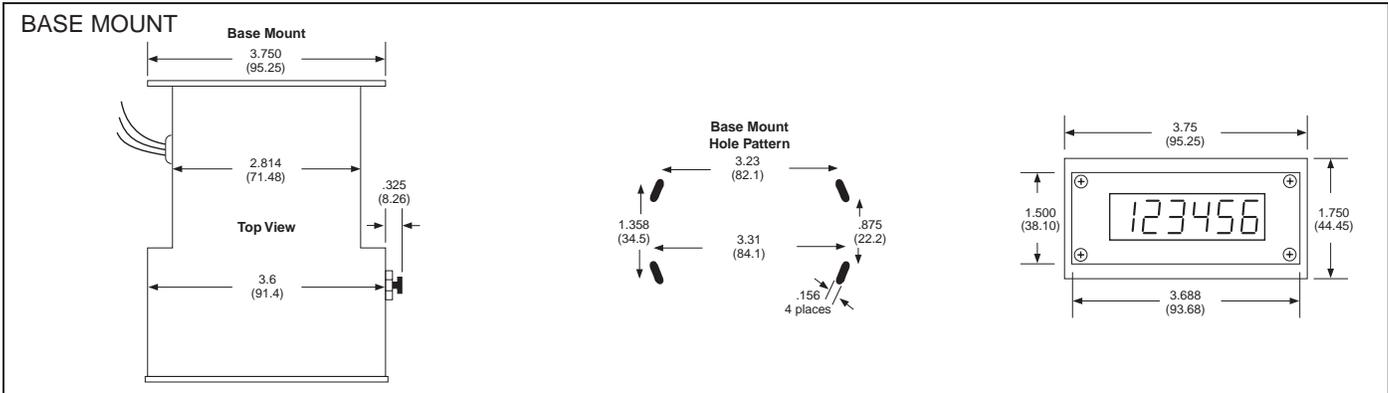
#### Accuracy:

0.1% based on an internal 60Hz time base.

### Switch Settings

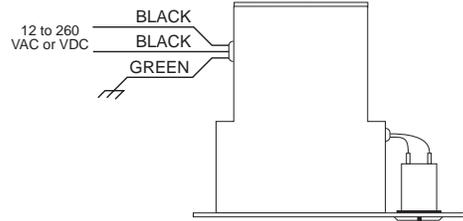
1	2	3	4	5	6	7	8	
X								Sec. 1/10
	X							Sec.
		X				X		Min. 1/100
			X			X		Min 1/10
				X		X		Hrs. 1/100
					X	X		Hrs. 1/10
		X						Min.
					X			Hrs.
							X	Level Activation (switch closure)
								JK Activation (pulse to start, pulse to stop)

X = Switch On

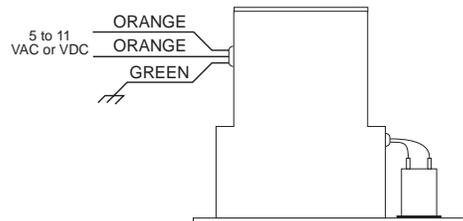


**Wiring:**

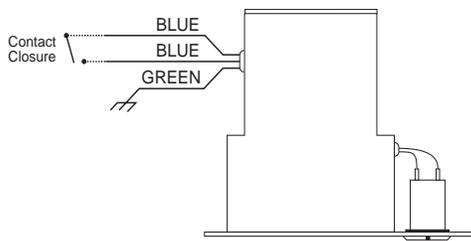
**Timer Inputs VL & JKV (12 to 260 V)**



**Timer Inputs VL & JKV (5 to 11V)**



**Timer Inputs C & JKC (Contact closures)**



**How To Order:**

**EXAMPLE: XL-10 P 1 JKV(5) 2 LT**

<b>Series</b>	XL-10	P	1	JKV(5)	2	LT
<b>Mounting</b>		P = Panel (front reset) B = Base (side reset)				
<b>Reset</b>			1 = Standard reset 2 = Key switch (Panel mount only)			
<b>Input to Time</b>				C = Dry switch closure VL = Voltage level (specify voltage) JKC = Momentary switch closure (on/pulse off/pulse) JKV = Voltage pulse (on/pulse off/pulse; specify voltage)		
<b>Timing Resolutions</b>						1 = Hours 2 = Hours & 1/10ths 3 = Hours & 1/100ths 4 = Min. & 1/10ths 5 = Min. & 1/100ths 6 = Seconds 7 = Seconds & 1/10ths 8 = Minutes
<b>Options</b>						BL = Back lighting RR = Remote Reset LT = Heated—Add LT for -20°C to -40°C (requires external 12 to 28 VAC or DC power supply)

# HVA

## Preset Hour Meter

### Features

- Rugged Case
- Varied Mounting Styles
- Manual Reset
- 5 Amp Switch
- Times Up to Preset
- Preset Displayed Permanently



### Application:

Perfect adding preset timer for chemical processes, electroplating baths, controlling periods of time, and endurance tests.

### Description:

Dual display 5 digit, preset. These units feature two registers, one for the set point, one for the actual time. Change setpoint during a run with front panel buttons. Manual reset on front panel. Upon reaching preset, a 5 amp Form C switch trips. The timer continues timing to register actual time elapsed. Panel or spring clip mount; accepts most voltages AC/DC; keylock transparent cover available.

### Specifications:

**Display:** 4 hour digits-white on black, 1 decimal digit-red on black.

**Digits:** Preset (.157"), counting (.197")

**Resolutions:** Hours 1/10

**Operating Voltages:** 12, 24, 48VDC; 24, 48, 110, 220VAC.

**Power Consumptions:** 1.5W, DC; 2.2 VA, AC.

**Switching:** 5 amp Form C transfers at preset.

**Switch Rating:** AC load max. 250V 5A DC load max 12V 3A; 24V 2A.

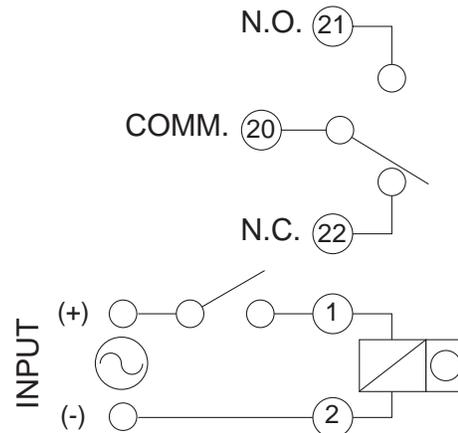
Arc suppression recommended for inductive load.

**Temperature:** (-10°C to +50°C) +12°F to ±122°F.

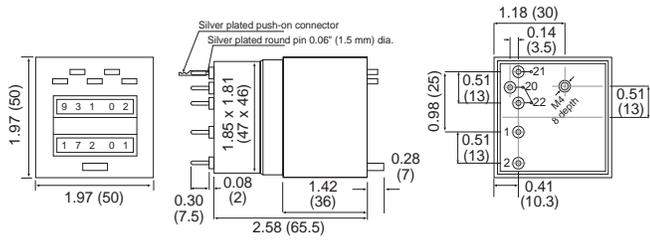
**Weight:** 5 oz.; including frame, 7 oz.

**Approvals:** CE Approved

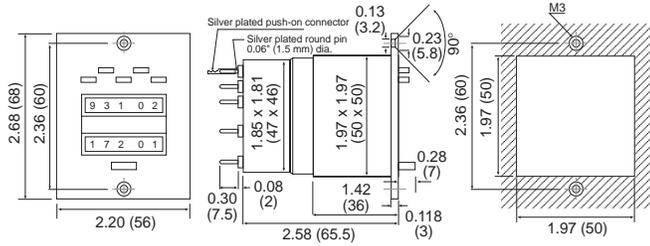
### Wiring:



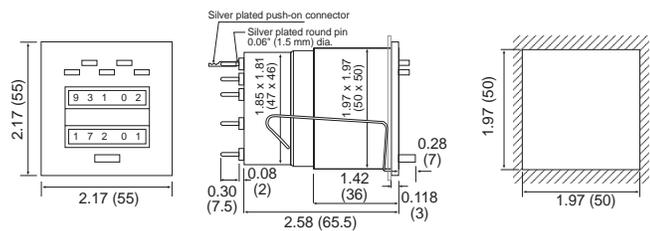
### 0 Mounting Style:



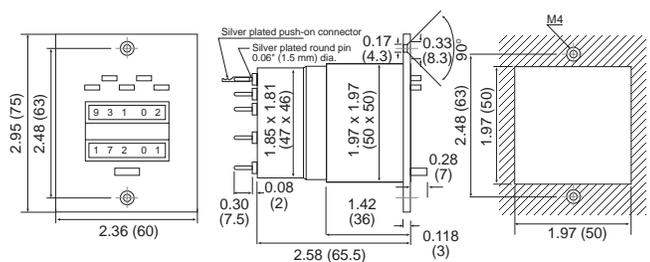
### 1 Mounting Style:



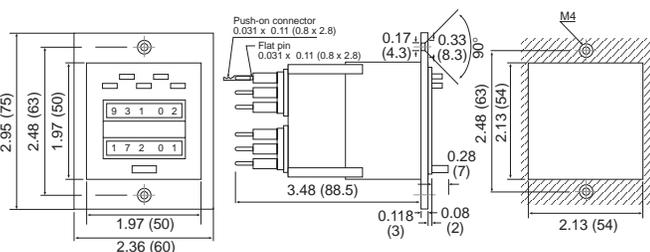
### 2 Mounting Style:



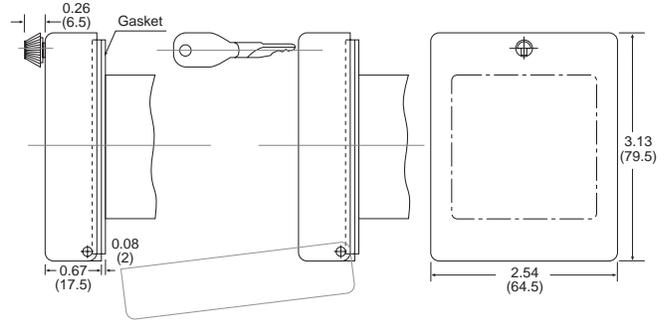
### 3 Mounting Style:



### F2B Option:

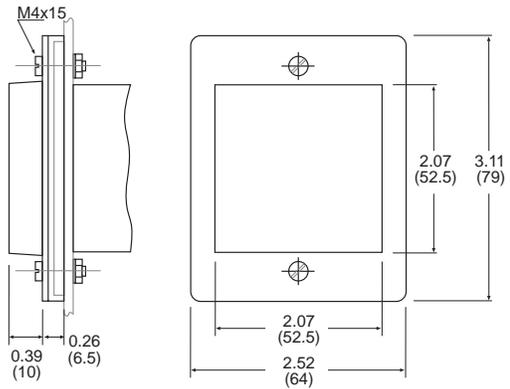


### F2DV Option:



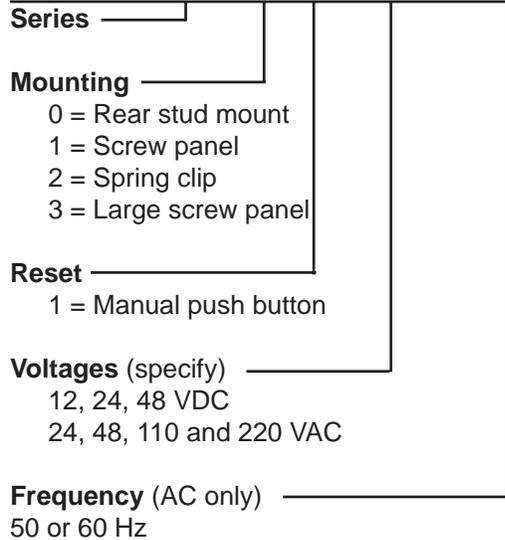
### F2DVS Option:

### K2 Option:



### How To Order:

**EXAMPLE: HVA15 1 1 110VAC 60Hz**



### Available Options (add to end of part number)

- K2 - Silicon cover
- F2 - Frame w/ Socket Box
- F2DVS - Frame w/ locking cover & Socket Box
- F2DV- Frame w/ knob cover & Socket Box
- US - Key reset
- DVS -Locking cover without Frame
- DV - Knob cover without Frame
- N7 - Explosion proof housing (see accessories section)

# DT20 Series

## Day Timer with 20 Programmable Presets

### Features

- 24 Hour (AM & PM), 7 Day Programming
- 20 Programs Provide Up To 10 ON & 10 OFF Events Per Day / Week
- Rechargeable Battery Backup With 100 Hour Carry-Over
- 16 Amp, SPDT Relay
- Manual Override
- Several Mounting Styles Available



The DT20 is a compact electronic 24 hour/7 day time switch module, with heavy duty relay contacts for switching low or line voltage loads. Applicable for time of day control of pumps, fans, heaters, HVAC control circuits, lighting, machinery and many other types of commercial, industrial, and agricultural equipment.

All models feature large keys with unique "circular programming" for easy programming, a large LCD display and battery backup.

### TECHNICAL DATA:

<b>Channels:</b>	1
<b>Programs:</b>	20
<b>Manual 3 way override:</b>	On-Auto-Off
<b>Shortest switching time:</b>	1 minute
<b>Reserve carryover:</b>	100 Hours
<b>Input voltage:</b>	24VAC/DC 120VAC 208/240VAC
<b>Switching output:</b>	SPDT relay
<b>Switch ratings:</b>	16A @ 277VAC 25ma, 40VDC 1000W Tungsten @ 250VAC 500W @ 125VAC

**Input draw:** 4VA

**Input frequency:** 50 or 60Hz

**Wiring connections:** 1/4" quick connects

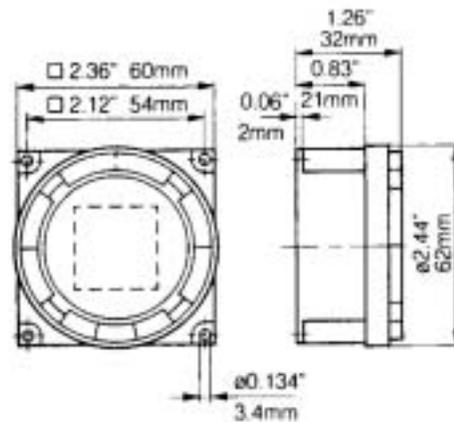
**Ambient temperature:** -20° F to 140° F (-28° C to 60° C)

**Approvals:** UL and Canadian UL recognized: File E83486

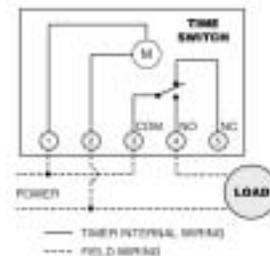
### MOUNTING OPTIONS:

The standard DT20 models may be surface mounted inside a panel or flush mounted with DTA-PH Base mounting kit, available from KEP. Indoor NEMA 1 (DTA-E150), and outdoor NEMA 3R (DTA-E200) enclosures are available for stand-alone mounting.

### Dimensions



### Terminal Connections

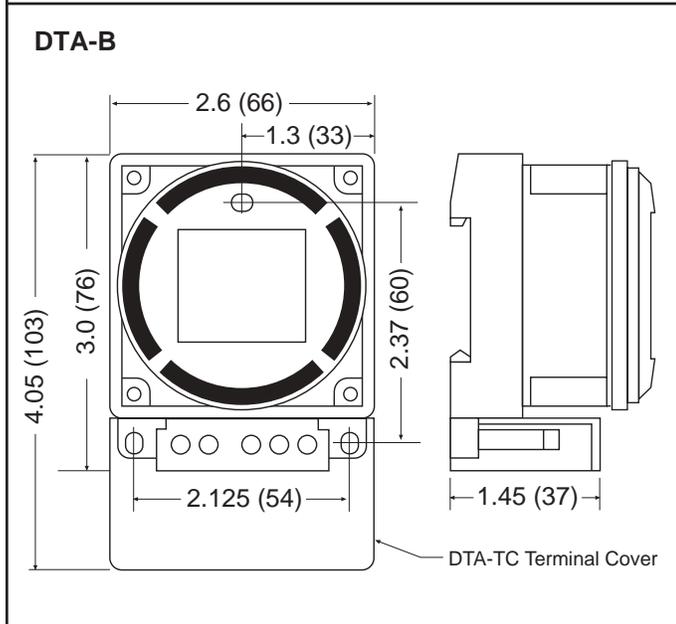
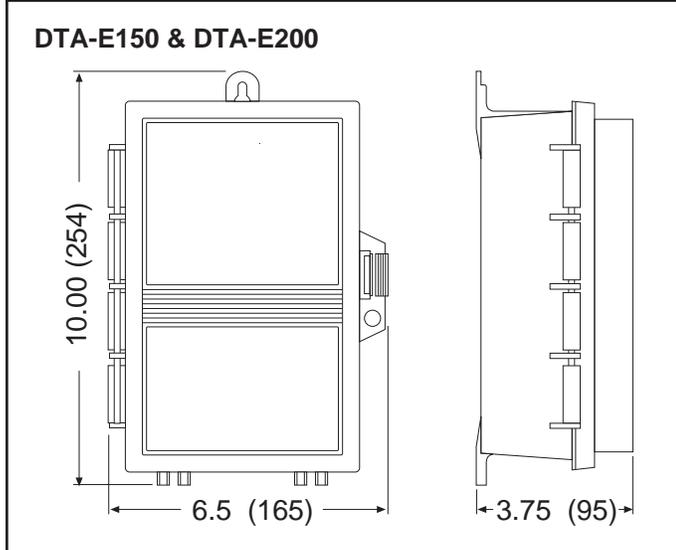
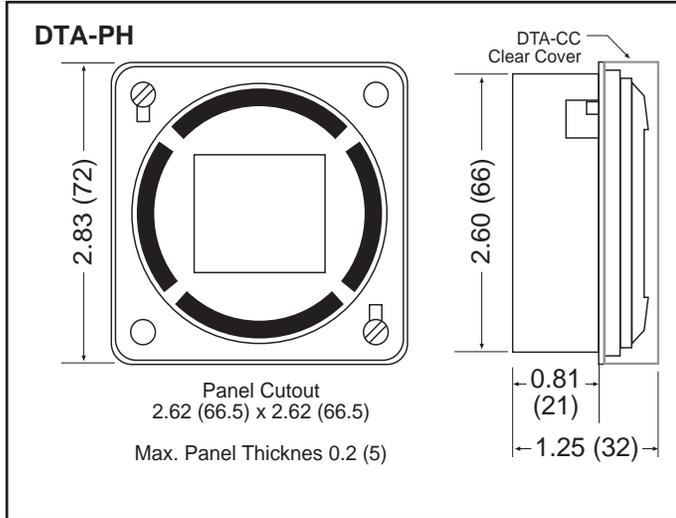


### CAUTION!

#### RISK OF ELECTRIC SHOCK

Turn power off at main panel before servicing the DT42 or the equipment it controls.

**Additional Mounting Options:**



**DT20 Day Timer**

**How To Order:**

**Example:** DT20 A

**Series:** DT20 = Day Timer

**Operating Voltage:**

- A= 110 VAC
- B= 220 VAC
- C= 24 V AC/DC

**Mounting Accessories**

- DTA-PH = Panel Housing for Panel Mount
- DTA-CC= Clear Cover for Panel Housing (DTA-PH)
- DTA-B= Base with Screw Terminal  
(not for panel mounting)
- DTA-TC= Terminal Cover for DTA-B
- DTA-E150= Indoor Enclosure
- DTA-E200= Outdoor Enclosure

# TR-910

## Programmable Time Relay with LCD Display

### Features

- Easy Operating and Programming Using Front Keypad
- Self Powered with Internal Replaceable Lithium Battery
- High Contrast, 2-line, 5-digit, LCD-Display
- 9 Programmable Time Ranges from 0.20 Seconds up to 99999 Hours
- Relay Contacts Rated at 8A; Programmable to NO or NC
- Resolution up to 0.01 Seconds
- Universal Inputs for 12 - 260 V AC/DC
- 8 Timing Modes



- 3 Programmable Activation Modes
- NEMA4/IP 65 Front Panel
- Plug-in Connector

### Specifications:

**Voltage supply:** Two, 3V AA replaceable lithium battery, service life > 10 years or 500,000 relay changes

**Inputs:** Timing Reset inputs: 12 to 260 V AC/DC, impedance 180 k $\Omega$  min. impulse 20 ms, (optocoupler)

**Display (time):** 5-digit LCD-Display; 6.5 mm high  
(set time, mode): 5-digit LCD-Display; 3.5 mm high

**Accuracy:** +50/-20 ms respectively 0.5 % of setting time (higher value counts)

**Repetition accuracy:** 0.3 % of setting time

**Operating temperature:** -10 to +60 °C

**Storage temperature:** -20 to +70 °C

**Relative humidity:** 80% max. up to 31 °C; decreasing to max. 50% at 40 °C

**Protection:** NEMA4/IP 65 with delivered seal

**Output relays:** SPTST voltage free contacts programmable as NO or NC

**Contact Rating:** 250 V AC at 8A;  $\cos \varphi = 1$   
250 V AC at 5A;  $\cos \varphi = 0.4$   
30 V DC at 8A;  $\cos \varphi = 1$

**Reaction time:** < 20 ms

**Expected life:** 2 A ohm's load 1000000 switching cycles

**EMV:** CE-conforml to EC-guideline 89/36/ EWG

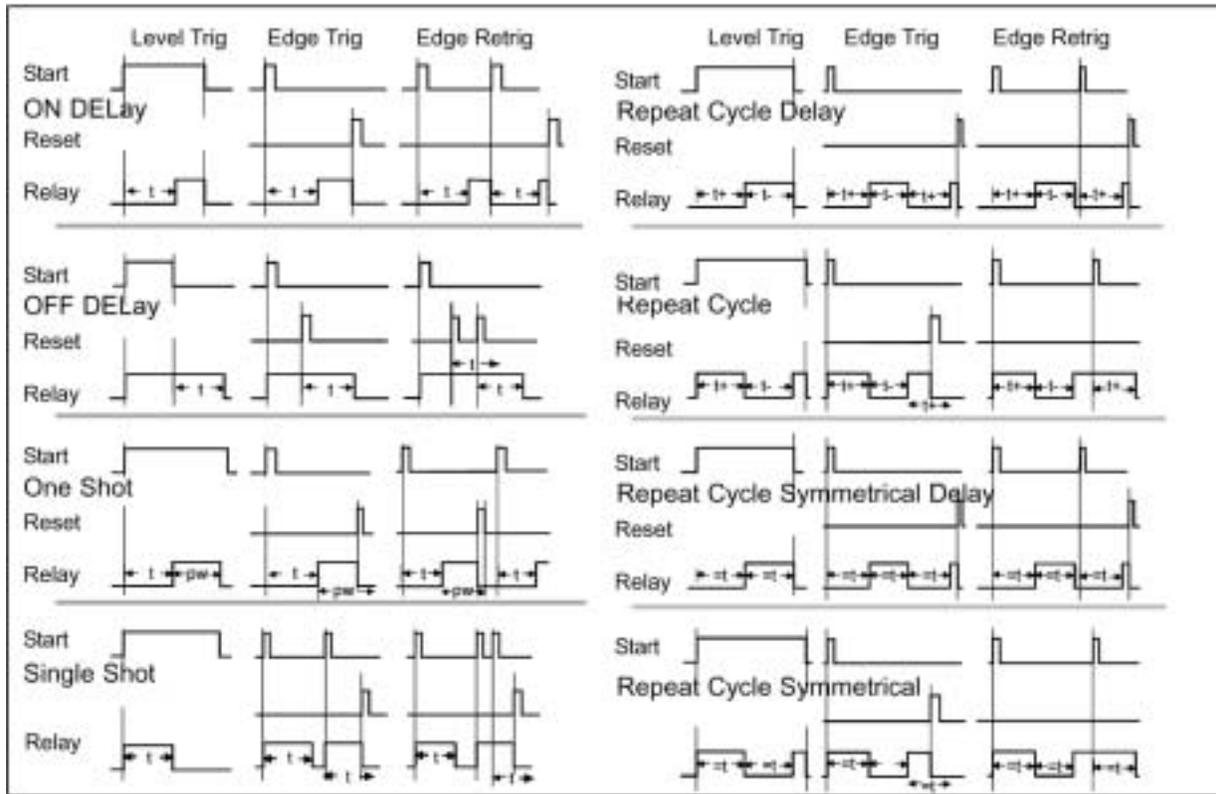
**Electromagnetic:** EN50081-2/EN 55011 class B

Radiation: Electromagnetic immunity: EN6100-6-2

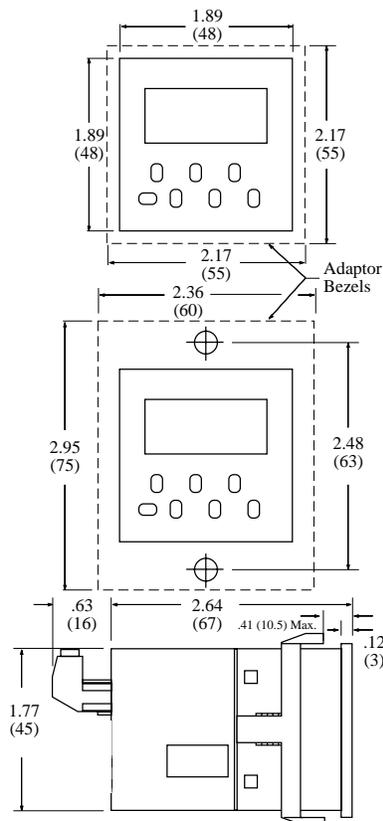
**Weight:** appr. 80 g

**Time ranges:** 1 s ... 99999 s; 0,2 s ... 9999,9 s; 0,02 ... 999,99s;  
1 min ... 99999 min; 0,1 min ... 9999,9 min; 0,01 min ... 999,99 min;  
1 h ... 99999 h; 0,1 h ... 9999,9 h; 0,01 h ... 999,99 h

## Timing Modes



## Dimensions



## Terminal Connections

1	Common for terminals 2 + 3	
2	Timing input, programmable to level or edge triggered	These inputs can be 12 - 260 V AC/DC. For DC input the polarity is unimportant
3	Reset input	
4/5	Voltage free relay contacts, programmable to NO or NC	
6/7	Connect together to disable front panel keys	

## Order Code:

Model Number: TR910.010.800

# INT62A

## Preset Timer with LED Display & BCD Output Option

### Features

- 6 Large, LED Digits
- Contact Closure, 3 to 30 Volt DC Start/Stop Pulse
- AC or DC Power
- Remote & Front Panel Reset
- Screw Terminal Connection
- NEMA 4X / IP65 Front Panel



### Applications:

Ideal for elapsed time indication applications where a large LED display is required. Equipment or machinery downtime indicator/ on-time indicator.

