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KEP Company Overview

Introduction

Kessler Ellis Products has manufacturing facilities located in Eatontown, New Jersey. KEP has been supplying display and instrumentation products since it was founded in 1960. In the early 80's, KEP broadened its product line to include flow measurement instrumentation. As the market for instrumentation continued to evolve, product offerings grew to include industrial automation, communication server software, communications accessories, and Industrial PC's.

People

KEP team members have consistently shown an obsessive concern about our customers for the last 40 years. We work hard to offer you solutions that solve your problems and service your needs. We take that extra step to ensure complete customer satisfaction.

Flow Measurement Community

KEP seeks to service the flow measurement community by providing versatile, economical instrumentation and "know how" to our users. Our goal is to enable you to select a suitable instrument from our offerings for use with a flowmeter selected from any supplier of your choice from the broad range of flowmeter types and suppliers on the market today.

Flowmeter Compatibility

There are a large number of flowmeter types in the market which are compatible with our line of instruments. These include: Coriolis, magnetic, nozzle, open-channel, orifice, pitot/annubar, positive displacement, rotometers, thermal mass, turbine, venturi, and vortex. Our flow instruments also operate with many proprietary flowmeter types.

Applications Assistance

KEP has a large number of applications engineers to assist you in selecting the most appropriate instrument for your application. Our application engineers can provide the detailed "know how" necessary to setup each instrument and to assist in the electrical interconnection between the flowmeter and the instrument.

Special Configurations

In addition to the standard products listed in this catalog, KEP offers in house engineering capabilities to customize the products and enclosures to meet the special needs of customers. Please contact us with you requirements.

Selection Guides

The pages which follow include two selection guides. The first is a preliminary selection guide to help you select several instruments that appear suitable for use with your flowmeter type and perform the intended instrument functions. The second selection guide contains a feature grid to help you make your final selection.

If you are unfamiliar with some aspect of the equipment selection or utilization, please review the tutorials that appear at the start of each section. These include answers to the most frequently asked questions we encounter while assisting customers.

Web Site

Visit our web site (www.kep.com) for the latest datasheets, user manuals, setup software, application notes and other vital information.



Product vs. Flow Meter Compatibility Table

Flow Meter Type	Flow Indicators Rate & Totalizers				Flow Batch Controllers				Flow Computers			Level and Special Instruments				
	SQUIRT, SQUIRT-R BAT R/T, RAT & D/T	INT-69 / INT-69PM2	MINITROL, PW & S	KEPTROL R/T	SUPERCONTROL - 1 LE	BATCHATCHER	MASSBATCH	SUPERCONTROL II	SUPERCONTROL - 1	MASSCONTROL - II	LEVELTROL / DPFC	KEPTROL II	INTELLECT-69PM2	FLOWTROL		
Coriolis	2	1	2	1	1,2	1	1	1,2		*				1	2	1
Differential Producers:	*		*, 3		*, 3			*, 3		*	*	*				
Venturi																
V-Cone																
Flow Nozzle																
Wedge																
Elbow																
Orifice																
Pitot / Annubar																
Magnetic	2	1	2	1	1, 2	1	1	1, 2	1	*	*	*		1	2	1
Positive Displacement	2	*	2	*	*	*	*	*	*	*	*	*		*	2	*
Propeller (turbo)	2	*	2	*	*	*	*	*	*	*	*	*		*	2	*
Roto Meter (Variable Area)					2, 4			2, 4		*	2	2, 4				
Target	*		*, 3		*, 3			*, 3		*	*	*, 3				
Turbine (paddle wheel & Insertion)	2	*	2	*	*	*	*	*	*	*	*	*		*	2	*
Thermal	*	1	*	1	*, 2	1	1	*, 2		*				1	*	1
Ultrasonic	2	1	2	1	1	1	1	1	1	*	*	*		1	2	1
Vortex	2	*	2	*	*	*	*	*	*	*	*	*		*	2	*
Open Channel Weirs & Flumes					2, 4			2, 4		2, 4	2, 4	2, 4				
ILVA / GilFlo											*					

NOTES:

* Recommended

1. Recommended for flow sensors equipped with pulse out converter
2. Recommended for flow sensors equipped with analog out converter
3. KEP unit must be equipped with optional Square Root Extraction feature
4. Multi point linearization option required