### Description:

The INT62A is a low cost, highly accurate 6 digit timer. The large, brilliant .6" red-orange LED's show the elapsed time. If there is a failure of the AC or DC power source, an internal memory system will retain all of the important information for at least ten years without any battery. The unit is housed in a NEMA 4X/IP65 front, DIN standard panel mount enclosure. See "Timer Switch Settings" section for "Time Base" ranges. The keypad is used to divide the "Time Base" from 1 to 100, change the decimal point, key-in preset times and reset the timer.

### Specifications:

**Mounting:** Standard DIN cut-out. 3.622" (92mm) wide, 1.772" (45mm) high, 4.4" (111.8mm) max depth behind panel.

**Display:** 6 digit, 0.55" High LED

**Power Supply:** 110 VAC 50/60 Hz., 220 VAC 50/60 Hz., 12 VDC - 10% to 24 VDC + 10%.

**Accuracy:** Over full temperature range, an accuracy of 0.05% is obtained by the use of an internal crystal time base oscillator.

**+ 5 Volt DC Output:** Up to 100mA of + 5 Volt regulated power is available to supply peripheral devices.

**Power Consumption:** Less than 425mA required for DC operation with all options. Less than 260mA without BCD output option. AC power consumption less than 5 watts with all options.

**Standby System:** Internal non-volatile RAM (EEPROM) retains counts for at least ten years without power.

**Housing:** Standard high impact UL94V-O rated plastic case.

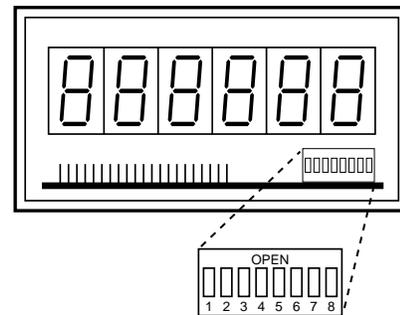
**Temperature:** Operating + 32 °F (0°C) to + 130°F ( + 54°C). Storage -40°F (-40°C) to + 200°F ( + 93°C).

**Signal input:** 3 to 30 Volt DC pulses of .5 ms. minimum duration.

**BCD Output:** Parallel TTL 5VDC compatible positive true logic four lines per digit. Six full digits of data.

### TIMER SWITCH SETTINGS:

Remove front bezel revealing DIP switches (see figure below). Set the switches to the desired function according to the programming instructions following: (OFF is up, ON is down)



SW 1 OFF Reset to zero  
ON Reset to preset

SW 2 OFF Level activation (continuous time)  
ON Pulsed activation (start and stop on same line)

SW 3 ON This switch must be in this position to be a timer. (if OFF it is a counter, see Preset Counter section)

SW 4, 5 Sets time base. (see below)

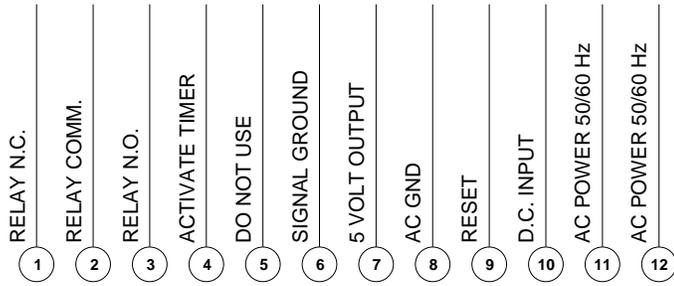
SW4	SW5	TIME BASE
OFF	OFF	Seconds and 1/100
ON	OFF	Minutes and 1/100
OFF	ON	Hours and 1/100
ON	ON	Minutes and seconds

SW 6 OFF Outputs latched until reset  
ON 250 mS. output (momentary)

SW 7 OFF Display continues to count thru preset.  
ON Display recycles at preset

SW 8 OFF Timer will not stop if reset is activated.  
ON Timer stops on reset and power recovery.

## Terminal Designations:

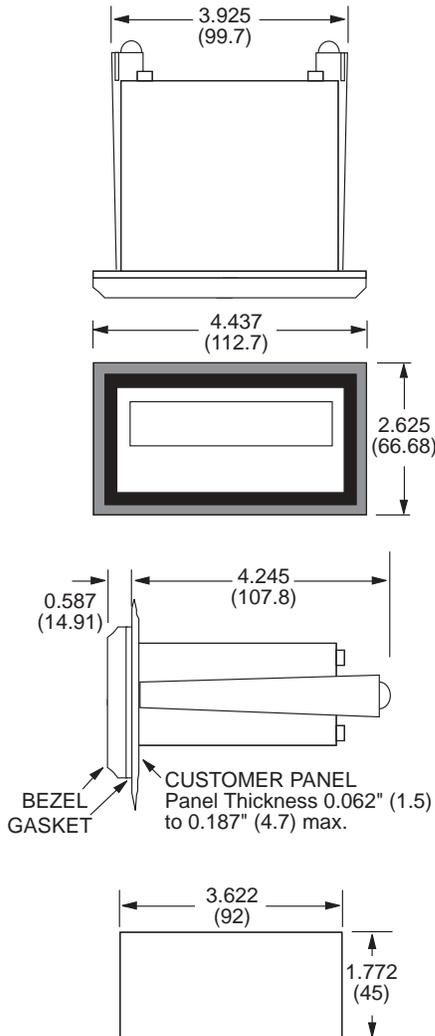


### IMPORTANT:

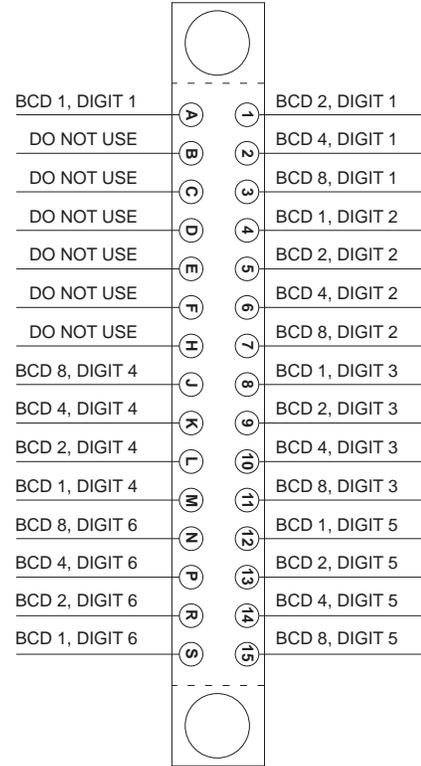
Terminal #8 must be connected to earth ground at all times when in use. This provides a ground path for static electricity which otherwise would cause faulty operation, erroneous data or circuit damage.

PRESET TIMERS

### Mounting:



## BCD Option Terminal Designations:



### NOTE:

The BCD PCB edge connector consists of 30 gold plated and bifurcated solder connections. It is configured with two rows of 15 solder points labeled 1 to 15 and A to S. Each solder terminal will accept up to three soldered wires of #22 AWG.

## How To Order:

**EXAMPLE: INT62 A 1 A 1 5 A**

**Series** \_\_\_\_\_

**Mode** \_\_\_\_\_  
 X = Non Preset (non-keyboard)  
 A = 1 Preset

**Control Outputs** \_\_\_\_\_  
 X = None (non-keyboard)  
 1 = 10 Amp Relay  
 2 = Open Collector Transistor

**Scalability** \_\_\_\_\_  
 X = None (non-keyboard)  
 A = ÷ by 1 to 100

**Input** \_\_\_\_\_  
 1 = 3 to 30 Volt DC pulse

**Power Supply** \_\_\_\_\_  
 1 = 12 VDC  
 2 = 24 VDC  
 5 = 110 VAC 50/60 Hz  
 6 = 220 VAC 50/60 Hz

**Data Outputs** \_\_\_\_\_  
 X = None  
 A = Parallel BCD  
 2 = Add "2" suffix if non-keyboard unit)

### Accessories

Non keyboard panel separate: Model 34235  
 Keyboard panel Model 34236

# 531 Series

## Temperature Display for Pt100 and Ni100 RTD's

### Features

- Compact and Low-Cost Temperature Display
- Temperature Display in °C or °F
- MIN/MAX Value Retention
- EEPROM Data Backup on Power Failure
- Galvanic Isolation with Reverse Polarity Protection
- Screw Terminal Connectors: pitch 5 mm
- Display Hold Input



- Easy Programming and Operation
- 5 Measurements/second

### Specifications:

Supply voltage: 10-30 V DC, galvanically isolated with reverse polarity protection

Current draw: max. 40 mA

Display: 5-digit display, red LED's; height 8 mm

Measuring rate: 5 measurements/second

Display refresh: 1-2 times per second

Data backup: EEPROM

Housing: housing for control panel 48 x 24 mm acc. to DIN 43 700; RAL 7021, dark grey

Ambient temp.: -20 to +65 °C

EMC: according to EC EMC directive 89/36/EEC

Interference emissions: EN 50081-2/EN 55 011 Class B

Interference resistance: EN 6100-6-2

Protection: NEMA4 / IP65 (front)

Weight: app. 50 g

Circuit type: 2-wire, 3-wire and 4-wire connection technique, programmable

Input: Pt100 or Ni100 RTD with sensor breakage monitoring

Control inputs: High: 4-30 V DC, Low: 0-2 V DC

Supply current: 1 mA

Supply line: 2-wire: max 20 Ω, programmable 3-wire, 4-wire: max 20 Ω, no balancing required

Temp. ranges: Pt100 acc. to DIN IEC 751:  
-199.9 °C to +850.0 °C  
-327.8 °F to +1562.0 °F

Ni100 acc. to DIN 43760:  
-60.0 °C to +250.0 °C  
-76.0 °F ... +482.0 °F

Resolution: 0.1°C (0.1°F) or 1°C (1°F)

Linearity error: Pt100 < 0.1 % for entire measuring range at an ambient temperature of 20 °C  
Ni100 < 0.2 % for entire measuring range at an ambient temperature of 20 °C

Temp. drift: 0.1 K/Kambient

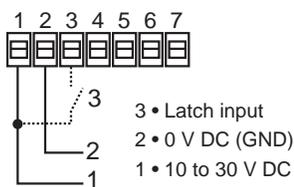
### Order #:

**531 = Temperature Display with RTD Input Accessories**

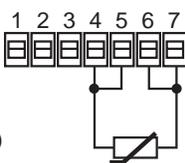
N7 - Explosion proof housing (see accessories section)  
E200 - Outdoor Enclosure (see accessories section)

### Wiring:

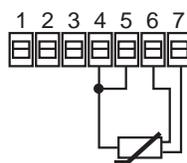
#### Power Supply



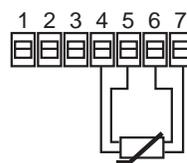
#### 2-Wire RTD



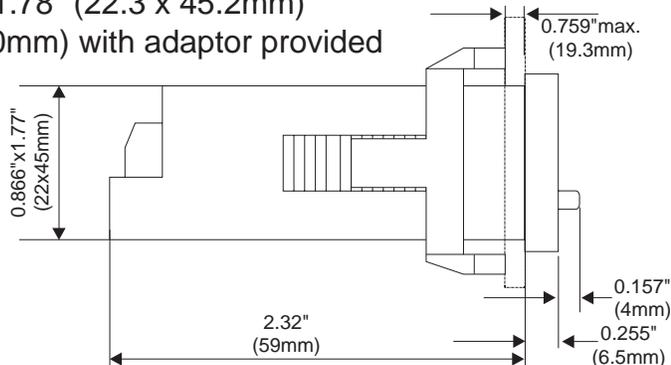
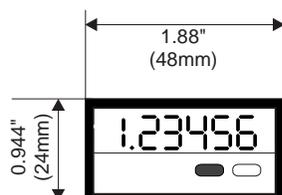
#### 3-Wire RTD



#### 4-Wire RTD



Panel Cutout: 0.876" x 1.78" (22.3 x 45.2mm)  
or 0.99" x 1.97" (25 x 50mm) with adaptor provided



# 532 Series

## Temperature Display for J, K and N Thermocouples

### Features

- Compact and Low-Cost Temperature Display
- Temperature Display in °C or °F
- MIN/MAX Value Retention
- EEPROM Data Backup on Power Failure
- Galvanic Isolation with Reverse Polarity Protection
- Screw Terminal Connectors: pitch 5 mm
- Display Hold Input
- 5 Measurements/second



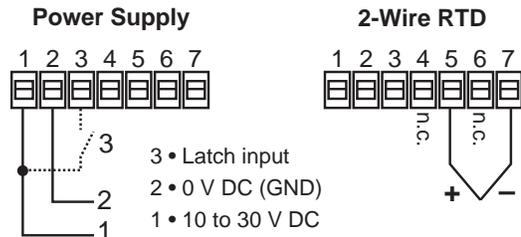
- J, K, N Thermocouples with External or Internal Cold Junction Compensation
- Easy Programming and Operation

### Specifications:

Supply voltage: 10-30 V DC, galvanically isolated with reverse polarity protection  
 Current draw: max. 40 mA  
 Display: 5-digit display, red 7-segment LED's; height 8 mm  
 Measuring rate: 5 measurements/second  
 Display refresh: 1-2 times per second  
 Data backup: EEPROM  
 Housing: housing for control panel 48 x 24 mm acc. to DIN 43 700; RAL 7021, dark grey  
 Ambient temp.: -20 to +65 °C  
 EMC: according to EC EMC directive 89/36/EEC  
 Interference emissions: EN 50081-2/EN 55 011 Class B  
 Interference resistance: EN 6100-6-2  
 Protection: NEMA4 / IP65 (front)  
 Weight: app. 50 g  
 Input: Thermocouple Sensor  
     J (Fe-CuNi)  
     K (Ni-CrNi)  
     N (NiCrSi-NiSi)  
     with sensor breakage monitoring  
 Control inputs: High: 4-30 V DC, Low: 0-2 V DC  
 Supply current: 1 mA  
 Supply line: 2-wire: max 20 Ω, programmable 3-wire, 4-wire: max 20 Ω, no balancing required

Temp. ranges: according to DIN IEC 584  
     J (Fe-CuNi) -210.0 °C to +1200.0 °C  
                   -346.0 °F ... +2192.0 °F  
     K (Ni-CrNi) -200.0 °C ... +1372.0 °C  
                   -328.0 °F ... +2501.6 °F  
     N (NiCrSi-NiSi) -200.0 °C ... +1300.0 °C  
                       -328.0 °F ... +2370.0 °F  
 Resolution: 0.1°C (0.1°F) or 1°C (1°F)  
 Linearity error: < 0.4 % for entire measuring range at an ambient temperature of 20 °C  
 Cold junction error: ±1.0 °C typ. ±3.0 °C  
 Temp. drift: 0.1 K/Kambient

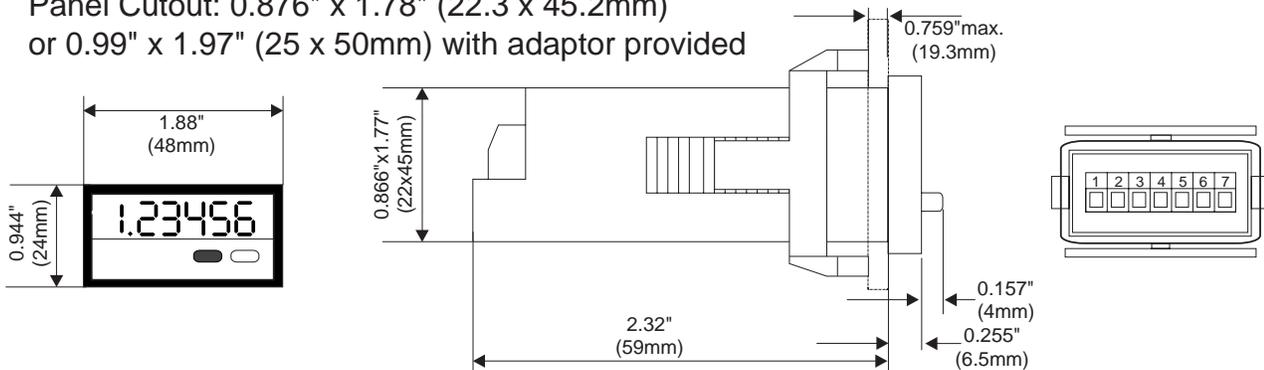
### Wiring:



### Order #:

**532 = Temperature Display with thermocouple Input**  
**Accessories**  
 N7 - Explosion proof housing (see accessories section)  
 E200 - Outdoor Enclosure (see accessories section)

Panel Cutout: 0.876" x 1.78" (22.3 x 45.2mm)  
 or 0.99" x 1.97" (25 x 50mm) with adaptor provided



# TP-554 Series

## Temperature/Process Monitor With or Without Alarms

### Features

- Very bright LED display, height 14mm
- DIN housing, 96 x 48 mm
- Programmable operating curve for standard signals, thermocouples, resistance thermometers, etc.
- Programmable operating curve, even non-linear, allowing the use of economical sensors
- Two relay outputs with two preset limit values

### Additional features:

- DIN housing 96 x 48 mm
- Character height: 14 mm
- Resolution 14 bits
- Simple menu-driven programming, and operation with 4 keys
- Electrical connections by means of plug-in screw terminals
- Voltage supply: 10-30 VDC or 90-260 VAC
- IP 65/NEMA4 (front)
- Auxiliary power supply output for transducer or sensor  
10..30 VDC: 10 VDC  $\pm$  2%, 30mA  
90..260 VAC: 24 VDC  $\pm$  15%, 50mA and 10 VDC  $\pm$  2%, 30mA
- Hum eliminator (50/60 Hz user selectable)
- Serial interface allows reading of the measured values and set-up programming.

### Specifications:

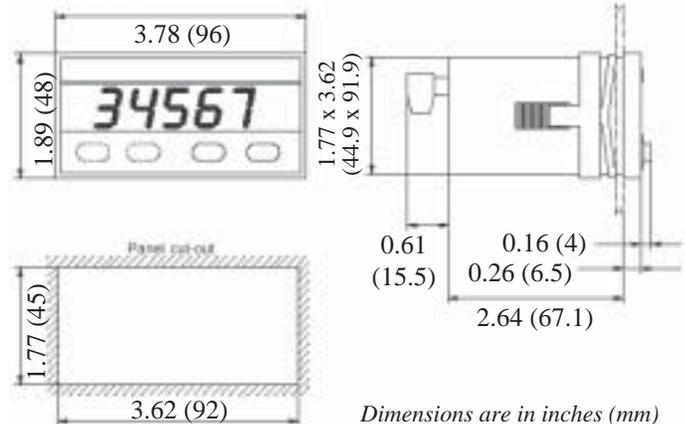
- Display range: -19.999..99.999
- Input ranges:  
0..400  $\Omega$ , 0..4000  $\Omega$   
0..100 mV, -100..+100 mV

### Thermocouples

- Integrated operating curves for thermocouples (types B, C, D, E, G, J, K, L, N, R, S, T, U)
- Programmable input operating curve with up to 24 reference points
- 2 programmable limit values (TP551; unit without presets, has only 2 buttons)
- Outputs: Two (2) SPDT relays (250 VAC / 3A)
- Programmable hysteresis (on, off, on/off)
- SET key to reset the outputs
- Inputs: thermocouple, millivolt, resistance thermometer with measurement on 2, 3 or 4 wires, RESET to reset the outputs, KEY terminal to lock the front keys.

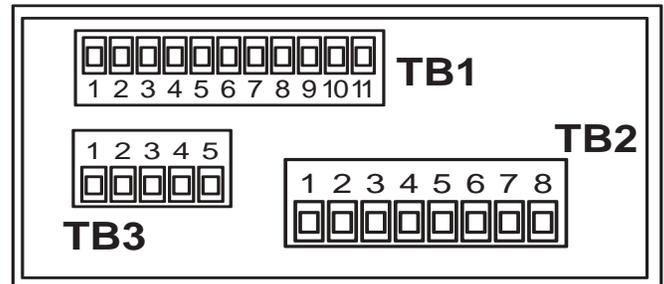


### Dimensions:



DIGITAL PANEL METERS

### Wiring:



#### TB1

- 1 Relay 2 Com. (Opto-Emitter)
- 2 Relay 2 N.O.
- 3 Relay 2 N.C. (Opto-Collector)
- 4 Relay 1 Com. (Opto-Emitter)
- 5 Relay 2 N.O.
- 6 Relay 2 N.C. (Opto-Collector)
- 7 A.C. In (10-30 VDC)
- 8 A.C. In (Ground; 0 VDC)

#### TB2

- 1 Measuring input 1 (Sense)
- 2 Measuring input 2 (- Ref)
- 3 Sensor (+Ref)
- 4 Current output for 0 .. 4000  $\Omega$  (+ Sense)
- 5 Current output for 0 .. 400  $\Omega$  (+ Sense)
- 6 Keys locking
- 7 Reference ground Reset / Key
- 8 Reset
- 9 GND for DC Output (Pins 10 & 11)
- 10 +10 VDC Out (30 mA)
- 11 +24 VDC Out (50 mA) (AC units only)

#### TB3

	RS232	RS485	RS422
1	GND	-	-
2	RxD	DO+/RI+	RI+
3	TxD	DO-/RI-	RI-
4	-	-	DO+
5	-	-	DO-

### Order Code

Example: TP554.010 0 00

Series: \_\_\_\_\_  
 TP551.012 = No Presets/Relays  
 TP554.010 = 2 Presets/Relays

### Operating Voltage:

0 = 90 to 260 VAC  
 3 = 10 to 30 VDC

### Options:

00 = without interface  
 05 = RS232  
 06 = RS422  
 07 = RS485

# BEACON Series

## Low Cost Digital Panel Meters

### Features

- AC / DC Voltage Inputs (Pos / Neg)
- AC / DC Current Inputs (Pos / Neg)
- AC or DC Supply Voltage
- NEMA 4X / IP65 Front
- Low / High Scaling
- 3<sup>1/2</sup> Digit Display
- Over-Range Indication
- DC Output to Power Peripherals



### Description:

The BEACON series is a bright new addition to KEP's product line. Featuring 3<sup>1/2</sup> digits of bright RED or GREEN (optional) LED's, these meters outshine the competition by offering DIP switch selection of the most frequently used functions. The new BEACON series focuses on applications needing 3<sup>1/2</sup> digits of display, showing -1999 to +1999 with switch selectable decimals. With their great flexibility and multiple input ranges, let the BEACON series digital panel meters be your guide.

### Specifications:

**Display:** 3<sup>1/2</sup> digit, .55" high, 7 segment bright LED. Minus sign displayed when current or voltage is negative. Decimal points inserted before 1st, 2nd, or 3rd least significant digits by DIP switch selection.

**Power:** Available in 5VDC, 8-24VDC, 115VAC or 230VAC ( $\pm 10\%$ ). 260 mA (DC); 6 VA (AC).

**Operating Temperature:** +32°F to 130°F (0°C to 60°C)

**Storage Temperature:** -40°F to 200°F (-40°C to 80°C)

**Output Power:** (AC powered units only)

18 VDC regulated  $\pm 4\%$  @ 50 mA

**Input Ranges:** (switch/jumper selectable)

#### AC & DC Volt Meters

0-1.999 Volts  
0-19.99 Volts  
0-199.9 Volts  
0-199.9 mV

#### AC & DC Current Meters

0-199.9  $\mu$ A  
0-1.999 mA  
0-19.99 mA  
0-199.9 mA  
0-1.999 amps (2A Option)

**Over-Range Indication:** Three least significant digits blank when input is over range.

**Max. Voltage on Basic Range:** 75 V AC/DC (terminals 4 & 5)

**Max. Voltage on Terminal Block:** 300 V AC or DC

### Max Shunt Currents:

199.9 $\mu$ A through 19.99mA- 10 x (max. range current)  
199.9mA- 1 amp  
1.999 amp- 3 amps

**Caution:** A fast blow fuse should be installed in series with the current meter in applications where fault currents may exceed maximum allowable current.

### Scaling:

**Reference Adjust** (supplied on all units)

Used to calibrate display to  $\pm 30\%$  of STD input.

### Span Adjust

Coarse and fine adjust pots offer  $\div 1$  to  $\div 13$  and when used with the switch selected ranges, offers direct readout of linear transducers.

### "0" Offset Adjust

Sets "low" input display at  $\pm 50\%$  of span.

### Accuracy: (23°C, 85% R.H.)

(Add  $\pm 2$  digits to below for negative readings )

DC Volts-  $\pm .1\%$  of Reading  $\pm 1$  digit

AC Volts-  $\pm .1\%$  of Reading  $\pm 3$  digits

### DC Current

199.9 $\mu$ A, 1.999mA, 19.99mA:  $\pm .1\%$  of reading  $\pm 1$  digit

199.9mA:  $\pm .18\%$  of reading  $\pm 1$  digit

1.999A:  $\pm .1\%$  of reading  $\pm 1$  digit

### AC Current

199.9 $\mu$ A, 1.999mA, 19.99mA:  $\pm .1\%$  of reading  $\pm 3$  digit

199.9mA:  $\pm .15\%$  of reading  $\pm 3$  digits

1.999A:  $\pm .5\%$  of reading  $\pm 3$  digits

### Temperature Coefficients:

#### Current Inputs

DC:  $\pm 100$  PPM/ $^{\circ}$ C  
(1.999A:  $\pm 200$  PPM/ $^{\circ}$ C)

AC:  $\pm 200$  PPM/ $^{\circ}$ C

#### Voltage Inputs

DC:  $\pm 75$  PPM/ $^{\circ}$ C

AC:  $\pm 150$  PPM/ $^{\circ}$ C

**Input Response Time:** 1 second

**Sample Rate:** 3 samples/second

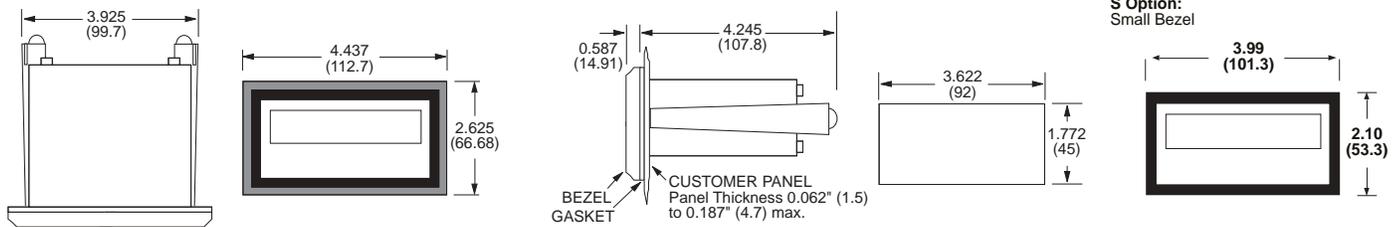
**Normal Mode Rejection:** 70dB 50/60Hz (DC units only)

**Common Mode Rejection:** 110dB DC or 50/60Hz (DC units only)

**Case:** Plastic case, NEMA 4X/IP65 front panel

**Weight:** 2 lbs.

## Dimensions:



## Switch S1 Functions:

- S1-1 Decimal Point XXX.X
- S1-2 Decimal Point XX.XX
- S1-3 Decimal Point X.XXX
- S1-4 Input Range 0-199.9 mV (Current Inputs)
- S1-5 Input Range 0-1.999 V
- S1-6 Input Range 0-19.99 V
- S1-7 Input Range 0-199.9 V
- S1-8 Current Shunt 0-199.9  $\mu$ A
- S1-9 Current Shunt 0-1.999 mA  
(Current Shunt 0-19.99 mA: Jumper A)  
(Current Shunt 0-199.9 mA: Jumper B)  
(Current Shunt 0-1.999 A: Jumper C) (2A Option)
- S1-10 ON: DC input  
OFF: AC input

## Switch S2 Functions:

- S2-1 ON: "0" Low Input  
OFF: Non "0" Input (Adj. P2)
- S2-2 ON: Non STD Input Range (Adj. P3 & P4)  
OFF: STD Input Range
- S2-3 ON: AC Input  
OFF: DC Input
- S2-4 ON: AC Input  
OFF: DC Input

## Potentiometer Function:

- P1: Display High Adj. (Ref)
- P2: Non "0" Input Adj. ("0" Offset) (S2-1 Must be OFF)
- P3: Non STD Input Adj. (Span) (Coarse)  
(S2-2 Must be ON)
- P4: Non STD Input Adj. (Span) (Fine)  
(S2-2 Must be ON)

## Terminal Designations:

- P1 DISPLAY HIGH Adj. (ref)
  - P2 NON "0" INPUT adj. ("0" offset)
  - P3 NON STANDARD INPUT COARSE Adj. (span)
  - P4 NON STANDARD INPUT FINE Adj. (span)
- 1• V/I HIGH INPUT
  - 2• V/I HIGH INPUT COMMON
  - 3• +18 VDC OUT (+DC POWER IN)
  - 4• -DC OUT (-DC POWER IN)
  - 5• EARTH GROUND
  - 6• AC POWER
  - 7• AC POWER

## How To Order

Example	BC	1	DX	G
BEACON				
<b>Power:</b>				
1= 5VDC				
2= 8-24VDC (DC ranges jumper selectable)				
4= 115VAC } All ranges				
5= 230VAC } jumper selectable				
<b>Input:</b>				
DS=DC Volt/Current display STD Input (no scaling)				
D0=DC Volt/Current scale from "0" only				
DX=DC Volt/Current scale with "0" offset				
A0= AC or DC Volt/Current scale from "0" only				
AX=AC or DC Volt/Current scale with "0" offset				
<b>Options:</b>				
G= Green LED's				
S= Small Bezel (2.12" H x 4.01" W)				
2A= 0 - 1.999 A input option				
5A= 0 - 5 Amp input option				

## Accessories:

- BCAL1 = Descriptor Labels: %, °F, °C, Hz, kHz, RPS, V DC, mA DC, mV DC, V AC, mA AC, mV AC,  $\mu$ A DC, A AC, A DC
- BCAL2 = Descriptor Labels: ft/sec, ft/min, ft/hr, ft<sup>3</sup>/sec, ft<sup>3</sup>/min, ft<sup>3</sup>/hr, GPM, GPH, RPM, in/sec, in/min, in/hr, lb/sec, lb/min, lb/hr
- BCAL3 = Descriptor Labels: L/sec, L/min, L/hr, m<sup>3</sup>/sec, m<sup>3</sup>/min, m<sup>3</sup>/hr, m/sec, m/min, m/hr, kpa, bar, kg, lb, PSI, kW
- BCR2A = External .1 $\Omega$  1% 5W shunt (0 - 1.999 A)
- BCSCALE = Custom Scaling  
(Specify with each unit, see below)

**Example:**      **Input**    **IDC**      **0.004**    **0.020**  
                         **Display**    **10.0**      **150.0**

## Where:

- IDC = DC Current, IAC = AC Current
- VDC = DC Voltage, VAC = AC Voltage
- Low Range 0.004 = 4 mA
- High Range 0.020 = 20 mA
- Low Display = 10.0
- High Display = 150.0

# HVM-1

## High Voltage Module for 5 to 240 VAC/VDC Input Signals

### Features:

- Opto-Isolation up to 2500 V
- Allows units with 3-30 VDC inputs to Accept Inputs from 5 to 240 VAC or VDC
- Screw Terminal Hookup.
- Low Cost

### Operation:

Connect the high voltage and the output as shown below. When pulsing with AC, be sure that the counter being driven by the HVM-1 is set for low speed inputs (usually 40 Hz or lower). If this is not done the counter will count each peak of the AC voltage.

### Description:

The HVM-1 enables products with low DC (3-30V) inputs to accept 5-240 VAC/DC input signals. The unit mounts on the counter or customer panel with the use of double sided tape. The circuitry allows various voltage pulses to be used for counting and provides opto-isolation of 2500V.

### SPECIFICATIONS:

#### Signal Inputs:

AC - 40 Hz max. (min. pulse width 12 msec.)  
DC - 100 Hz max. (min. pulse width 5 msec.)  
5 to 48 or 48 to 240 VAC/DC

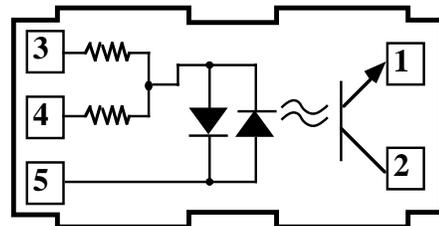
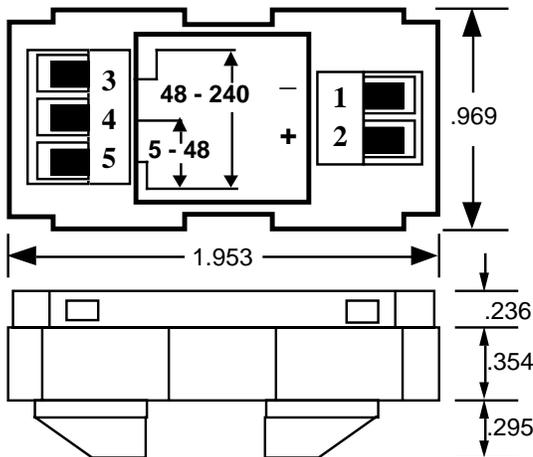
#### Input Impedance:

5 to 48 V - 15K ohm  
48 to 240 V - 100K ohm

#### Output

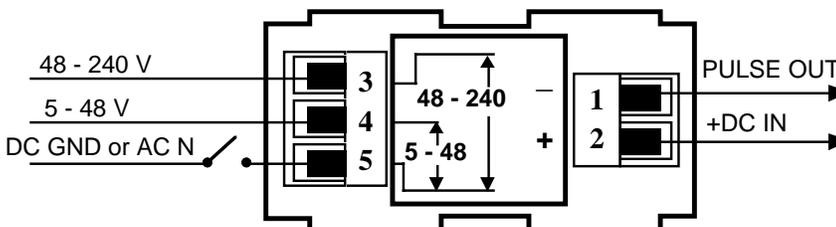
Voltage:  
Off - 24 VDC max.  
On - .7V @ 20 mA  
Current: 20 mA MAX.

INPUT MODULES



### Typical Wiring:

MINITROL	KEPTROL KEPTROL R/T BATCHTROL II	INTELLECT SERIES
TERMINAL PIN #	TERMINAL PIN #	TERMINAL PIN #
5 and/or 6	3 and/or 4	4 and/or 5
7	13	7



### How To Order:

Part number	Description
HVM-1 .....	High Voltage Module

# KAL-DR/T

## Dual Mode RPM/Counter or Frequency Meter

### Features

- UL/CSA Listed, CE Certified
- Requires Only One Pulse Per Unit of Measure
- Doesn't Require Multi-Tooth Gears
- NEMA 4X / IP65 Front
- 5 Digit Ratemeter / 6 Digit Totalizer
- Low Cost
- RPM & Total



### Application:

The KAL-DR/T measures the time between pulses (1/tau), It shows rate per minute (RPM) while keeping track of total units in an internal counter. An external connection causes a change from RPM to RPS (frequency) (No totalizer in RPS mode) No gears, no expensive inductive sensors - just a simple proximity switch sensing 1 pulse per revolution of the shaft - we do the rest!

### Description:

The KAL-DR/T monitors both rate and count continuously and simultaneously. While the display is indicating units per minute, a "background" totalizer keeps count of events or items. A pushbutton on the front panel toggles the display between rate and count and is also used to reset the count (by holding it pressed for 3 seconds)

An alternative gated mode of operation is available to measure signal frequency.

Maximum rate is 20000 in the RPM mode, or 50 kHz in the frequency mode. Connections are made via push on wire connectors for easy field installation. KAL-DR/T has a 6 digit, 0.276" high display and meets NEMA 4X standards from the front panel. It does not have a battery, so it must be powered from an external 10-30 VDC source.

### SPECIFICATIONS

**Power:** (Pin 5) 10 to 30 VDC, 10mA

**Display:** 6 digit black LCD

Digit size 0.276" high

**Temperature Range:** + 14 to 140°F (-10 to 60°C)

**Sealing:** Front panel sealed to NEMA 4X

**Connection:** 5 pin, plug in connector with 9" leads supplied with meter.

### Accuracy:

Period: 0.18%; 3 to 20K RPM.

Gated:  $\pm 1$  LSD 1 to 50K RPS

### Signal Inputs:

#### Slow Speed Input (Pin 2):

negative edge triggered

Low: < 0.7V, High: 5 to 18 V or open

Max. speed: 30 Hz, Min Pulse 15 mS

Input Impedance: 1 M Ohm

#### High Speed Input (Pin 4):

negative edge triggered

Low: < 0.7V, High: 5 to 18 V or open

TTL and CMOS compatible

Input Impedance: 1 M Ohm

Update Time 2 sec. (min.) to 18 sec. (max.) depending on period.

#### Period (RPM) Mode:

Max. speed: 333 Hz, Min. pulse 1.5 mS (3 to 20K RPM)

#### Gated (Frequency) Mode:

Max. Speed: 50 kHz, Min. Pulse 10 uS (1 to 50K RPS)

#### Period/Gated Mode Select (Pin 3):

Linked to Pin 1: Frequency Meter

Left Open: RPM Meter

#### Totalizer:

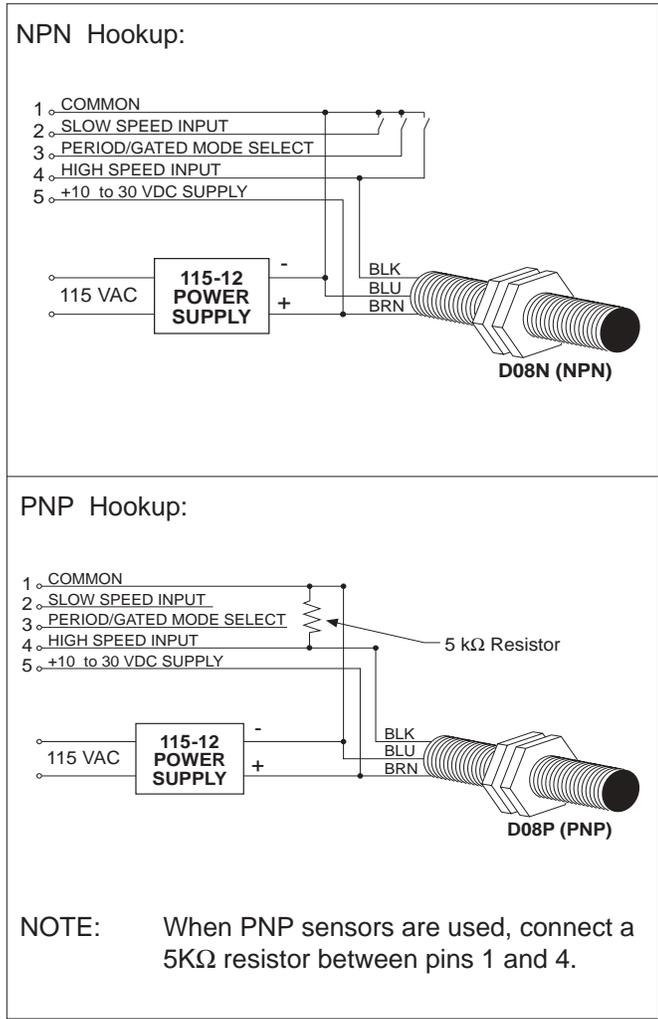
999999 maximum display (333 Hz maximum input speed)

**Approvals:** UL File - E135458, CSA File - LR96702,  
CE Approved

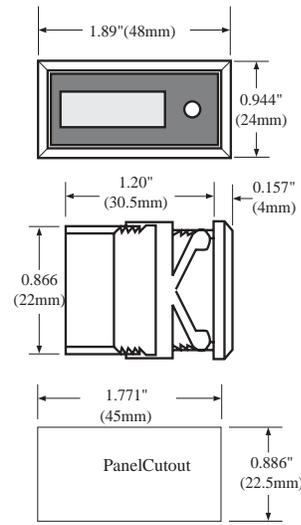
**Material:** ABS

**Weight:** 1.7 oz.

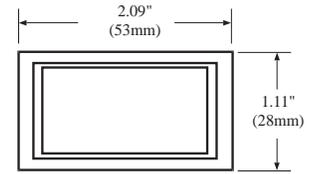
**Typical Hookup:**



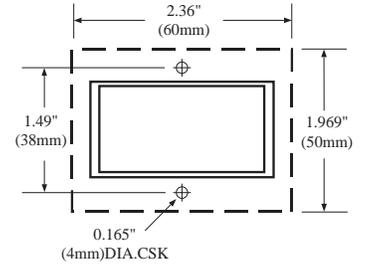
**Mounting:**



**Adaptors (included)  
KAL-DP1X2**



**KAL-DP1**



RATE INDICATORS

Our D Series Proximity Sensors interface easily with our full line of counters and ratemeters. Use PNP sensors (D\_P) on all KEP units except KAL Series, which requires D\_N (NPN) sensors. (See Sensors & Accessories Section)

**HOW TO ORDER**

Part Number	Description
KAL- DR/T .....	Ratometer with Totalizer
KAL - DTB .....	Terminal block adaptor

**Accessories**

- 115-12 - 12 V Power Supply (see accessories section)
- N7 - Explosion proof housing (see accessories section)
- E200 - Outdoor Enclosure (see accessories section)

# 136K

## Battery Powered Ratemeter with LCD Display

### Features

- Low price and high efficiency
- Large (8 mm) 8-digit LCD display,
- Optional backlighting
- Input frequency range from 1 Hz ... 12 kHz
- Gate measuring method, gate time 1 second
- Accuracy 0.05%
- High voltage input for 10 to 260 V AC/DC voltage pulses
- NEMA4/IP65 Front Panel
- Screw terminals, RM 5 mm



- Lifetime of the battery approximately 8 years
- Operating temperature -10 to +60 °C
- All versions for positive or negative counting edge

### Specifications

**Power supply:** non-replaceable lithium battery: (lifetime approximately 8 years at 20°C)

**Backlighting:** external electrical source 24V DC +/-20%, 50 mA

**Display:** LCD, 8 decades, 8 mm high characters

**Display range:** 0 to 99999999

**Resolution:** 1/sec (1 Hz)

#### Inputs:

- A. Counting input of the DC-versions (max. 30 V DC) Slow counting input: max. 30 Hz NPN  
Fast counting input: max. 12 kHz (PNP), 7 kHz (NPN)  
Switching level:

NPN: Low: 0 -0.7V, High: 3-30V DC

PNP: Low: 0 -0.7V, High: 4 -30V DC

#### Interference emissions:

EN 55011 Class B, EN 61000-6-2

EN 61010 Section 1 (only AC versions)

#### Operating temperature:

-10 to +55 °C

#### Ambient temperature:

-10 to +60 °C

#### Storage temperature:

-20 to +70 °C

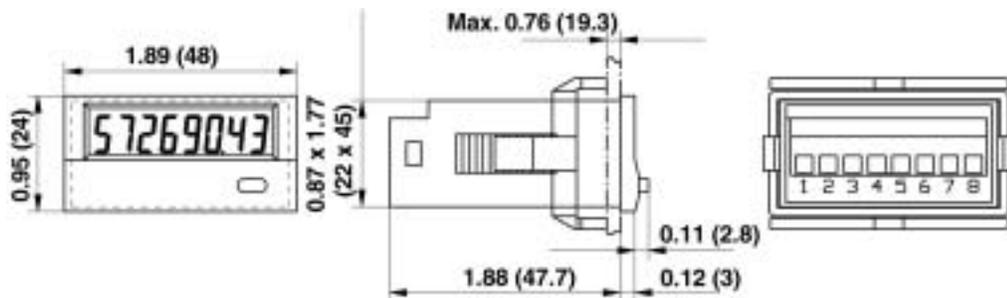
#### Protection:

NEMA4/IP65 front

#### Weight:

approximately 50 g

### Dimensions:



### Order Table

Type	Mode	Counting inputs					
		INP A			INP B		
136K.012.8x0	Tacho	0 ... 0,7 V DC	NPN	7 kHz	0 ... 0,07 V DC	NPN	30 Hz
136K.012.8x1		4 ... 30 V DC	PNP	12 kHz	4 ... 30 V DC	PNP	

X: 5 = no backlight  
X: 8 = with backlight

#### Accessories

N7 - Explosion proof housing (see accessories section)

E200 - Outdoor Enclosure (see accessories section)

# PROTROL

## Draw, Ratio & Net Ratemeter

### Features

- 2 Separate Dividing Scale Factors for Inputs A & B
- 2 Set Points Each With a Hysteresis Alarm Range
- Displays Three Separate Values; A (A Rate), B (B Rate) & C (A-B), (A÷B) or [(A-B)÷B]
- Digital Input Up To 10kHz
- NEMA 4X / IP65 Front



- 2 Stage Panel Lockout
- RS232 or RS422 Communications

### Description:

Featuring 6 digits of bright, 7-segment LED displays, the Protrol is a rate, ratio and draw meter which is field programmable. The two inputs (A & B) each have separate scaling factors. The unit can be programmed to display: two separate ratemeters (A & B), the net difference of A & B, the ratio of A to B (A ÷ B) or the draw [(A - B) ÷ B]. Two assignable set points are standard with a programmable hysteresis (alarm range).