Product vs. Feature Table

Features	Flow Indicators Rate & Totalizers								Flow Batch Controllers			Flow Computers		Level and Special Instruments		
	SQUIRT	BAT R/T, RAT & D/T	INTELLECT-69	MINITROL / DRT	ST-1 & ST-1LE	KEPTROL R/T	BATCHTROL II	MASSBATCH	ST-1 & ST-1LE	MINIBATCHER	SUPERCONTROL - II	MASSTROL / DPFC	LEVELTROL II	KEPTROL FIC	INTELLECT-69PM2	FLOWTROL
AC Powered			●	●	●	●	●	●	●	●	●	●	●	●	●	●
DC Powered		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Loop Powered	●	●														
Battery Powered		●														
DC Power Output			●	●	●	●	●	●	●	●	●	●	●	●	●	●
LED Display			●	●		●	●	●		●			●	●	●	
LCD Display	●	●														
2 x 20 Char. Backlit LCD Display					●			●		●	●	●				
2 x 20 Char. VFD Display					●			●		●		●				
Multiple Language Capabilities										●						
Rate Display	4.5	4.5	4.5	4.5	6	6	6	6	6	4	6	6		6	4.5	6
Total Display	8	8	6	6	12	8	8	8	12	6	12	12	12	8		8
Accumulative Total (grand total)				6	12	8	8	8	12		12		12	8		8
Net Total Display (A-B, A+B)				●									●			
Net Rate Display (A-B, A+B)				DRT									●			
Two Pulse Inputs, Separate Scaling				●									●			
Pulse Inputs		●		●	●	●	●	●	●	●	●	●	●	●		●
Magnetic Pickup Inputs		●		●	●			●	●	●	●					
Quadrature Inputs				●	●			●								
Analog Inputs	●		●		ST1	●	●		●		●	●	●		●	
Square Root Extraction	●		●		ST1	●	●		●		●	●	●			
Multi Point Linearization		●			●	●	●	●	●		●	●	●			
Stacked DP Inputs											●	●				
Batching Capability					●		●	●	●	●			●			●
Remote Reset	●	●	●	●	●	●	●	●	●	●			●	●		●
Remote Start & Stop Inputs				●		●	●	●	●				●			●
Alarm Outputs		RAT	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Analog Outputs		●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Pulse Outputs	●	●			●	●	●	●	●		●	●	●	●		●
RS-232 Serial Communication			●	●	●	●	●	●	●	●	●	●	●	●	●	●
RS-422 Serial Communication			●	●		●	●		●				●			●
RS-485 Serial Communication				●	●				●	●						
Temperature Compensation								●	●		●	●	●			
Heat (BTU) Equations											●	●			●	
Steam Equations											●	●				
Volume Equations	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
Corrected Volume Equations									●	●		●	●			
Mass Equations									●	●		●	●		●	
Gas Equations											●	●				
NEMA4 (water tight) Enclosure	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
NEMA7 (explosion proof) Enclosure	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MPP-2400 Modem				●					●		●					
TWP Two Way Pager											●					

NOTE: Refer to datasheets for compatibilities of other models not listed

Signal Conditioners and Converters Tutorial

Signal conditioners, signal converters, transmitters and amplifiers are devices which represent the majority of the basic instrumentation requirements for transducers. They are provided with flow, temperature, pressure, as well as many other transducer sensor types.

In some cases the signal conditioner/converter is provided by the sensor manufacturer so the user will have his desired output signal.

However, in other cases, there is a need for an external signal conditioner/converter to provide the desired output signal or to provide it at a more attractive price.

Signal conditioners and converters are ancillary devices intended to amplify, filter, condition, scale, and convert the low level "raw" signals produced by many transducers and convert it into the desired, industry standard high level signal before transmitting it across a potentially noisy environment. In some cases, a secondary function is providing signal isolation.

Generally, the output signals from the sensor may be in the form of either a pulse or analog current / voltage that is proportional to the span of the signal being measured. Open collector transistors are common as pulse output signals. The most common analog signal is a 4-20mA.

In many flowmeter types the frequency of the raw input signal carries the flow information. The frequency is related to flow rate. Each pulse or cycle is related to a small equivalent quantity of flow. The quantity represented by each pulse varies with each individual meter and must be scaled to obtain engineering units.