### Specifications:

#### Display

5 digit, .55" high, 7 segment, red orange, LED.

**Input Power:** 110 ± 15% or 12 to 15VDC; 220 VAC ± 15% or 12 to 15VDC.

Current: maximum 250 mA DC or 6.5 VA at rated AC voltage.

**Output Power:** (AC powered units only) + 12VDC @ 50mA unregulated -10 +50%

#### Temperature:

Operating: +32°F (0°C) to +130°F (+54°C).

Storage: -40°F (-40°C) to +200°F (93°C).

**Memory:** EEPROM stores data for ten years if power is lost.

#### Reset:

Front Panel: Resets (updates) normalization process.

Remote: Resets control output (if it's in hysteresis and below the preset).

#### Control Outputs:

2 each N.O. Relay - 5 Amp @ 120/240 VAC or 28 VDC. (N.C. Relay contacts or NPN sink from 10VDC to .5V @ 100mA available with solder jumpers).

#### Input:

STD: High Impedance. Open or 0 to 1V (low), 4 to 30V (high) 10K Ohm impedance. 9.99 kHz max. input speed.  
OPTION "M": For Magnetic pickup Inputs, accepts 30mV inputs

**Set Points:** Two control set points are provided. The outputs have a programmable hysteresis alarm range from 0 to 99999

**Rate Display:** The ratemeters (A&B) update once per second and are accurate to 0.01% FS (± 1 display digit). The unit will sample from 2 to 24 seconds and will compute a weighted average (normalization).

**Programming:** Set points, decimal points, Scaling from .0001 to 99999, input type, normalization factor, hysteresis alarm range, and security panel lock code are all programmable from the front panel.

**Housing:** Standard 1/8 DIN, high impact ABS plastic case (NEMA 4X / IP65 front panel).

**Shipping Weight:** 2 lbs.

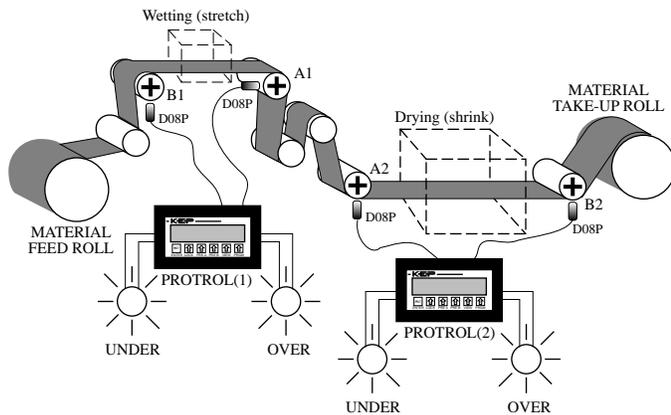
**Approvals:** CE Approved

### Terminal Designations:

- 1- COMMON
- 2- N.O.(N.C./NPN)
- 3- COMMON
- 4- N.O.(N.C./NPN)
- 5- A INPUT
- 6- B INPUT
- 7- 12VDC OUT/+DC IN
- 8- -DC (GROUND)
- 9- RESET INPUT
- 10- NOT USED
- 11- A.C. INPUT
- 12- A.C. INPUT

RELAYS  
A  
B

## Protrol Application:



This application involves the process of shrinking material for pre-shrunk jeans. The process involves the wetting/stretching and drying/shrinking of the material. The KEP Protrol allows the operator to view the rate of the input and output feeds (displays A & B). A third display (display C) allows the user to view  $A-B$ ,  $A \div B$  or  $(A-B) \div B$ . In this application Protrol(1) monitors the wetting/stretch and Protrol(2) monitors the drying/shrink. The wetting process must maintain a 2.4% stretch and the drying process must maintain a 3.2% shrink. Both the wetting and drying functions must have over and under detection if the process exceeds or lags by .1%. For each Protrol there is an over detection lamp and an under detection lamp.

Here's how the Protrol's are set up. Each roller (excluding the feed and take-up rolls) are one foot in circumference. Since there are four targets per rotation, there are four pulses per foot. Therefore, the scaling factors are all set at four. The C display is selected to view  $(A-B) \div B$ . Both Protrols were field modified for a normally closed (N.C.) B relay.

### Protrol(1):

Typically, B1 rotates at 25 RPM and A1 at 25.6 RPM. This yields a 2.4% stretch  $([25.6-25] \div 25 = .024)$ . Preset A is set at .025 and preset B is set at .023 (to maintain a .1% tolerance). Relay A is wired to the over detection lamp and relay B is wired under detection lamp.

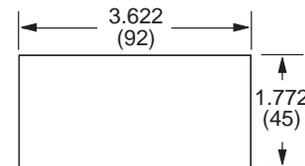
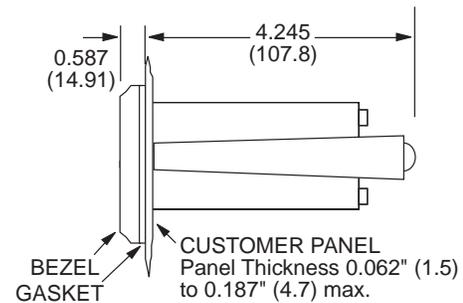
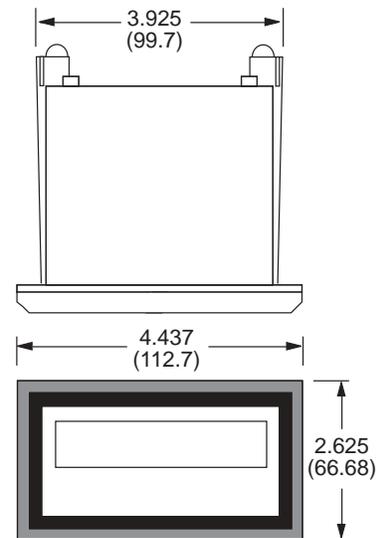
### Protrol(2):

Typically, B2 rotates at 24.8 RPM and A2 at 25.6 RPM. This yields a 3.2% stretch  $([25.6-24.8] \div 24.8 = .032)$ . Preset A is set at .033 and preset B is set at .031 (to maintain a .1% tolerance). Relay A is wired to the over detection lamp and relay B is wired under detection lamp.

Now the operator can view the input and output speeds of the wetting and drying cycles, as well as the amount of stretch and shrink. The warning lamps let the operator know if there is a problem prior to the process or after the process.

**NOTE:** To view the C display in percentage (X100), order MS280.

## Dimensions:



## HOW TO ORDER

<b>EXAMPLE:</b>	PR	A	1
<b>Series</b>	PR = Protrol		
<b>Operating Voltage</b>	A = 110 VAC $\pm$ 15% or 12 to 15 VDC	B = 220 VAC $\pm$ 15% or 12 to 15 VDC	C = 24 VAC $\pm$ 15% or 12 to 15 VDC
<b>Options</b>	1= RS232 Communications	2= RS422 Communications	M = Mag. Input, Input A & B, 30mV input A= Analog Output (4-20/0-20 mA)

## Accessories

Separate non keyboard panel order #34235  
Separate keyboard panel - order #34237

# 260 Series

## Ultra Versatile Commutated Thru-Bore Encoder

### Features:

- Low Profile
- Thru-Bore and Hollow Bore (Blind) Styles
- Simple, Innovative Flexible Mounting System
- Incorporates Opto-ASIC Technology



### Description

The Model 260's larger bore (up to 0.625") and low profile make it the perfect solution for many machine and motor applications. Available in two distinct formats - a Hollow Bore and a complete Thru-Bore - the Model 260 uses the pioneering Opto-ASIC design. The Model 260 uses an innovative anti-backlash mounting system, allowing simple, reliable, and precise encoder attachment. Unlike traditional kit or modular encoder designs, it's integral bearing set provides stable and consistent operation without concerns for axial or radial shaft runout.

### Specifications

#### Electrical

Input Voltage .....	4.75 to 28 VDC for temperatures up to 70°C; 5 to 16 VDC for 0° to 100°C operating temperature; 5 VDC for 0° to 120°C operating temperature
Input Current .....	100 mA max with no output load
Output Format .....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face.
Output Type .....	Pull-Up; 100Ma Max per channel
Index .....	Once per revolution gated to channel A.
Freq. Response .....	200 kHz standard, 300 kHz optional
Noise Immunity .....	Tested to BS EN61000-6-2; BS EN50081-2; BS EN61000-4-2; BS EN61000-4-3; BS EN61000-4-6, BS EN55011
Symmetry .....	180° (±18°) electrical
Quad. Phasing .....	90° (±22.5°) electrical
Min. Edge Sep .....	67.5° electrical
Accuracy .....	Within 0.01° mechanical from one cycle to any other cycle, or 0.6 arc minutes.

#### Mechanical

Max Shaft Speed ...	7500 RPM. Higher shaft speeds may be achievable, contact Customer Service. Note: For extreme temperature operation, derate temperature by 5° C for every 1000 RPM above 3000 RPM
Bore Size .....	0.250" through 0.625" 5 mm through 15 mm
Bore Tolerance .....	-0.0000" / +0.0006"

#### User Shaft Tolerances

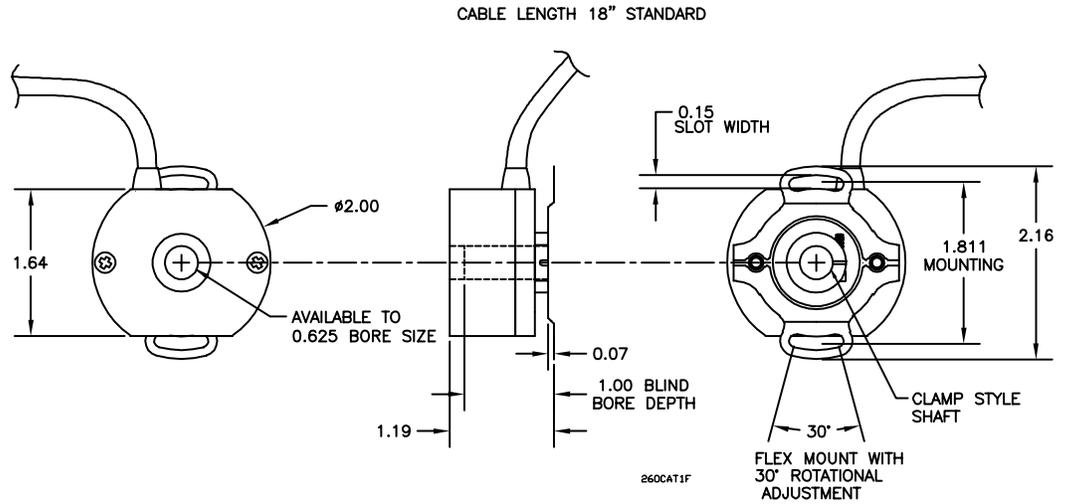
Radial Runout .....	0.007" max
Axial Endplay .....	±0.030" max
Starting Torque .....	IP50 Thru-Bore: 0.50 oz-in IP50 Hollow Bore: 0.30 oz-in IP64 Thru-Bore: 2.50 oz-in IP64 Hollow Bore: 2.0 oz-in Note: Add 3.0 oz-in for -40° C operation
Moment of Inertia ...	3.9 X 10 <sup>-4</sup> oz-in-sec <sup>2</sup>
Max Acceleration ...	1 X 10 <sup>5</sup> rad/sec <sup>2</sup>
Electrical Conn .....	18" cable (foil and braid shield, 24 AWG conductors non-commutated, 28 AWG commutated), 5- or 8-pin M12 (12 mm) in-line connector with 18Ø cable (foil and braid shield)
Housing .....	Black non-corrosive finish
Mounting .....	Slotted Flex Mount standard, additional flex mount options available (see Ordering Code)
Weight .....	3.5 oz typical

#### Environmental

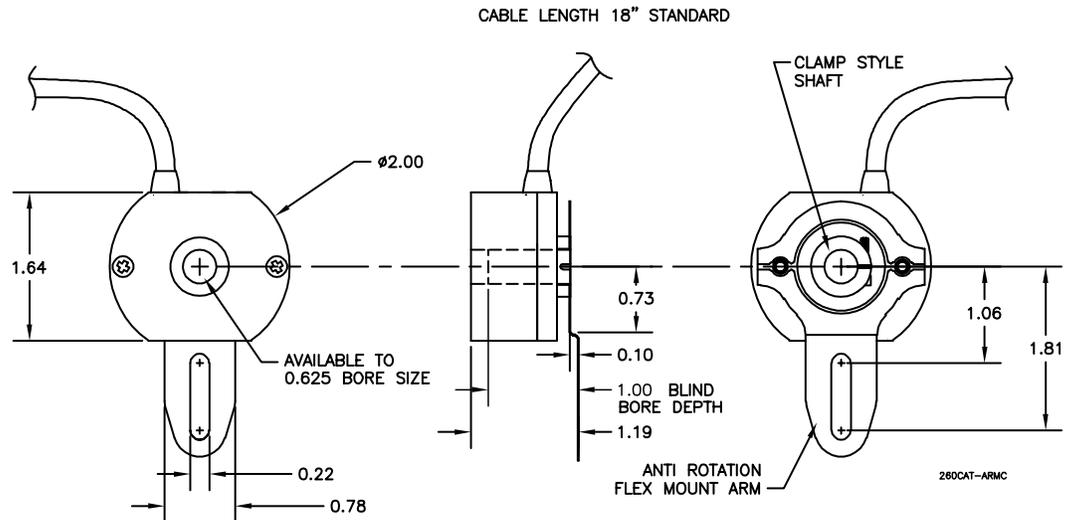
Operating Temp .....	0° to 70° C for standard models -40° to 70° C for low temperature option 0° to 100°C for high temperature option 0° to 120° C for extreme temperature option
Storage Temp .....	-40° to +100° C
Humidity .....	98% RH non-condensing
Vibration .....	10 g @ 58 to 500 Hz
Shock .....	50 g @ 11 ms duration

# Dimensions

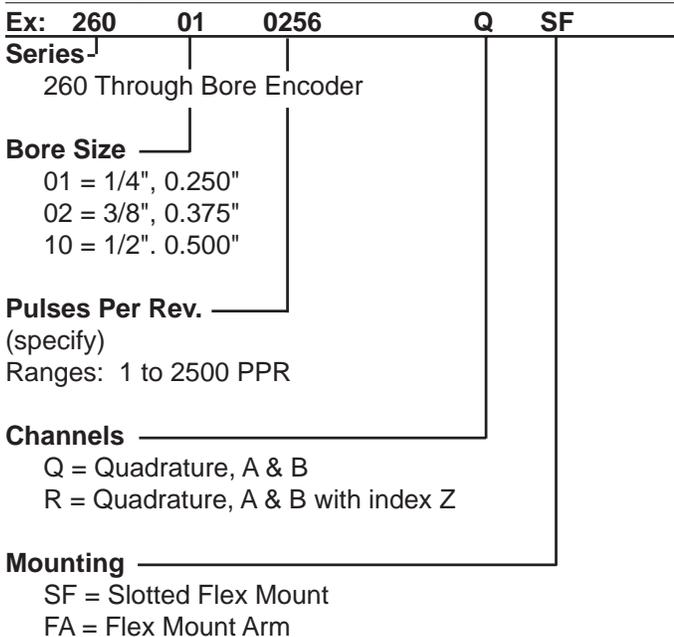
## Slotted Flex Mount (SF)



## Flex Mount Arm (FA)



## How To Order:



## Model 260 PPR Options

0001*	0010*	0012*	0020*	0025*	0030*	0040*
0060	0100	0120	0128*	0200	0250	0254
0256	0300	0360	0500	0512	0600	0720
0800	0840	1000	1024	1200	1250	1270
2000	2048	2500	2540			

\*Contact Customer service for High Temp option  
Contact Customer Service for other disk resolutions

# 725 Series

## Heavy Duty Size 25 (2.5") Optical Shaft Encoder

### Features:

- Standard Size 25 Package (2.5" x 2.5")
- Up to 30,000 Pulses Per Revolution
- Standard and Industrial Housings
- Flange Mounting
- IP66 Sealing Available



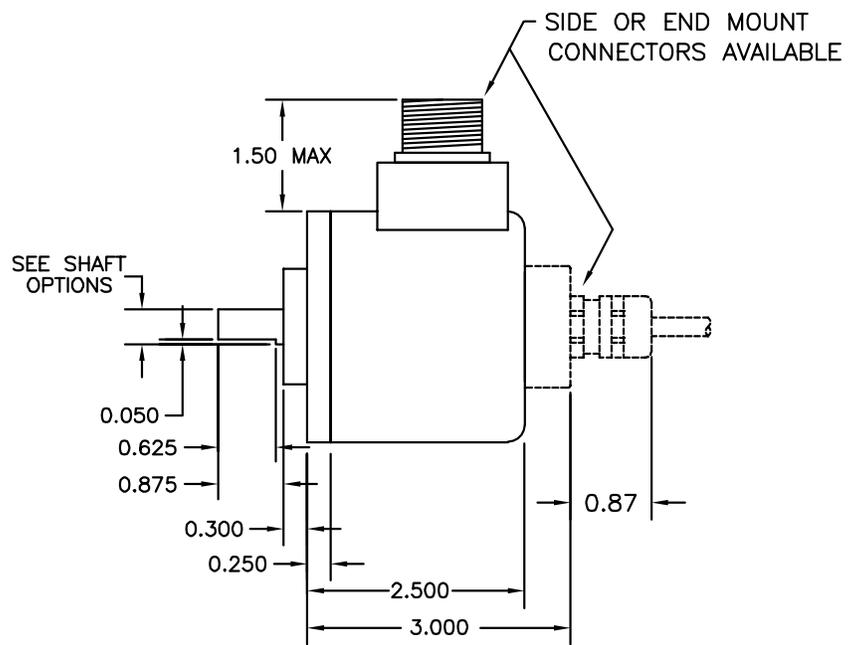
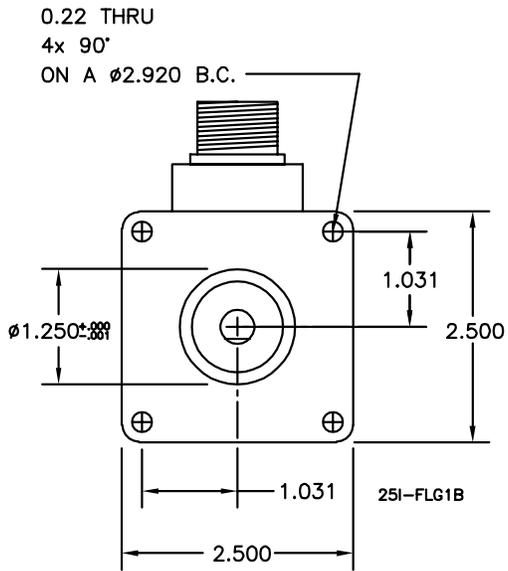
### Description

Model 725 Size 25 Accu-Coder™ optical shaft encoder is specifically designed for the challenges of an industrial environment. But don't let its tough, industrial package fool you; it still has the performance to reach resolutions up to 30,000 cycles per revolution. The Model 725 is available with both flange and servo mounting options, along with two distinctive 2.5" diameter housing styles. The rugged Standard Housing (N) isolates the internal electronics from the shock and stress of the outer environment. The extra heavy-duty Industrial Housing (I) features a fully isolated internal encoder unit that prolongs bearing life by using an internal flexible mount to protect the encoder from severe axial and radial shaft loading.

### Specifications

Input Voltage .....	4.75 to 28 VDC for temperatures up to 85°C; 4.75 to 24 VDC for temperatures greater than 85°C	Max Shaft Speed ...	6000 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Input Current .....	100 mA max with no output load	Shaft Size .....	0.375" (standard), 0.250", 0.3125", 6 mm, 8 mm, 10 mm
Input Ripple .....	100 mV peak-to-peak at 0 to 100 kHz	Shaft Material .....	303 stainless steel
Output Format .....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation.	Shaft Rotation .....	Bi-directional
Output Type .....	Pull-Up; 100Ma Max per channel	Radial Shaft Load. .	35 lb max (standard housing) 40 lb max (industrial housing)
Index Z .....	Occurs once per revolution.	Axial Shaft Load ....	40 lb max (standard housing) 45 lb max (industrial housing)
Freq Response .....	Up to 1 MHz	Starting Torque .....	1.0 oz-in typical with IP64 seal or no seal 3.0 oz-in typical with IP66 shaft seal
Noise Immunity .....	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2	Moment of Inertia ...	5.2 x 10-4 oz-in-sec <sup>2</sup>
Symmetry .....	1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 CPR: 180° (±36°) electrical	Max Acceleration ...	1 x 10 <sup>5</sup> rad/sec <sup>2</sup>
Quad Phasing .....	1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 CPR: 90° (±36°) electrical	Electrical Conn .....	6-, 7-, or 10-pin MS style, 5- or 8-pin M12 (12 mm), 9-pin D-sub Miniature, or gland with 24 inches of cable
Min Edge Sep .....	1 to 6000 CPR: 67.5° electrical at 100 kHz output 6001 to 20,480 CPR: 54° electrical >20,480 CPR: 50° electrical	Housing .....	Black non-corrosive finish
Rise Time .....	Less than 1 microsecond	Bearings .....	Precision ABEC ball bearings
Accuracy .....	Instrument and Quadrature Error: For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 CPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)	Mounting .....	Flange, servo, or 5PY
		Weight .....	20 oz typical
		Operating Temp .....	0° to 70° C for standard models 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see CPR Options.)
		Storage Temp .....	25° to +85° C
		Humidity .....	95% RH non-condensing
		Vibration .....	725N: 10 g @ 58 to 500 Hz 725I: 20 g @ 58 to 500 Hz
		Shock .....	725N: 50 g @ 11 ms duration 725I: 75 g @ 11 ms duration
		Sealing .....	IP50 standard, IP64 and IP66 optional

## Dimensions



### How To Order:

<b>Ex:</b> 725	<b>S</b>	<b>1000</b>	<b>Q</b>	<b>S</b>
<b>Series</b>				
725 = 2.5" Encoder				
<b>Shaft Size</b>				
S = 3/8", 0.375" (std)				
4 = 1/4", 0.250"				
<b>Pulses Per Rev.</b>				
(specify)				
Ranges: 1 to 30,000 PPR				
<b>Channels</b>				
A = Channel A				
Q = Quadrature, A & B				
R = Quadrature, A & B with index Z				
<b>Connector Location</b>				
S = Side				
E = End				

### Model 725 PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*
0010*	0011*	0012*	0014*	0020	0021*	0024*
0025*	0030*	0032*	0033*	0034*	0035*	0038*
0040*	0042*	0045*	0050*	0060	0064*	0100
0120	0125	0128*	0144*	0150*	0160*	0200
0240*	0250	0254*	0256*	0300	0333*	0360
0400	0500	0512	0600	0625*	0635	0665*
0720	0768*	0800	0889	0900*	1000	1024
1200a	1201 <sup>a</sup>	1203 <sup>a</sup>	1204 <sup>a</sup>	1250 <sup>a</sup>	1270 <sup>a</sup>	1440
1500	1800	2000	2048	2400 <sup>a</sup>	2500	2540 <sup>a</sup>
2880 <sup>a</sup>	3000 <sup>a</sup>	3600 <sup>a</sup>	4096 <sup>a</sup>	5000 <sup>a</sup>	6000 <sup>a</sup>	7200 <sup>a</sup>
7500 <sup>a</sup>	9000 <sup>a</sup>	10,000 <sup>a</sup>	10,240 <sup>a</sup>	12,500 <sup>a</sup>	14,400 <sup>a</sup>	15,000 <sup>a</sup>
18,000 <sup>a</sup>	20,000 <sup>a</sup>	20,480 <sup>a</sup>	25,000 <sup>a</sup>	30,000 <sup>a</sup>		

\* Contact Customer Service for High Temperature Option.

<sup>a</sup> High Temperature Option (H) limited to 85° C maximum for these CPR options.

# 755A Series

## High Precision Size 15 (1.5") Optical Shaft Encoder

### Features:

- Miniature Size (1.5" Diameter)
- Up to 30,000 Pulses Per Revolution
- Servo Mounting
- 100 kHz Frequency Response



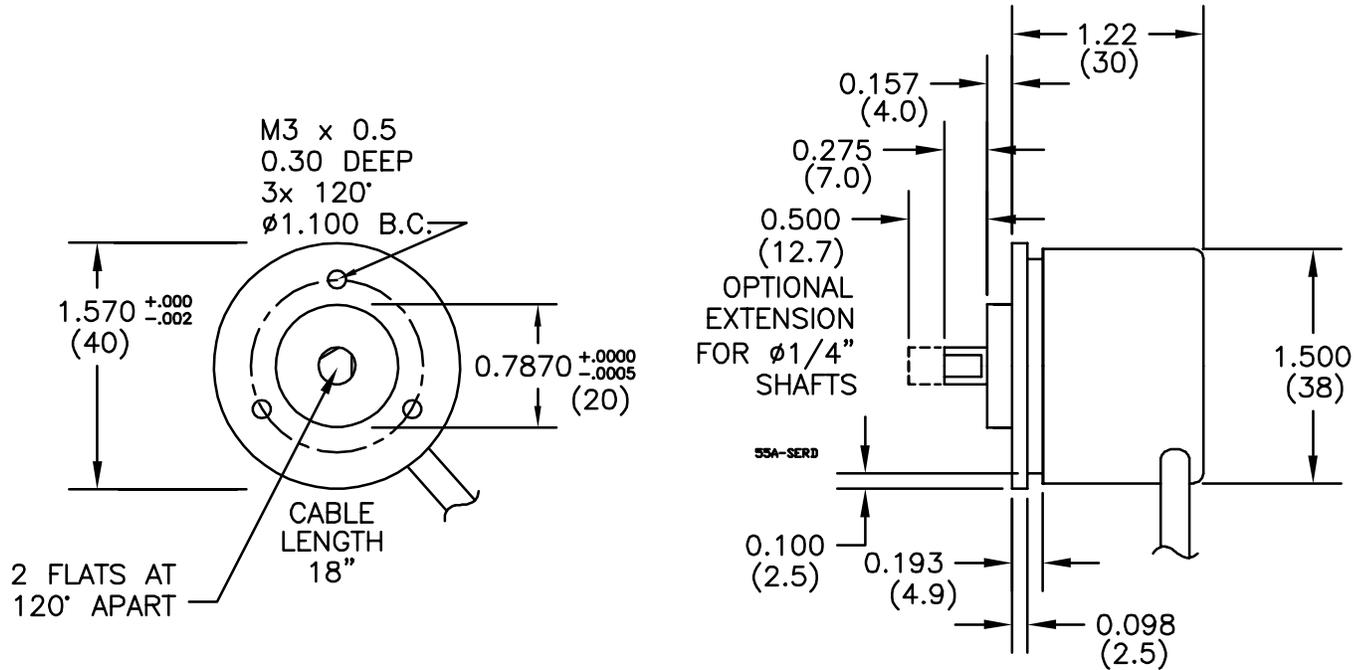
### Description

The Model 755A Size 15 is ideal for applications requiring a small, high precision, high performance encoder. Approximately 1.5" in diameter and 1.5" long, it will fit where many encoders cannot. Designed with all metal construction and shielded ball bearings, it will provide years of trouble-free use. The standard servo mount (S) version is available with a variety of shaft sizes and lengths. With its high reliability and quick delivery, the Model 755A encoder is the perfect replacement encoder for less reliable encoders of this size.

### Specifications

Input Voltage .....	4.75 to 28 VDC for temperatures up to 85° C 4.75 to 24 VDC for temperatures greater than 85° C	Max Speed .....	7500 RPM. Higher shaft speeds may be achievable, contact Customer Service.
Input Current .....	100 mA max with no output load	Shaft Size .....	0.250", 5 mm, 6 mm
Input Ripple .....	100 mV peak-to-peak at 0 to 100 kHz	Shaft Rotation .....	Bi-directional
Output Format .....	Incremental- Two square waves in quadrature with channel A leading B for clockwise shaft rotation, as viewed from the mounting face.	Radial Shaft Load ..	5 lb
Output Types .....	Pull-Up- 100 mA max per channel	Axial Shaft Load ....	3 lb
Index Z .....	Occurs once per revolution.	Starting Torque .....	0.14 oz-in typical; 4.0 oz-in typical for -40° C operation
Freq Response .....	100 kHz std	Moment of Inertia ...	2.8 x 10 <sup>-4</sup> oz-in-sec <sup>2</sup>
Noise Immunity .....	Tested to BS EN61000-4-2; IEC801-3; BS EN61000-4-4; DDENV 50141; DDENV 50204; BS EN55022 (with European compliance option); BS EN61000-6-2; BS EN50081-2	Max Acceleration ...	1 x 10 <sup>5</sup> rad/sec <sup>2</sup>
Symmetry .....	1 to 6000 CPR: 180° (±18°) electrical at 100 kHz output 6001 to 20,480 CPR: 180° (±36°) electrical	Electrical Conn .....	18" cable (foil and braid shield, 24 AWG conductors), 5- or 8-pin M12 (12 mm) in-line connector with 18" cable (foil and braid shield), 8-pin Molex, Terminal Block
Quad Phasing .....	1 to 6000 CPR: 90° (±22.5°) electrical at 100 kHz output 6001 to 20,480 CPR: 90° (±36°)	Housing .....	Black non-corrosive finish
Min Edge Sep .....	1 to 6000 CPR: 67.5° electrical at 100 kHz output 6001 to 20,480 CPR: 54° electrical >20,480 CPR: 50° electrical	Bearings .....	Precision ABEC ball bearings
Rise Time .....	Less than 1 microsecond	Mounting .....	Servo
Accuracy .....	Instrument and Quadrature Error: For 200 to 1999 CPR, 0.017° mechanical (1.0 arc minutes) from one cycle to any other cycle. For 2000 to 3000 CPR, 0.01° mechanical (0.6 arc minutes) from one cycle to any other cycle. Interpolation error (units > 3000 CPR only) within 0.005° mechanical. (Total Optical Encoder Error = Instrument + Quadrature + Interpolation)	Weight .....	3.10 oz servo mount, typical
		Operating Temp .....	0° to 70° C for standard models -40° to 70° C for low temperature option 0° to 100° C for high temperature option (0° to 85° C for certain resolutions, see CPR Options.)
		Storage Temp .....	25° to +85° C
		Humidity .....	98% RH non-condensing
		Vibration .....	10 g @ 58 to 500 Hz
		Shock .....	50 g @ 11 ms duration

## Dimensions



### How To Order:

<b>Ex:</b> 755A	07	1000	Q
<b>Series</b> <sup>J</sup>			
755A = 755A Encoder			
<b>Shaft Size</b>			
07 = 1/4", 0.250"			
19 = 1/4", 0.250" x 0.500"			
<b>Pulses Per Rev.</b>			
(specify)			
Ranges: 1 to 30,000 PPR			
<b>Channels</b>			
A = Channel A			
Q = Quadrature, A & B			
R = Quadrature, A & B with index Z			

### Model 755A PPR Options

0001*	0002*	0004*	0005*	0006*	0007*	0008*
0010*	0011*	0012*	0014*	0020	0021*	0024*
0025*	0030*	0032*	0033*	0034*	0035*	0038*
0040*	0042*	0045*	0050*	0060	0064*	0100
0120	0125	0128*	0144*	0150*	0160*	0200
0240*	0250	0254*	0256*	0300	0333*	0360
0400	0500	0512	0600	0625*	0635	0665*
0720	0768*	0800	0889	0900*	1000	1024
1200a	1201 <sup>a</sup>	1203 <sup>a</sup>	1204 <sup>a</sup>	1250 <sup>a</sup>	1270 <sup>a</sup>	1440
1500	1800	2000	2048	2400 <sup>a</sup>	2500	2540 <sup>a</sup>
2880 <sup>a</sup>	3000 <sup>a</sup>	3600 <sup>a</sup>	4096 <sup>a</sup>	5000 <sup>a</sup>	6000 <sup>a</sup>	7200 <sup>a</sup>
7500 <sup>a</sup>	9000 <sup>a</sup>	10,000 <sup>a</sup>	10,240 <sup>a</sup>	12,500 <sup>a</sup>	14,400 <sup>a</sup>	15,000 <sup>a</sup>
18,000 <sup>a</sup>	20,000 <sup>a</sup>	20,480 <sup>a</sup>	25,000 <sup>a</sup>	30,000 <sup>a</sup>		

\* Contact Customer Service for High Temperature Option.

<sup>a</sup> High Temperature Option (H) limited to 85° C maximum for these CPR options.

# 200 Series

## Hollow Shaft Encoder

### Description:

#### MODEL 230 - BI-DIRECTIONAL

The Model 230 Optical Encoder is designed to mount directly on a shaft for bi-directional applications. The encoder produces two symmetrical 50% duty cycle square wave output signals in quadrature relationship to each other. The signals lead or lag each other by 90 degrees depending upon the direction of rotation.



### Specifications

#### Model 230

#### ELECTRICAL INPUT

Voltage .....	5 to 16 VDC (specify)
Current .....	50 Milliamperes
Regulation .....	±10%

#### ELECTRICAL OUTPUT

Wave shape .....	Square Wave
Rise Time .....	Less than 1 microsecond
Current .....	Sink 20 milliamperes/output
Pulse rate .....	0 to 6000 Hz
Pulses per shaft revolution .....	1 to 100 (specify)

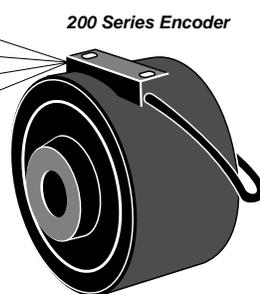
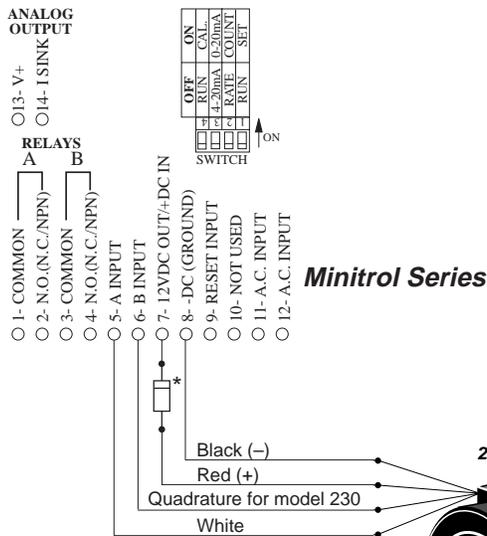
#### MECHANICAL

Hollow shaft speed .....	4000 RPM maximum
Hollow shaft rotation .....	Either direction
Bearings .....	Sealed ball bearings
Bore size .....	.250"(6.35mm) to .875"(22.22mm) dia. (spec)
Bore tolerance .....	+.003"(.076mm)-.000"(.000mm)
Running torque .....	10 oz. inches (40.5gm-cm)
Operating life .....	100,000 hrs.
Housing .....	Alum. black anodized finish
Cable .....	Two 3 conductor shielded, 6 ft. long w/ built-in strain relief
Weight .....	8 oz. (227 grams)

#### ENVIRONMENTAL

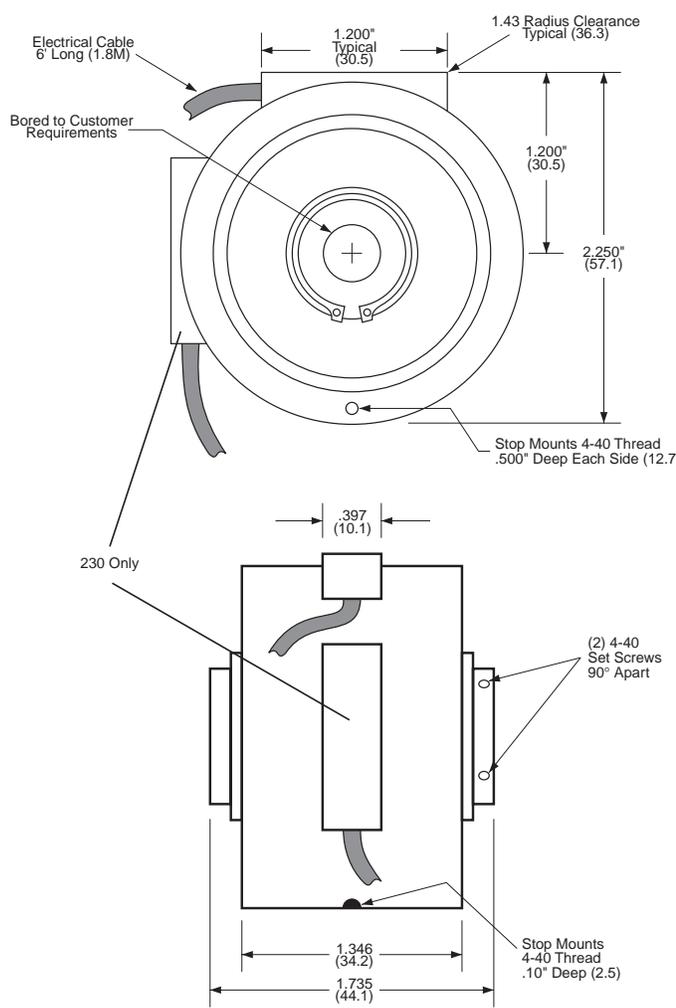
Temperature .....	+32°F (0°C) to +167°F (+75°C)
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### Typical Application:

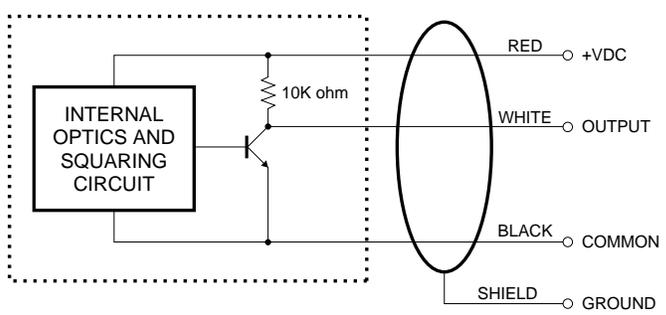


\* When using a 220 encoder with a Minitrol, Protrol or Positrol series, use a 12V encoder with a 5V 1W Zener (as IN4733) or 200Ω 1W dropping resistor between (+) DC supply and red lead. The 230 encoder requires a regulated power supply as KEP 115-12.

### Mounting:



### Circuit Diagram Per Channel:



A flexible housing stop must be provided to prevent improper bearing wear and overheating. Please do not mount outer housing rigidly.

### How To Order:

**Ex: 230 12VDC 50PPR F .500**

**Series** | 230 Quadrature (2 channels)

**Input voltage** (specify) | 5VDC standard voltages  
12VDC standard voltages  
Others available between 5 and 15 VDC

**Pulses Per Rev.** (specify) | Ranges: 1 to 100 PPR

**Housing Type** | F = Standard round for hollow shaft

**Shaft Bore Size** (specify) | Bore diameter in 1/100 of inch  
Ranges: .250" to .750"

ENCODERS

# 700 Series

## Optical Shaft Encoder

### DESCRIPTION:

The 700 optical incremental shaft encoders convert input shaft rotation into square wave output pulses to provide an accurate means of digitizing position, rate or direction of rotation. They are designed specifically for industrial applications requiring a rugged and reliable shaft encoder that is sealed against dust, oil vapor and moisture.

The shaft encoder produces an output signal by rotating a shatter-proof plastic disc with clear and opaque segments between a light emitting diode and a photo-transistor sensor. The output signal from the sensor is then converted into a square wave signal by an internal squaring circuit. The number of output pulses per shaft revolution is determined by the number of clear and opaque segments on the disc. Bidirectional models have a second LED and sensor positioned to produce two square wave signals in quadrature.



### SPECIFICATIONS:

#### ELECTRICAL SPECIFICATIONS

##### INPUT:

Voltage .....5 VDC, or 8 to 30 VDC (Specify Choice)  
Current .....50 mA  $\pm$  10%  
Ripple .....2%  
Regulation ..... $\pm$ 5%

##### OUTPUT

Amplitude .....80% of input voltage (min.)  
Current .....Sink up to 20 milliamperes (10 milliamperes on multi-output units). 1.5K pull up to input voltage  
Polarity .....Positive  
Wave Shape .....Square wave, 50% "on" and 50% "off"  
Pulse Rate .....0 to 20,000 pulses per second  
Rise Time .....Less than 1 microsecond  
Pulses per Rev. ....1 to 1270 (Specify choice)  
Accuracy .....Within  $\pm$ 0.1 degrees from one pulse to any other pulse.

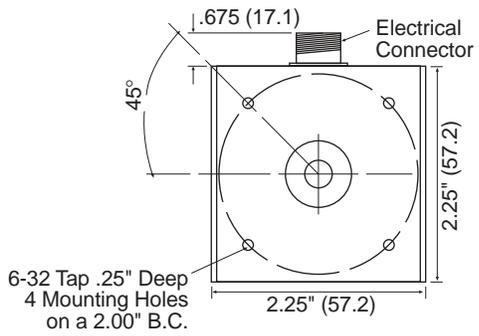
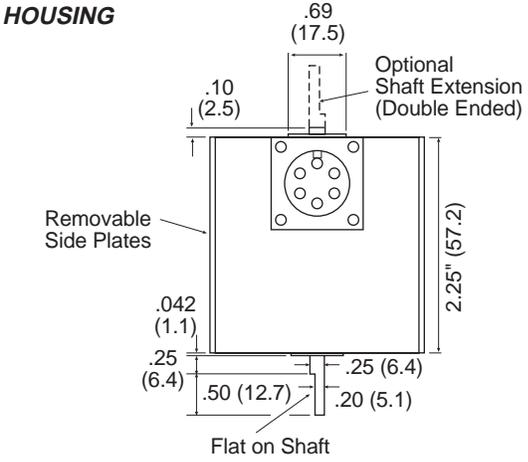
#### ENVIRONMENTAL SPECIFICATIONS

Temperature .....0 to 75 degrees C ( +32°F to 167°F)  
Vibration .....3 g's at 5 to 1000 CPS  
Shock .....20 g's, 10 milliseconds

#### MECHANICAL SPECIFICATIONS

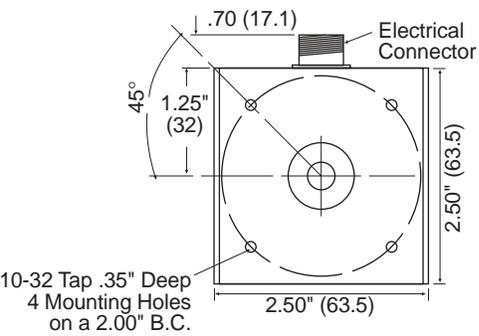
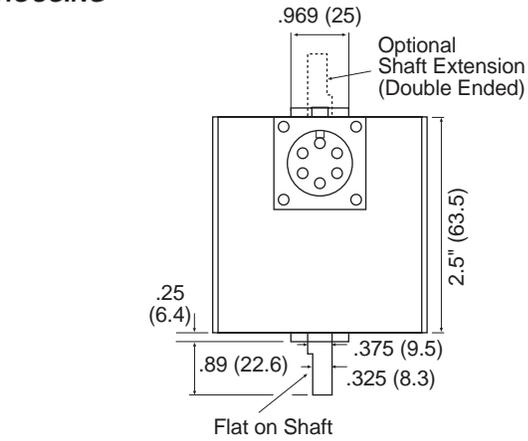
Shaft Speed .....6,000 RPM maximum  
Shaft Rotation .....Either direction  
Bearings .....Sealed ball bearings  
Starting Torque .....0.10 ounce-inches  
Moment of Inertia ....0.0025 ounce-inches seconds squared  
Radial Loading .....10 pounds operating  
Axial Loading .....5 pounds operating  
Shaft Size ......250" or .375" diameter (Specify choice)  
Shaft Type .....Single or double ended (Specify choice)  
Operating Life .....100,000 hours average  
Housing .....Aluminum with black anodized finish. Sealed against dust, oil vapor and moisture.  
Mounting .....Provisions for either base or face mounting  
Weight .....A-10 oz., B- 3.75 lbs., C- 3.25 lbs., D- 6 lbs.  
Connector Type .....6-pin MS Connector or Solder Terminals

**A HOUSING**



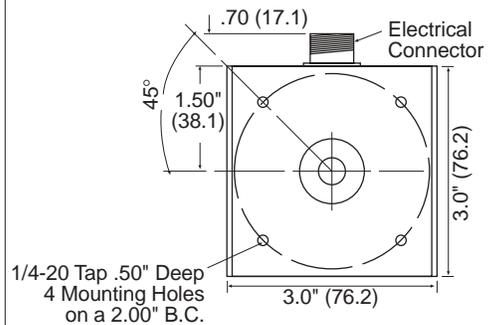
The same mounting hole pattern is also provided on the opposite end and the base.

**B HOUSING**

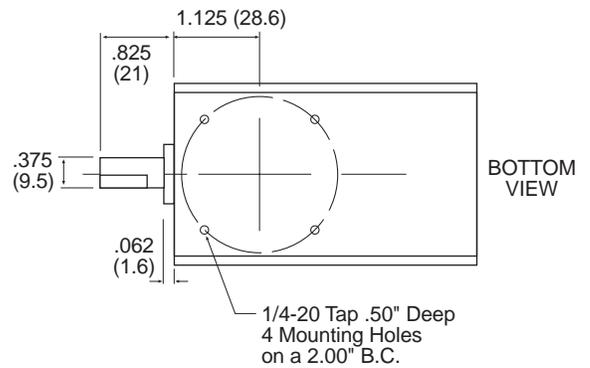
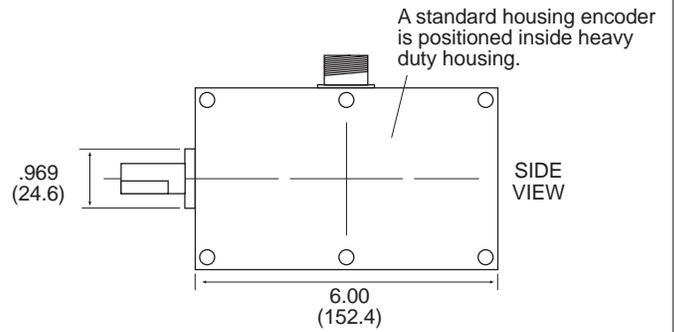


The same mounting hole pattern is also provided on the opposite end and the base.

**C HOUSING**

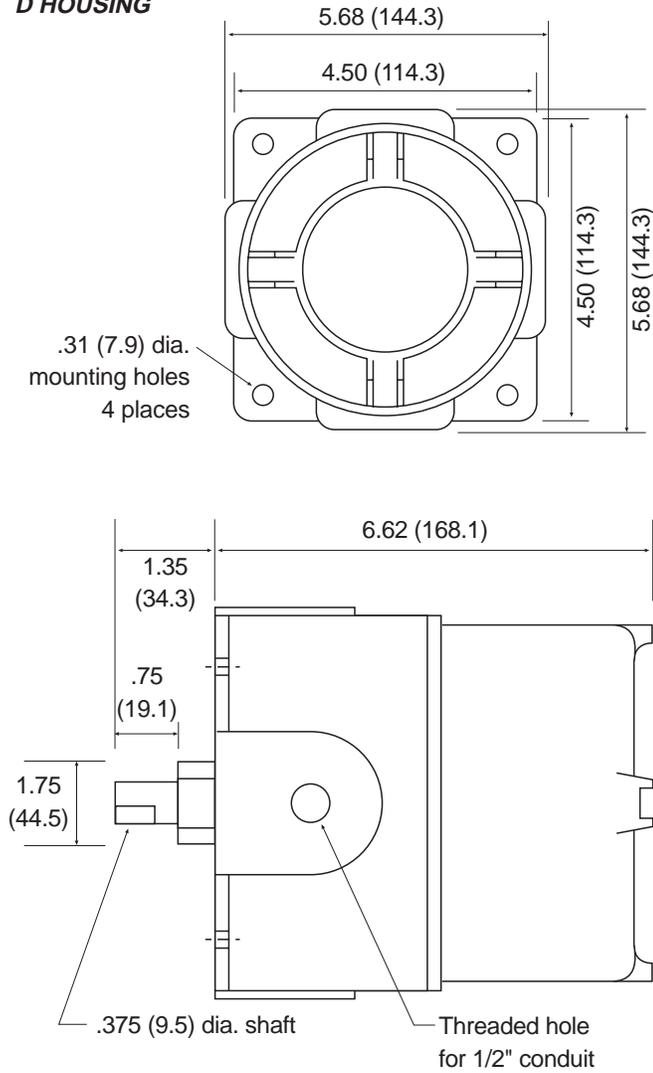


The same mounting hole pattern is also provided on the opposite end and the base.



**Standard Encoders for Faster Delivery**

**D HOUSING**



**Type**

**Order Number**

Single Channel      **711 12VDC 600PPR A1**  
 Square Wave Pulse    **711 12VDC 1200PPR A1**

Dual Channel         **716 12VDC 600PPR A1**  
 Quadrature           **716 12VDC 1200PPR A1**

**How To Order Special Encoders:**

**EX: 715-1 12VDC 200PPR 50US 500RPM A1 L2.3**

**Series** —  
 711 (Single Square Wave Pulse)  
 712 (711 with Reference Pulse)  
 713 (2 Different Square Waves)  
 \*715-1 (Bi-Directional; 2 Channels)  
 \*715-2 (Bi-Directional; 1 Channel plus direction)  
 716 (Quadrature)  
 \*717 (High Resolution 711l)

**Input Voltage** —

5 VDC  
 12 VDC  
 15 VDC  
 24 VDC

**Pulses Per Rev.** —

**Over 600PPR**  
 (Model 713 ex.: 100/200 PPR)

**\*Pulse Width** (if required) —

ms = milliseconds  
 us = microseconds

**Shaft Maximum RPM** (specify) —

**Housing Type** —

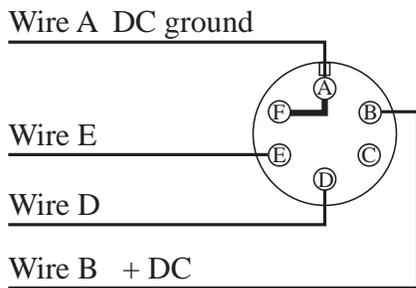
- A. Standard
  - A1. Single Shaft
  - A2. Dual Shaft
- B. Industrial:
  - B1. Single Shaft
  - B2. Dual Shaft
- C. Heavy Duty Housing:
  - C1 (with mating connector)
  - C2 (with mating connector & shaft seal)
  - C3 (with 1/2" conduit thread & terminal strip)
  - C4 (with shaft seal, 1/2" conduit thread & terminal strip)
  - C5 (extra heavy duty up to 50lb. radial load : 10mm shaft)
- D. Explosion Proof  
 (Class 1, Groups C & D / Class 2 Groups E, F, G / NEMA 7 & NEMA 9)

**Other Options** —

- L- Custom Shaft
- B - 3/8" shaft option
- ENC MS: Extra mating connector
- ENC-CABLE##: Extra mating connector with 4-conductor cable
- Reference Pulse - Add 1N (neg. pulse) or 1P (pos. pulse) after PPR

See the following page for Mounting Brackets and Measuring Wheels.

**WIRING**



Encoder Model #	Wire D	Wire E
711	pulses	N/C
715-1	CW pulses	CCW pulses
715-2	pulses	hi-cw/lo-ccw
716	Quad "A"	Quad "B"
717	pulses	N/C

**ENCODERS**

# ENCODER ACCESSORIES

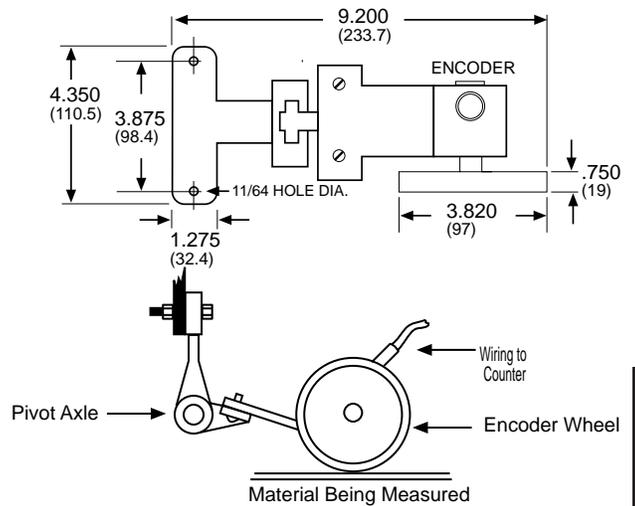
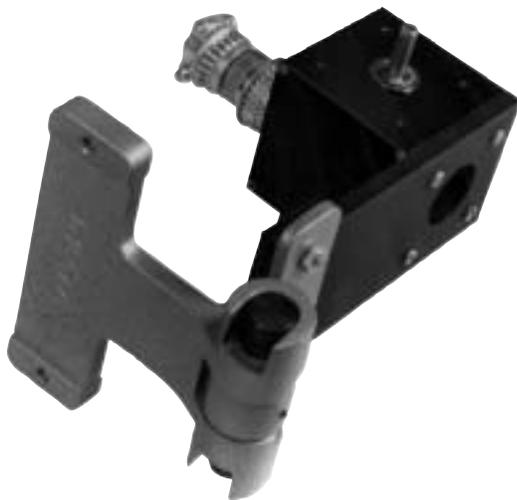


MEASURING WHEELS			
1 FOOT (304.8mm) CIRCUMFERENCE		1/3 METER (13.12" CIRCUMFERENCE)	
Bore	.251 (6.38mm) ID		Bore .251(6.38mm) ID
Face Width	1/2" (12.7mm) 1" (25.4mm)		Face Width 1/2" (12.7mm)
Rubber	15537-070 15537-530		Rubber 407186-009
Smooth	15537-095 15537-525		Smooth 407186-010
Knurled	15537-510 15537-535		Knurled 407186-011
Grooved	15537-187		
For 3/8" bore add 3/8 to end of part number			

## ENCODER BRACKET

Plate Mount Model 7005

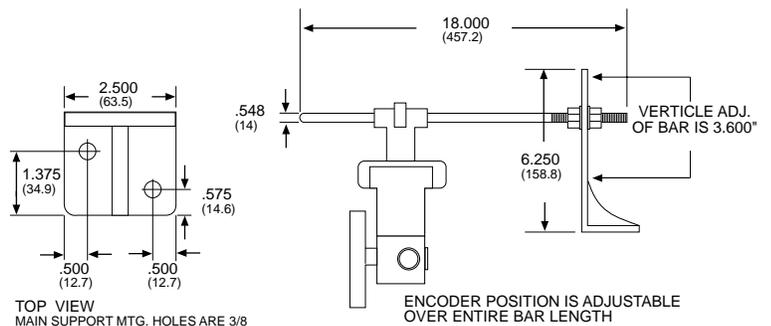
Use with 700 series Encoders



## ENCODER BRACKET

Surface Mount Model 7006

Use with 700 series Encoders



# KEP Magnetic Switches

## Features

- CE Approved
- Non Contact Switching
- N.O., N.C. & SPDT Industrial Reed Switches

- Momentary & Bistable Versions Available
- No Switching Power Needed (Drives KAL Series without external power)
- Long Life (Estimated 3 Billion Operations)

## Switch Operations:

### N.O. (third letter "S") (Closing Switch)

If a permanent magnet (a north pole [red] or a south pole [blue]) is placed near the actuating zone of the magnetic switch, the contact tongues inside the glass sealed gas protected area spring quickly to close position. When field is removed switch opens again.

### N.C. (third letter "O") (Opening Switch)

A contact tongue of a switch is magnetized by an internal magnet with the south pole field. If a south pole (blue) actuating magnet is placed near the magnetic switch, both contact tongues are magnetized with the same polarity. Like poles repel each other and the magnetic switch contact opens. When field is removed switch closes again.

### SPDT (third letter "U") (Change over Switch)

A change over contact has one moveable (COMM.) and two static contact tongues (N.C. and N.O.) When there is no magnetic field, contact tongue rests on the N.C. contact by means of its elastic force. When an actuating magnet is placed near it (north pole [red] or south pole [blue]) the moveable contact tongue switches. The NC contact opens and the NO contact springs to close position. When field is removed, moveable contact returns to rest position.

### Bistable (fourth letter "M"\*)

By means of an internal polarizing magnet, a contact tongue is magnetized with a south pole field in such a way that when north pole magnet (red) is placed in its proximity the magnetic switch contact changes state. The switch remains in this state until a south pole magnet (blue) is placed in its proximity.

**Operating Temperature:** 14° to 176°F (-10° to 80°C)

### Cable

Length: 39.4" (1 M)

Color:

Jacket: Gray or Beige 0.22" (5.6mm) diameter

Inside: 19 ga.

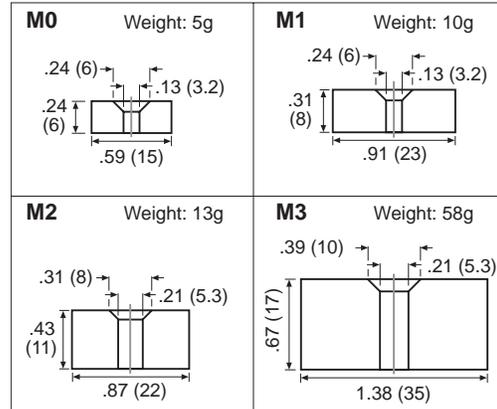
N.O.: Brown & Blue

N.C.: Black & Blue

SPDT: Brn (comm), Blue (N.C.), Blk (N.O.)

NOTE: Some cables may have extra green/yellow wire connected to metal case.

## Actuating Magnets:

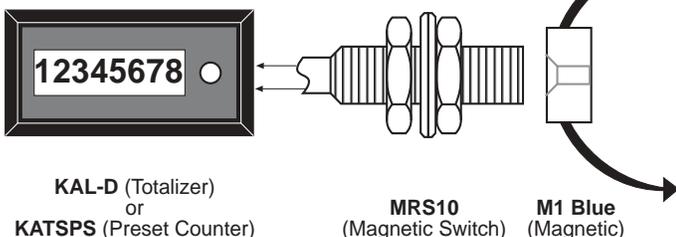


## Switch & Magnet Spacing:

Mag. Switch	Magnets			
	M0	M1	M2	M3
KRS9	≈3mm	≈6mm	≈10mm	≈27mm
KRU9	≈5mm	≈9mm	≈14mm	≈30mm
KWU9	≈4mm	≈7mm	≈11mm	≈26mm
GMS9	≈3mm	≈6mm	≈10mm	≈22mm
GMU9	≈3mm	≈5mm	≈8mm	≈19mm
MRS10	≈4mm	≈7mm	≈11mm	≈28mm
MRS12	≈4mm	≈7mm	≈11mm	≈27mm
MRU12	≈3mm	≈6mm	≈10mm	≈28mm
DRS	≈5mm	≈7mm	≈11mm	≈27mm
DRU	≈3mm	≈5mm	≈9mm	≈17mm
DRSM	≈14mm	≈20mm	≈28mm	≈58mm
DRUM	≈8mm	≈15mm	≈20mm	≈45mm
FLS-AL	≈5mm	≈7mm	≈11mm	≈27mm
FLU-AL	≈3mm	≈5mm	≈9mm	≈17mm
FLSM-AL	≈14mm	≈20mm	≈28mm	≈55mm
FLUM-AL	≈8mm	≈15mm	≈20mm	≈45mm
FWU-AL	≈5mm	≈8mm	≈13mm	≈30mm
FGMS-AL	≈3mm	≈5mm	≈9mm	≈21mm

NOTE: To convert from mm to inches use the following:  
mm ÷ 25.4 = inches

## Electronic Counting With No Outside Power:



**Type: KRS9  
KRU9  
KWU9**

**Technical Data:**

Switching Action: Monostable

Contact Material: KRS9 & KRU9: rhodium  
KWU9 - tungsten

Protection: NEMA 4X / IP65

Make/Break Capacity: KRS9 & KWU9: 60 VA max.  
KRU9: 40 VA max.

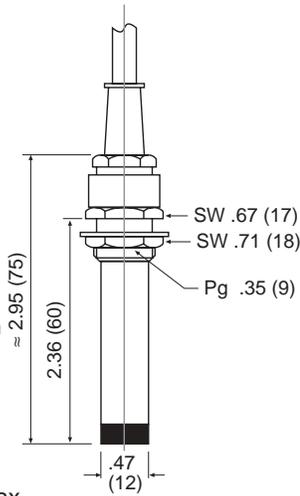
Switching Voltage: 250V max.

Switching Current: KRS9: 2A max.  
KRU9 & KWU9: 1A max.

Switching Frequency: KRS9 & KRU9: 300 Hz  
KWU9: 100 Hz

Switching Hysteresis: KRS9 & KRU9:  $\approx$  5mm  
KWU9:  $\approx$  2-3mm

Housing: Glass fiber reinforced nylon



**Type: GMS9  
GMU9**

**Technical Data:**

Switching Action: Monostable

Contact Material: rhodium

Protection: NEMA 4X / IP65

Make/Break Capacity: GMS9: 100 VA max.  
GMU9: 40 VA max.

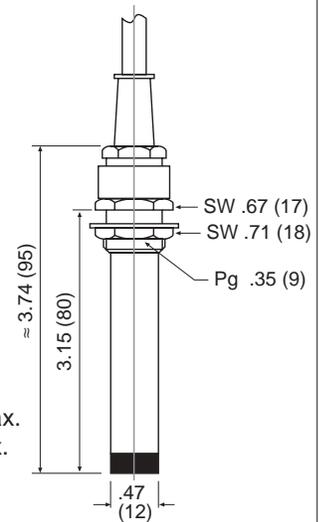
Switching Voltage: 250V max.

Switching Current: GMS9: 2A max.  
GMU9: 1A max.

Switching Frequency: 300 Hz

Switching Hysteresis: GMS9:  $\approx$  3-4mm  
GMU9:  $\approx$  5mm

Housing: Glass fiber reinforced nylon



**Type: MRS10**

**Technical Data:**

Switching Action: Monostable

Contact Material: rhodium

Protection: NEMA 12 / IP54

Make/Break Capacity: 10 VA max.

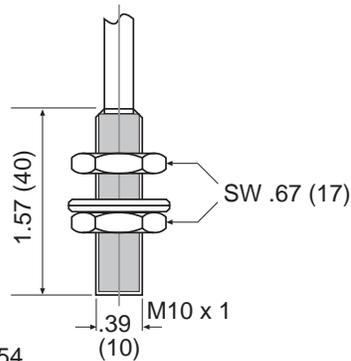
Switching Voltage: 250V max.

Switching Current: 0.5A max.

Switching Frequency: 1000 Hz

Switching Hysteresis:  $\approx$  5mm

Housing: Brass



**Type: MRS12  
MRU12**

**Technical Data:**

Switching Action: Monostable

Contact Material: rhodium

Protection: NEMA 12 / IP54

Make/Break Capacity: MRS12: 60 VA max.  
MRU12: 40 VA max.

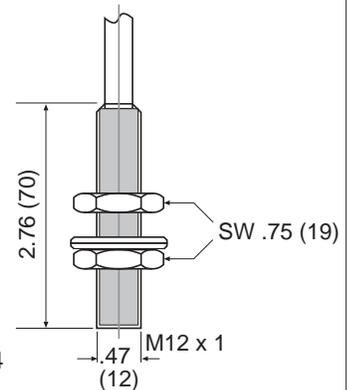
Switching Voltage: 250V max.

Switching Current: MRS12: 2A max.  
MRU12: 1A max.

Switching Frequency: 300 Hz

Switching Hysteresis:  $\approx$  5mm

Housing: Brass



**Type: DRS, DRU, DRSM, DRUM, FGMS-AL**

**Technical Data:**

Switching Action: DRS, DRU & FGMS-AL: monostable  
DRSM & DRUM: bistable

Contact Material: rhodium

Switching Frequency: 300 Hz

Switching Hysteresis: DRS & DRU: ≈ 5mm  
FGMS-AL: ≈ 3-4mm

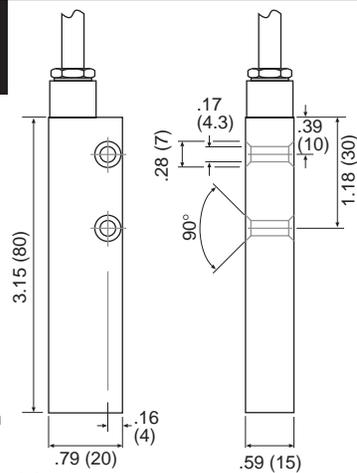
Protection: DRS, DRU, DRSM & DRUM: NEMA 12 / IP54  
FGMS-AL: NEMA 4X / IP65

Make/Break Capacity: DRS: 60 VA max.  
DRU & DRUM: 40 VA max.  
DRSM & FGMS-AL: 100 VA max.

Switching Voltage: 250V max.

Switching Current: DRS, DRSM, & FGMS-AL: 2A max.  
DRU & DRUM: 1A max.

Housing: DRS, DRU, DRSM & DRUM: Glass fiber reinforced nylon  
FGMS-AL: Aluminum



**How To Order:**

**Actuating Magnets:**

- MO (specify RED or BLUE)
- M1 (specify RED or BLUE)
- M2 (specify RED or BLUE)
- M3 (specify RED or BLUE)

**NOTE:** RED Magnets are North; BLUE Magnets are South

**Magnetic Switches:**

- KRS9
- KRU9
- KWU9
- GMS9
- GMU9
- MRS10
- MRS12
- MRU12
- DRS
- DRU
- DRSM
- DRUM
- FLS - AL
- FLU - AL
- FLSM - AL
- FLUM-AL
- FWU-AL
- FGMS-AL

**Type: FLS-AL, FLU-AL, FWU-AL, FLSM-AL, FLUM-AL**

**Technical Data:**

Switching Action: FLS-AL, FLU-AL & FWU-AL: monostable  
FLSM-AL, FLUM-AL: bistable

Contact Material: FLS-AL, FLU-AL, FLSM-AL & FLUM-AL: rhodium  
FWU-AL: tungsten

Switching Frequency: FLS-AL, FLU-AL, FLSM-AL & FLUM-AL: 300 Hz  
FWU-AL: 100 Hz

Switching Hysteresis: FLS-AL & FLU-AL: ≈ 5mm  
FWU-AL: ≈ 2-3mm

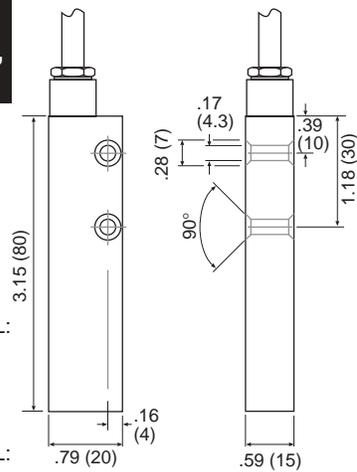
Protection: NEMA 4X / IP65

Make/Break Capacity: FLU-AL & FLUM-AL: 40 VA max.  
FLS-AL, FWU-AL: 60 VA max.  
FLSM: 100 VA max.

Switching Voltage: 250V max.

Switching Current: FLS-AL & FLSM-AL: 2A max.  
FLU-AL, FLUM-AL & FWU-AL: 1A max.

Housing: Aluminum



# D Series

## Inductive Proximity Sensors

Features:

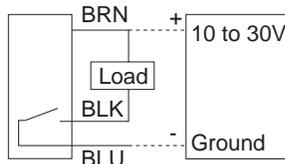
- CE Approved
- Low Cost
- Non Contact Sensing of Any Metal
- No Magnets Needed
- Low Power Consumption
- Shock Resistant



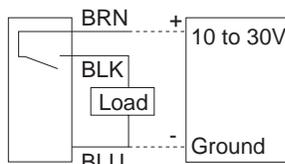
The D Series comes in three sizes, all in the easy flush mount type. Both NPN (sinking) or PNP (sourcing) types are available. They sense any conductive metal surface within range of their sensing coils. They do not require a magnetic target and are perfect for our ratemeters and counters. An LED indicator lights during activation.

	(8mm Diameter)	(12mm Diameter)	(18mm Diameter)
<b>NPN Type (SINK)</b>	<b>#D08N</b>	<b>#D12N</b>	<b>#D18N</b>
<b>PNP Type (SOURCE)</b>	<b>#D08P</b>	<b>#D12P</b>	<b>#D18P</b>
Scanning Principle	Inductive	Inductive	Inductive
Mounting Type	Flush	Flush	Flush
Switch Function	Closer (N.O.)	Closer (N.O.)	Closer (N.O.)
Switch Range; Steel	1mm ± 10% STD	2mm ± 10% STD	5mm + 10% STD
Temperature Range	-25° to +70°C	- 25° to + 70°C	-25° to +70°C
Protection Class	NEMA 4 / IP67	NEMA 4 / IP67	NEMA 4 / IP67
Housing Diameter	M8x1	M12x1	M18x1
Housing Material	Stainless Steel	Chrome Plated Brass	Chrome Plated Brass
Cable	2m, 3 x 0.14mm <sup>2</sup>	2m, 3 x 0.14mm <sup>2</sup>	2m, 3 x 0.14mm <sup>2</sup>
Supply	10-30 VDC	10-30 VDC	10-30 VDC
Feed Current	~8 mA	~8 mA	~8 mA
Switch Current	1mA; Max. drop 0.7 V	1mA; Max. drop 0.7 V	1mA; Max. drop 0.7 V
Switch Current	100 mA; Max. drop 3 V	100 mA; Max. drop 3 V	100 mA; Max. drop 3 V
Frequency	2 kHz	2 kHz	1 kHz
Hysteresis, % of Range	< +15%	< +15%	< ±15%
Function Indicator	LED in Body	LED in Body	LED in Body

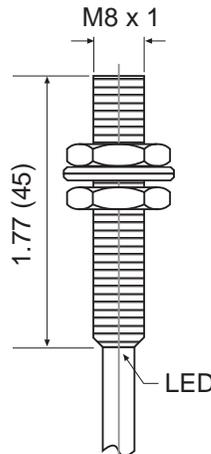
### NPN Wiring



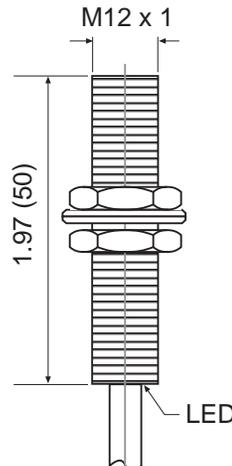
### PNP Wiring



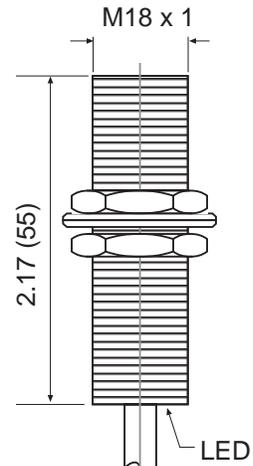
### D08



### D12



### D18



# INDUCTIVE PROXIMITY SENSOR for use with KEP Counters and Ratemeters

**Applications:** Our D Series switches interface easily with our full line of counters and ratemeters. Use PNP switches (D\_P) on all KEP units except KAL Series, which requires NPN (D\_N) switches.

## TYPICAL WIRING

<p><b>KAL-D</b></p> <p>CMOS/TTL COMPATIBLE CONTACT CLOSURE JUMPER OR SWITCH MOMENTARY SWITCH</p> <p>1-BLACK-COMMON 2-GREEN-RESET ENABLE 3-YELLOW-EXTERNAL RESET 4-BROWN-SLOW SPEED INPUT 5-BLUE-HIGH SPEED INPUT</p> <p>115 VAC → 115-12 POWER SUPPLY</p> <p>BLK BLU BRN</p> <p><b>D12N (NPN)</b></p>	<p><b>Minicount ( MC or MC2)</b></p> <p>RELAYS A B</p> <p>□ 1 COMMON □ 2 N.O. (N.C./NPN) □ 3 COMMON □ 4 N.O. (N.C./NPN) □ 5 A INPUT □ 6 B INPUT □ 7 12 V OUTPUT/ + DC INPUT □ 8 - DC (GROUND) □ 9 RESET INPUT □ 10 NOT USED □ 11 AC INPUT □ 12 AC INPUT</p> <p>POWER COUNT GROUND</p> <p><b>D12P</b></p>														
<p><b>Minirate (MR2 or MR)</b></p> <p>RATE INPUT 12 VOLT OUT SIGNAL GROUND</p> <p>1 2 3 4 5 6 7 8 9 10 11 12</p> <p>BRN + BLU - BLK A</p> <p>Just sense the keyway - No gears Required!</p> <p><b>D12P (PNP)</b></p>	<p><b>KALtrol (KAT1)</b></p> <p>□ 1 AC Main □ 2 AC Main Neutral □ 3 + 12 DC / 8-30 VDC in □ 4 Relay Common □ 5 Relay N.C. □ 6 Relay N.O. □ 7 AC/DC Reset □ 8 AC/DC Count □ 9 AC/DC Common □ 10 Keypad Disable □ 11 *High Speed Count Input □ 12 0V / DC Ground</p> <p>BRN BLK BLU</p> <p><b>D12P</b></p> <p>*Select PNP (SW1 OFF)</p>														
<p><b>KAL-DR/T</b></p> <p>1-BLACK-COMMON 2-GREEN-SLOW SPEED INPUT 3-YELLOW-PERIOD GATED MODE SELECT 4-BROWN-HIGH SPEED INPUT</p> <p>115 VAC → 115-12 POWER</p> <p>BLK BLU</p> <p><b>D12N (NPN)</b></p>	<p><b>How To Order:</b></p> <table border="1"> <thead> <tr> <th>TYPE</th> <th>SIZE</th> </tr> </thead> <tbody> <tr> <td>NPN Type</td> <td>D08N</td> </tr> <tr> <td>(sink)</td> <td>D12N</td> </tr> <tr> <td></td> <td>D18N</td> </tr> <tr> <td>PNP Type</td> <td>D08P</td> </tr> <tr> <td>(source)</td> <td>D12P</td> </tr> <tr> <td></td> <td>D18P</td> </tr> </tbody> </table>	TYPE	SIZE	NPN Type	D08N	(sink)	D12N		D18N	PNP Type	D08P	(source)	D12P		D18P
TYPE	SIZE														
NPN Type	D08N														
(sink)	D12N														
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PNP Type	D08P														
(source)	D12P														
	D18P														

# PD Series

## Photoelectric Sensors

### Features:

- Low Cost
- Non Contact Sensing
- Various Sensing Types
- Low Power Consumption
- Shock Resistant

### Description:

The PD Series photoelectric sensors offer superior optical performance in a miniature 18 mm package. Designed specifically for a wide variety of applications, including food processing, packaging, and materials handling. Their miniature size makes it easy to design into any system.

The PD Series provides flawless operation in the harshest environments. Rated NEMA 4, 6, and 13, the PD Series keeps working in wet and high-pressure washdown situations even under water. The PD Series is highly immune to extreme shock and vibration, and passes the NEMA ICS 1-109 showering arc test. Even walkie-talkies won't interfere with it's performance.

PD Series sensors are available in 10-30 VDC thru-beam reflex, and proximity configurations. Infrared, visible-beam, and polarized models are available, as is a complete line of fiber optic cables. Easy alignment is provided by a variable intensity indicator (patents pending) on all models, and by an additional forward-looking alignment indicator on thru-beam models.

The unique "round and square" profile makes installation easy. It can be screwed into standard 18 mm threaded brackets. Bulkhead mounts are mounted flush against any surface. Electrical connections are made via an all purpose cable.

### New From KEP—Sensi Prox...

The PD Series introduces a photoelectric breakthrough: SENSI-PROX. Unlike other proximity sensors whose signal strengths drop off gradually, KEP's SENSI PROX proximity sensor has an extremely sharp cut-off. Because of this, SENSI PROX sensors provide superior background suppression and absolute detection at precise distances.

### Accessories:

Retroreflectors and mounting brackets are available to complete the installation of your PD Series sensor.



### Specifications:

#### ELECTRICAL (all models)

**Input voltage:** 10-30 VDC (above 55°C derate to 24 VDC at 70°C)

**Power dissipation:** 1W max

#### Response time:

Dark-to-light: 1 mS max

Light-to-dark: 1 mS max

**Sensitivity adjustment:** 20:1 ratio

**Power on delay:** <300 mS

#### Output type and rating:

Source and sink transistors:

Sourcing: 100 mA max

Sinking: 250 mA max (above 55°C, derate sinking output to 120 mA max at 70°C) Off-state voltage: 30 VDC max

Off-state leakage: 10 μA max

**Light/Dark Operation:** When the Lt/Dk control is in the Lt position (fully clockwise) the outputs turn on when the beam is complete. When in the Dk position, the outputs turn on when the beam is broken.

**Alignment Indicator:** LED intensity varies with signal strength to aid alignment. LED status:

OFF: power is off

DIM: power is on, but beam is broken

BRIGHT: power is on, and beam is complete (unbroken).

Intensity varies with signal strength.

#### Mechanical/Environmental:

**Operating temperature:** -20°C to +70°C (-4°F to +158°F)

**Storage temperature:** -20°C to +70°C (-4°F to +158°F)

**Humidity:** 95% RH, noncondensing

**Case material:** Rigid Polyurethane

**Lens material:** Polycarbonate

**Vibration:** 30g or 0.06 in displacement, whichever is less, from 50 Hz to 2 kHz

**Shock:** 100g for 3 ms 1/2 sine wave pulse

**Ratings:** NEMA 4, 6, 13

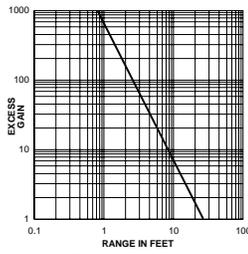
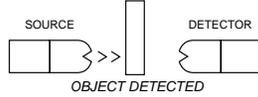
**Mounting:** Side or 18 mm thru-hole (see dimensions).

**Cable Length:** 6 feet

Side mounting: Use #4 screws to attach the sensor to a wall or mounting bracket. Thru-hole mounting: The sensor can be mounted through an 18 mm (0.71 in) diameter hole using nuts included with the sensor.

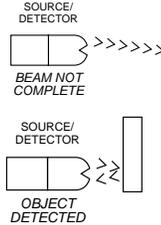
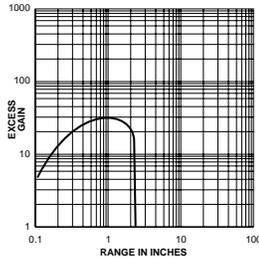
NOTE: All sensors UL and CSA approved.

**WIDE-ANGLE THRU-BEAM**  
**PDS 25** — 10-30 VDC source  
**PDD 25** — 10-30 VDC detector  
**Maximum range:** 25 ft.  
**Effective beam:** 0.25 in diameter  
**Field of view:** 40 in. at 100 in.  
**Sunlight immunity:** 10,000 footcandles



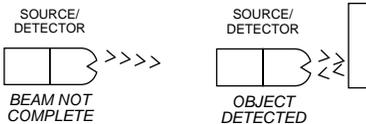
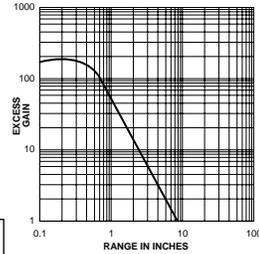
**VISIBLE-BEAM SENSI PROX (Diffused)**  
**PROXIMITY**  
**PDP02** — 10-30 VDC

This sensor has a precise gain cut-off (from an excess gain of 20 to 1 in 150-thousandths of an inch) which makes it ideal for applications in which background suppression is necessary. This sensor also emits a visible beam of light for easy alignment.  
**Maximum range:** 2.25 in.  
**Optimum range:** 0 to 2.25 in.  
**Detection spot diameter:** 0.1 in. at 2 in.  
**Sunlight immunity:** 10,000 footcandles



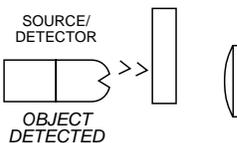
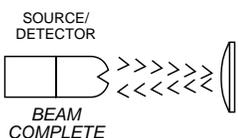
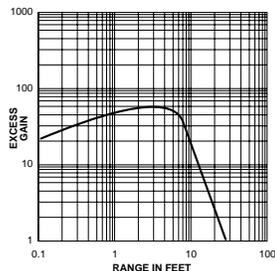
**SHORT-RANGE PROXIMITY (Diffused)**  
**PDP08** — 10-30 VDC

**Maximum range:** 8.0 in.  
**Optimum range:** 0 to 4.0 in.  
**Field of view:** 2 in. at 5 in.  
**Sunlight immunity:** 10,000 footcandles



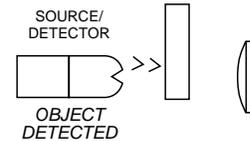
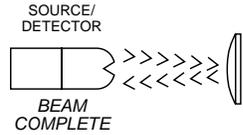
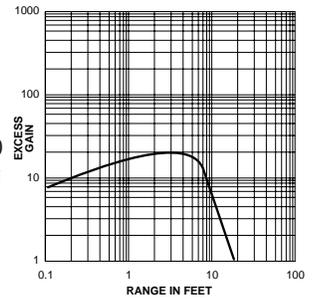
**VISIBLE-BEAM REFLEX**  
**PDR25 Series** — 10-30 VDC

This sensor emits a visible beam of light for easy alignment.  
**Maximum range:** 25 ft.  
**Optimum range:** 0 to 15 ft.  
**Field of view:** 2 in. at 100 in.  
**Sunlight immunity:** 10,000 footcandles



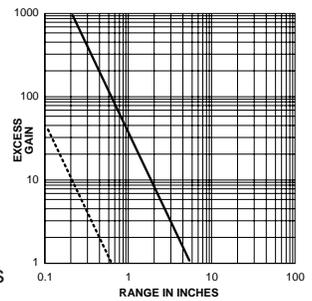
**POLARIZED VISIBLE-BEAM REFLEX**  
**PDR15 Series** — 10-30 VDC

The polarized reflex sensor responds only to light reflected from a hard surface retroreflector as T3.0 or T.5. It does not respond to most reflective tapes nor shiny objects. This feature is important in applications where shiny objects such as cans or bottles are to be detected. This sensor also emits a visible beam of light for easy alignment.  
**Maximum range:** 15 ft.  
**Optimum range:** 0 to 10 ft.  
**Field of view:** 1 in. at 50 in.  
**Sunlight immunity:** 10,000 footcandles

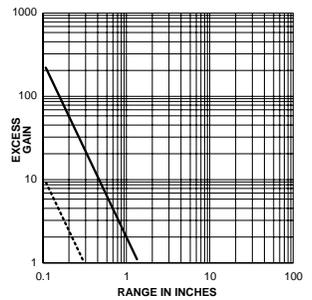


**FIBER OPTIC SENSOR**  
**PDF Series** — 10-30 VDC

Special purpose sensor for use with the plastic fiber optic cable family. Fiber optic cables plug into sockets on the front of the sensor. Sensor operates in thru-beam or proximity mode depending on the fiber optic cable selected.  
**Maximum range:**  
 0.65 in. for 0.04 in. fiber optic cables in proximity mode.  
 6 in. for 0.04 in. fiber optic cables in thru-beam mode.  
 0.3 in. for 0.02 in. fiber optic cables in proximity mode.  
 1.5 in. for 0.02 in. fiber optic cables in thru-beam mode.  
**Field of view:** Depends on fiber optic cable selected  
**Sunlight immunity:** 10,000 footcandles



----- Prox Performance  
 \_\_\_\_\_ Thru-Beam Performance



----- Prox Performance  
 \_\_\_\_\_ Thru-Beam Performance

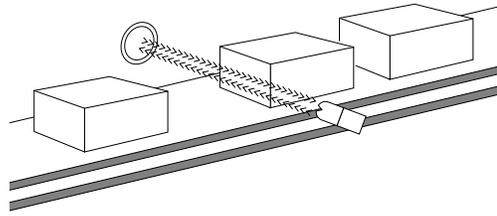
## HOW TO PICK THE RIGHT SENSOR

1) Most applications can be satisfied with a reflex unit, one that sends out a light signal to bounce off a reflector back to the source. This unit is ideal for sensing ranges from 1" to 15 ft. Use P/N PDR Series and order a PDA T.5 or PDA T3.0 reflector.

### BOX COUNTING

MODEL #	DESCRIPTION
PDR25	Reflex Sensor
PDA3.0	Retroreflector

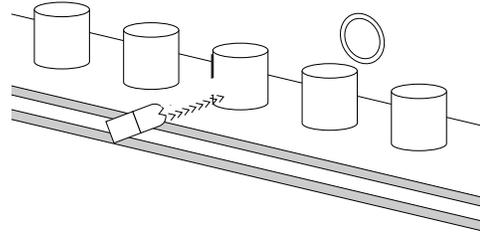
A single reflex control detects boxes anywhere on a four foot wide conveyer. Interfacing the control with a KEP counter provides totals.



2) If you have shiny objects to be detected like metal cans or covered in shiny shrink wrap that might accidentally act as a refl and trip the sensor, use the Polarized reflex unit. It works best to 10 feet. Use a PDR15 and a hard surface target reflector.

### BATCH COUNTING AND DIVERTING

MODEL#	DESCRIPTION
PDR15	Polarized Reflex Sensor
PDAT3.0	Retroreflector



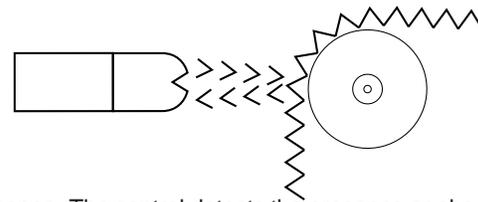
3) If you can look directly at the object to be sensed and there are no objects to false trigger the unit, you only need to look 4 inches or less to see the object. Use PDP08.

4) If you want to look out only 2 inches and ignore objects very close to that range, we have a special product with total background suppression. Use PDP02.

### FILTER PAPER LENGTH CONTROL

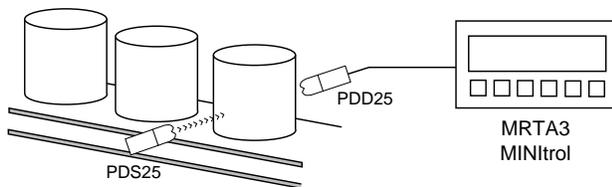
MODEL #	DESCRIPTION
PDP02	Sensi Prox

A fixed-focus proximity control with the standard output interfaces with a KEP Counter to measure a specific length of corrugated automotive filter



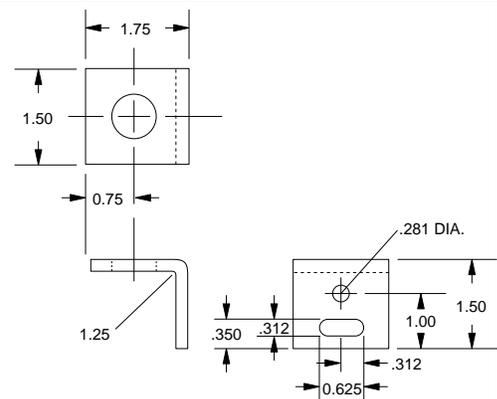
paper. The control detects the presence or absence of a corrugation. When a predetermined number of corrugations has been detected, the Keptrol or Intellect counter closes a relay, which directs a shear to cut the paper.

5) If you have to look very far or if you are looking thru a very smokey or dirty area, thru beam sensors are the most powerful type of photo-electrics because the light only travels one way. It leaves the source and is received at the detector. Of course, you will have to buy and wire two separate units for a thru beam application. Use PDS25 and PDD 25.

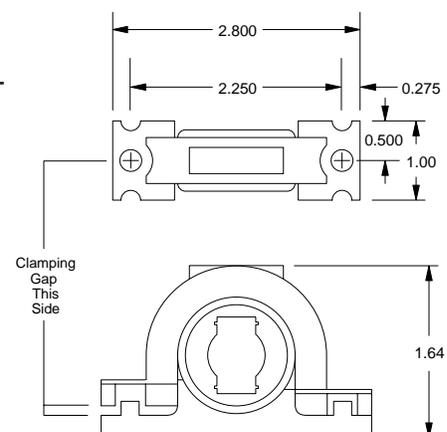


6) Now if you really have some special requirements — small space, high temperature, intrinsic safety needs or very small object detection, use our Fiber Optic Unit. Use P/N PDF00 with appropriate fibers ordered separately.

### PDABA BRACKET

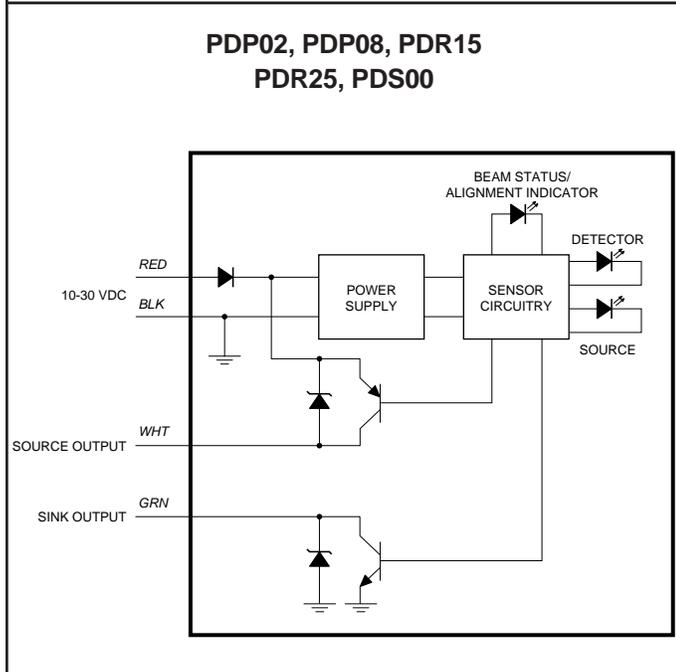
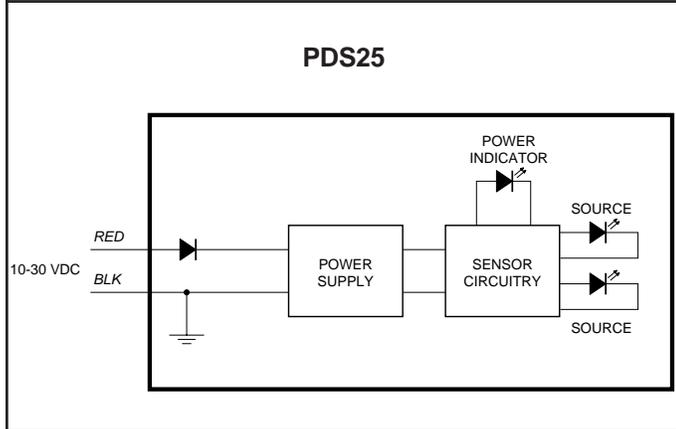
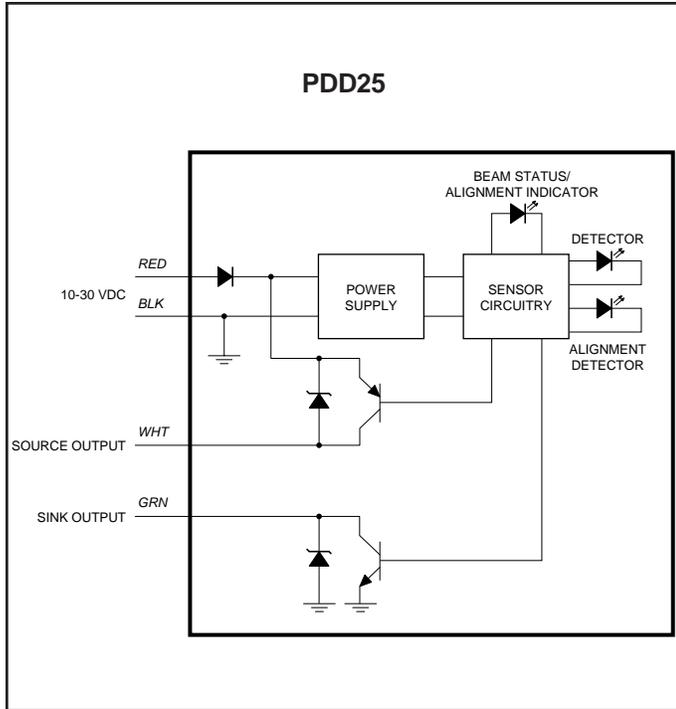


### PDABS SWIVEL BRACKET

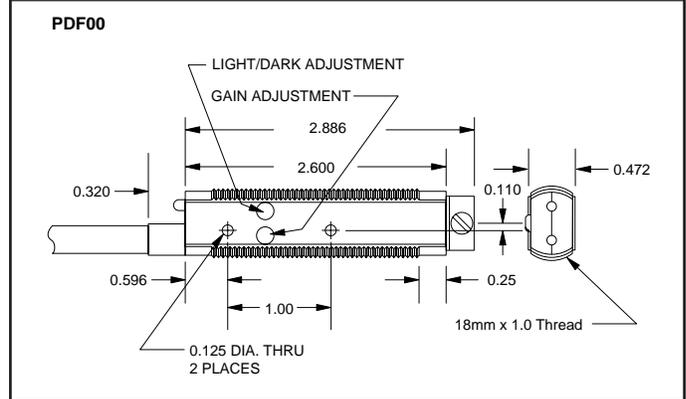
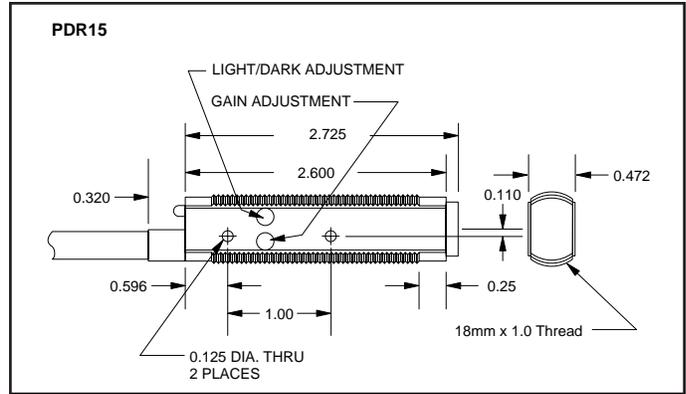


SENSORS

**WIRING DIAGRAMS:**



**DIMENSIONAL DIAGRAMS:**



**How To Order:**

**EXAMPLE: PD R 25**

<b>Series</b>	Photo Detector
<b>Style</b>	
S = Source	25
D = Detector	25
P = Prox (Sensi Prox)	02
PS = Prox (Short Range)	08
R = Reflex (Visible)	25
RP = Reflex (Polarized)	15
F = Fiber Optic	00

**Maximum Range** \_\_\_\_\_  
 0X = (in inches)  
 XX = (in feet)

**ACCESSORIES:**

**EXAMPLE: PDA T3.0**

<b>Series</b>	Photo Detector Accessories
<b>Type</b>	
F1 = Fiber Bifurcated Reflex	78" long - cut to desired length
F2 = Fiber Thru-beam (set of 2)	78" long - cut to desired length
T3.0 = Target - round reflector 3" dia.	(2 per package)
T.5 = Target - round reflector 0.5" dia.	(2 per package)
TX X = Target Tape - 2" (specify length _ _)	
BS = Bracket - swivel	
BA = Bracket - 90° angle	(2 per package)

SENSORS

# Industrial Instruments REPLACEMENT PRODUCTS

The following is a list of replacement products. The products listed below are either obsolete, sold for replacement only or replaced by a newer KEP product. Please call the factory for pricing or technical information.

MTHVS  
MLTHVS  
HK15 (OBSOLETE; Replaced by HK17 )  
T610, TR510, T603 (OBSOLETE; Replaced by H57)  
QT 15 (OBSOLETE; Replaced by HK17)  
KP7 (OBSOLETE; Replaced by 904K)  
M16  
M18  
CHC  
CHH  
CHR  
AW16  
W16  
ED15  
MVS13  
MVS16

EVS15  
ETSVS  
ETMVS  
ETHVS  
E14  
E16  
ET SERIES  
LT SERIES  
ER SERIES  
INT 61 (Refer to MC2 for replacement)  
INT 66  
INT 63 (Refer to MR2 for replacement)  
INT 64 (Refer to INT69R for replacement)  
INT 65 (Refer to INT69T for replacement)  
L SERIES  
KP6 COUNTER (OBSOLETE; Replaced by CTF5)

## 8000 Series

*Electronic Counter*



Visit  
[www.kep.com](http://www.kep.com)  
for datasheet

## 8200-8400 Series

*Electronic Timer*



Visit  
[www.kep.com](http://www.kep.com)  
for datasheet

## OMNI Series

*Preset Counter*



Visit  
[www.kep.com](http://www.kep.com)  
for datasheet

## OMNI Series

*Preset Timer*



Visit  
[www.kep.com](http://www.kep.com)  
for datasheet

## SCPS Series

*Preset Counter*



Visit  
[www.kep.com](http://www.kep.com)  
for datasheet

## SCPT Series

*Preset Timer*



Visit  
[www.kep.com](http://www.kep.com)  
for datasheet

SENSORS

# Industrial Instruments

## ACCESSORIES

### Spare Parts

ORDER NO.	DESCRIPTION
Model 36120	Flex Cover
KEPTROLBEZEL	Front panel bezel for KEPtrol
KP8CASE	Case for KEPtrol
TROLCLAMP	Mounting Kit (4 clamps & gasket)
*BATCHMAINRT3L	KP8, KRT, BT2 Mainboard
KEPTROLDISP	KP8, KRT, BT2, FLO8 Display Board

\*PROM sold separately (see below)

### MINITROL Input Chips

ORDER NO.	DESCRIPTION
EPLDMRTIN3	High Impedance input chip for Minitrol
EPLDMRTIN5	Up/down control input chip for Minitrol
EPLDMRTIN9	Quadrature input chip for Minitrol

### KEPtrol Program Chips

ORDER NO.	DESCRIPTION
PROMKP8V1.7	PROM for KEPtrol
PROMRSV1.0	PROM for Trol RS422 & RS232

### INT69 & MINITROL ACCESSORIES

ORDER NO.	DESCRIPTION
34235	Non Keyboard Front Panel
34237	Keyboard Front Panel

SENSORS

# N7 HOUSING

## Explosion Proof Housing for N7 Hazardous Areas

**Use With the Following KEP Models:**  
 MK Series, B Series, BVA Series, MVS Series,  
 KAL-D Series, 520 Series and KAT-SP Series

**Description:**  
 Most KEP series totalizers and Elapsed Timers (less than 3.1" deep) can be factory installed in this explosion proof housing. An optional approved local pushbutton located on the housing provides reset (for units with electric reset) without violation of safety requirements. Electrical reset can also be located at a remote station.

When safe conditions exist, the screw-on cover with its glass window may be removed for field wiring, maintenance or to change preset values.

The housing may be drilled and tapped to customers requirements, up to 2" NPT. Unless otherwise specified, housing is drilled and tapped for 1/2" NPT as illustrated and 3/4" NPSM if reset button is ordered.

**Specifications:**  
**Rating:** Class I, Groups C & D  
 Class II, Groups E, F, G  
 Class III

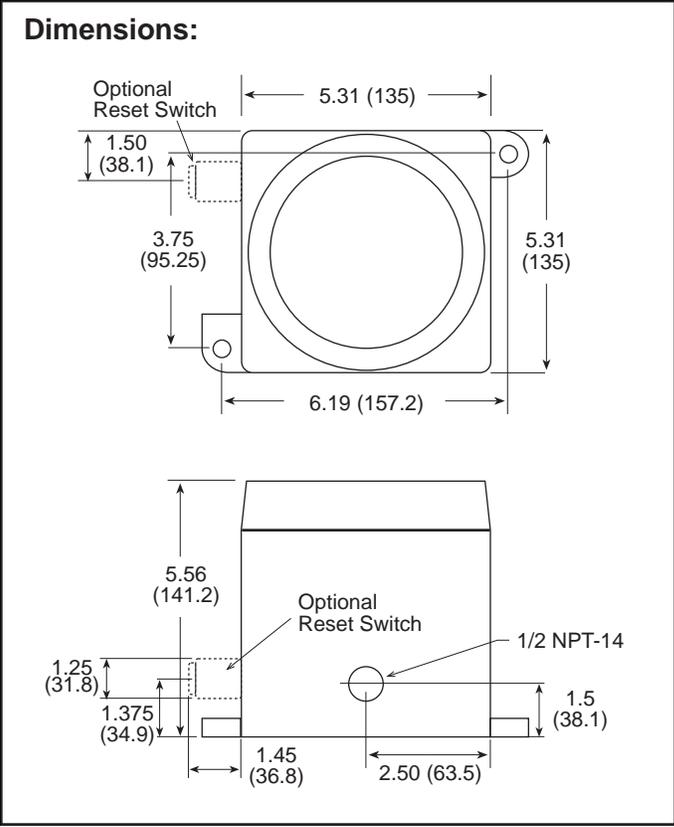
**Max. Depth Behind Panel:** 3.1"

**Max. Hight Above Panel:** 0.625"

**Weight of Housing:** 6 lb. Max.

**Ordering Examples:**

Model Housing	Local Reset Option (R) if used	Counter Catalog Number (Use #1 or Clip Mount)
N7	R	529K.2
N7	R	MK18.10 24VDC 25CPS
N7	R	KAT-SP



ACCESSORIES & REPLACEMENT

# N3, N4, N12 HOUSING

## NEMA 3,4 or 12 Housing for Counters/Timers

### Features

- NEMA 12 - Dust and Oil Tight
- NEMA 3 - Waterproof for Outdoors
- NEMA 4 - Waterproof for Indoors
- 14-Gauge Welded Seam Construction
- For Use with MK16/18 Counters and M16/18 Timers

### Description

The MK series counters and M series timers may be supplied in the NEMA 3, 4 or 12 enclosure. The removable covers have wide neoprene gaskets and are held by captivated screws which thread into sealed wells in the enclosure body. 14-gauge welded seam construction is used for throughout. Finish is baked blue hammertone over phosphorized surface. The lexan window will not shatter or discolor. The enclosure is available for MK16, MK18 series counters and M16, M18 series timers.

### Type of Counters:

- MK16.10** - 6 digit, no reset
- MK18.10** - 8 digit, no reset
- MK16.12** - 6 digit, push button reset
- MK16.12KS** - 6 digit, key reset

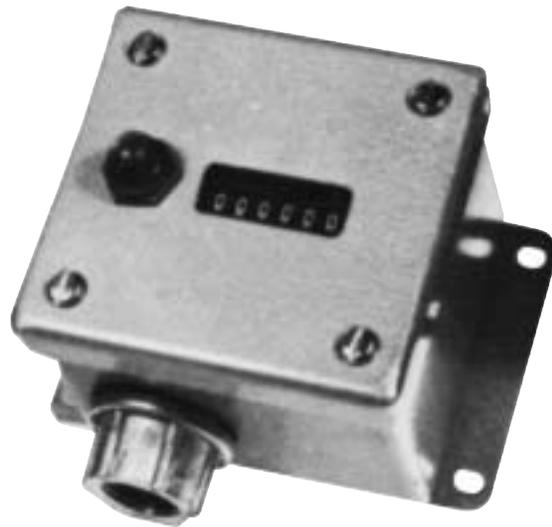
### Type of Timers:

- Mxx16.10** - 6 digit, no reset
- Mxx18.10** - 8 digit, no reset
- Mxx16.12** - 6 digit, push button reset
- Mxx16.12KS** - 6 digit, key reset

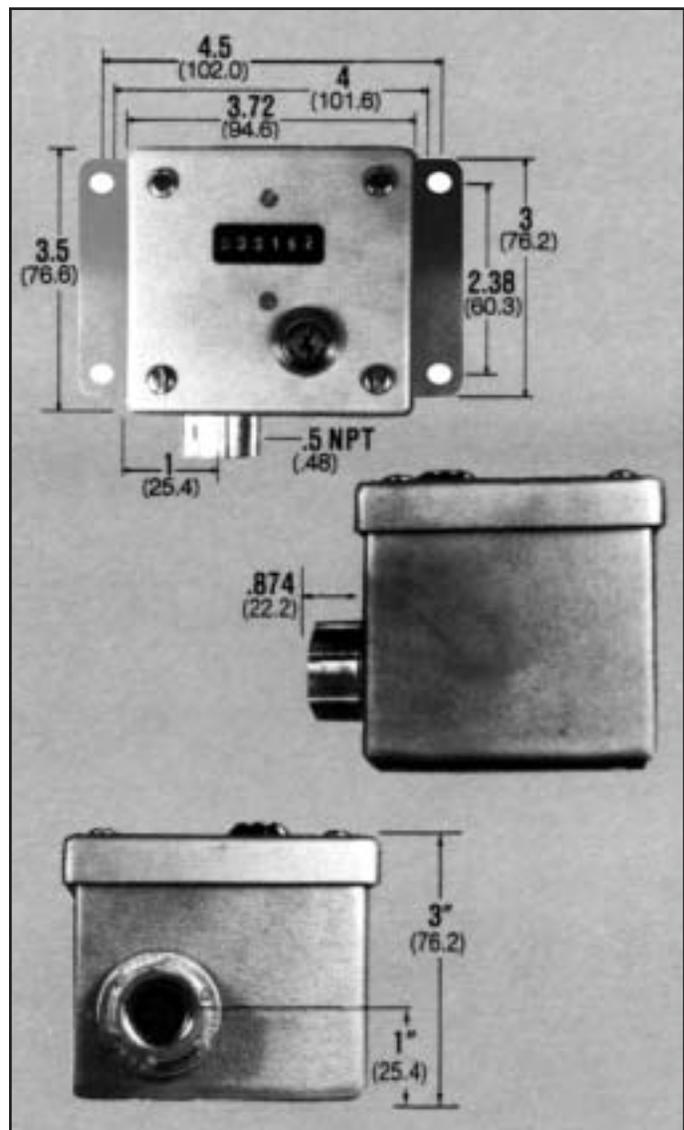
### How To Order:

(add suffix to part number of counter/timer)

- N-12** - NEMA 12, industrial dust and oil tight
- N-3** - NEMA 3, dust tight, rain tight and sleet & ice resistant - for outdoor use
- N-4** - NEMA 4, water dust tight - for indoor use



### Dimensions:



# E200

## Outdoor Enclosures For Units in 1/32 DIN Cases

### Features

- Low Cost
- Compatible with all Standard 1/32 DIN Products
- NEMA 3R (raintight) Enclosure
- Quick-Release Latches with Security Lock Provision
- Light Weight

### E200 Plastic Outdoor Enclosure

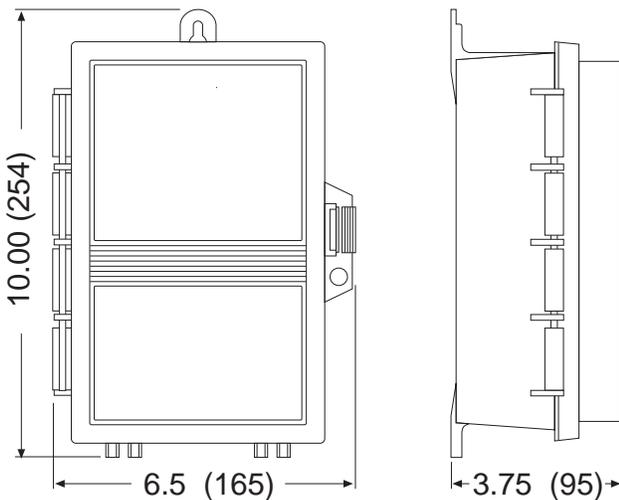
The E200 is a Plastic NEMA 3R raintight enclosure with hinged door and latch. It offers provisions for mounting up to four of ANY KEP 1/32 DIN sized units. The E200 also offers five combination 1/2"-3/4" knockouts: In bottom, sides and back for easy wiring and conduit connections. Exterior Size: 6.5" x 10" x 3.75" deep. Interior Size: 4.75" x 7.75" x 3" deep. Dark grey plastic finish.



Compatible with all Standard 1/32 DIN Products Including:

- KAL D Series
- KAL D Time Series
- 130K - 136K Series
- 520K - 530K Series

### Dimensions:



### Ordering Information

<u>Part Number</u>	<u>Description</u>
E200-0	E200 Enclosure with no cutout
E200-1	E200 Enclosure with 1 cutout
E200-2	E200 Enclosure with 2 cutouts
E200-3	E200 Enclosure with 3 cutouts
E200-4	E200 Enclosure with 4 cutouts



# Installation Of Electronic Instruments In Industrial Environments

## 1) Supply line

An MOV (metal oxide varistor) placed across the supply lines at the unit often clips the high voltage spikes sufficiently to prevent malfunction. A line filter offers added protection (See Figure A). For areas where there are large power surges caused by switching on and off large motors, solenoids, welders, etc. or by electronic switching of large variable speed drives, it may be necessary to install lightning arrestors or isolating power supplies to run the electronic equipment.

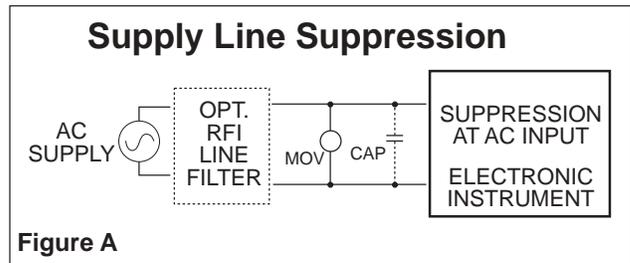


Figure A

## 2) Relay Contact

Arc suppression is needed across inductive loads such as solenoids, motors, or even other small relay coils driven by relay contacts. When the contact opens, large electrical spikes are generated. These noise spike, in addition to degrading the relay contact, can radiate off the output lines and into sensitive areas of the equipment. The best way to alleviate this situation is to suppress the spike at the coil itself.

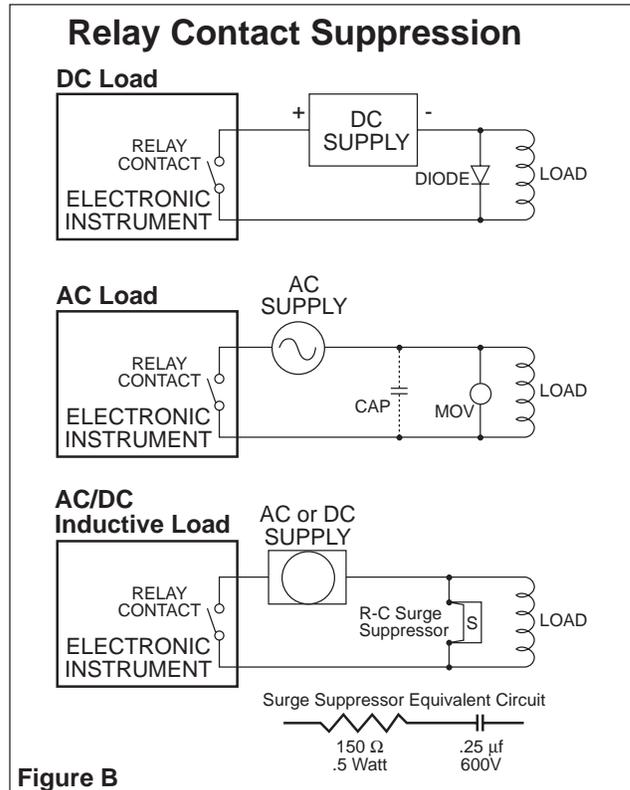


Figure B

For DC powered coils a simple diode as IN4000 Series placed across the DC coil is usually very effective (cathode-banded side of diode connected at more positive side of coil and anode connected to other side of coil. See Figure B.)

For AC powered coils, an MOV placed across the coil clamps the voltage and usually eliminates the malfunction. Another method to suppress the noise is to place a capacitor across the coil. A .05 to .1  $\mu\text{F}$  ceramic capacitor rated at 3 times the operating voltage will slow down the rise of the spike thus lessening harmful effects. At times a combination of the MOV and capacitor is needed to clamp the voltage and slow down the rise.

For AC or DC powered coils, a Resistor-Capacitor Surge Suppressor placed across the coil will extend the life of relay contacts and will reduce the possibility of electronic instruments being adversely affected by electrical noise. The Surge suppressor should be connected directly on the coil terminals of the load device being suppressed. If this is not possible, connect the suppressor at the terminal strip closest to the load being suppressed. The suppressor should be connected in parallel with the inductive load.

## 3) RFI Noise Through The Air

If electrical noise cannot be suppressed, it is recommended that any electronic equipment be mounted away from the relay coils, solenoids or other noise sources to avoid RFI or EMI caused malfunction. Often it is sufficient to separate the two by 6" to 12" but metal shielding or separate cases may be necessary where there are strong fields from relay coils, solenoids, welding equipment or large motors.

## 4) Signal Input Lines

Input signal lines should be run separately from power lines or lines that may have large surges that may couple into the signal lines. They should not be run in the same trough nor bundle as power lines. It is a good practice to run these low current signal lines through shielded cable with the shield tied to DC ground at the source. Tying the shield to earth ground is recommended only if there is still noise interference after the unit is installed. As often as not, the shield connected to ground causes as many problems as it solves. If the shield is tied to earth ground it should be connected at one place, ideally close to the DC ground

## Optional Arc Suppressors

Description	KEP#	Industrial Equivalent
Diode IN4005	38012	IN4000 Series
MOV 115 VAC	30090	GE#V130LA10
MOV 230 VAC	30124	GE#V250LA10
.05 $\mu\text{F}$ @ 600V Cap	32013	0.1 to 0.05 $\mu\text{F}$ @ 60V Cap.
RFI Line Filter	N/A	GE#1B1, Corcom#1R1
Quencharc	32145	ITW 104150