The input signal to a pulse signal conditioner may be a contact closure, a magnetic pickup, or a low level pulse. Some conditioner/converters scale the pulse signal such that each pulse represents a engineering quantity of flow (for example 1 pulse per gallon). Some converters convert the variable frequency signal into a current proportional to flow rate.

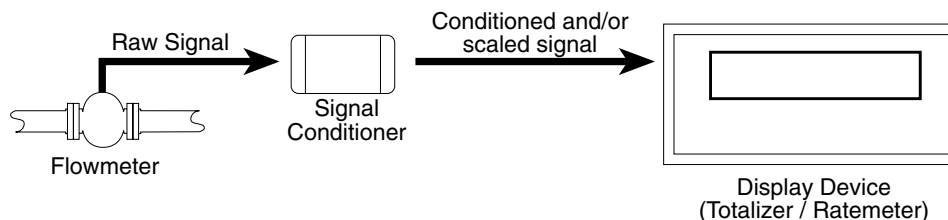
In nearly all cases the signal conditioner/converter is intended to be powered by a DC supply voltage normally available in most instruments with 24 VDC being the most common.

Enclosures are available for outdoor weatherproof and also hazardous locations.

Signal Conditioner/Converters are applied in most PLC and PC based control systems to adapt the raw process transducer signals into the standardized levels provides on I/O Cards.

Only the most common signal conditioner/converters applicable for flow metering are shown in the data sheets to follow.

Typical Application:



SC-FI Series

Frequency to Current Signal Conditioner

Features:

- Magnetic Pickup or Contact Closure Input
- Optically Isolated Input
- 10 kHz Maximum Input Frequency
- Standard, 2-Wire, 4-20 mA Output
- Two Year Warranty
- Loop Powered
- Various Mounting Styles
- LED Indicator

Description:

The SC-FI is a two wire frequency to analog converter that converts a pulse rate input into a 4-20 mA output signal proportional to frequency or rate.

The input pulse rate is amplified and filtered by the input signal conditioning circuitry. Two forms of input signal conditioning are provided, one for magnetic pickups or contact closure inputs and the other is an isolated pulse input (depending on order code).

The amplified frequency signal is then converted to an analog signal using a precision frequency to analog converter.

The output stage derives its power from the output current loop. The output stage converts the analog input signal into the desired output range. Multi-turn potentiometers provide for the necessary trimming of span and zero.

Specifications:

Operating Temperature

32° F (0°C) to 158°F (70°C)

High Level Pulse Input

Type: Opto-Isolated
Input Impedance: 3.3 kΩ
Logic 1: 4-30 VDC
Logic 0: 0-1 VDC
Frequency Range: 0-10 kHz
Fault Protection: Reverse Polarity Protection
Over Voltage Protection
Isolation Voltage: 500 V
Fast Transient Immunity: 500 V
Maximum Rise Time: No Limit
Maximum Fall Time: No Limit

Magnetic Pickup Input

Differential Input
Input Impedance: 10 kΩ
Frequency Response: 0-3500 Hz
Trigger Sensitivity: 30 mV p-p
Over Voltage Protection: ± 30 VDC

Contact Closure Input

Sensor Compatibility- Requires an isolated, contact closure
Maximum Contact Voltage- 5 V
Maximum Contact Current- 0.12 mA
Nominal Pullup Resistance - 47 Kohm to 5 Vdc
Frequency Range - 0-100 Hz



Frequency to Current Conversion

Range Selection: DIP Switch Selectable

Available Ranges:

Standard

150 Hz, 300 Hz, 600 Hz, 1200 Hz,
2500 Hz, 5000 Hz, 10,000 Hz

Factory Default: 1000 Hz

Contact Closure Option

30 Hz, 60 Hz, 120 Hz, 240 Hz,
480 Hz, 960 Hz, 1920 Hz

Factory Default: 100 Hz

Analog Output

Accuracy: ± 0.1% Span (@ 20° C)
Output Type: Two Wire, Loop Powered
Range: 4-20 mA
Compliance Voltage: 10 to 40 VDC
Loop Burden: < 10 VDC
Trim Controls: Zero & Span, non-interacting
Span (20 mA) Trim Range: 50% to 100% of full scale
Linearity: < ±0.1% Span
Output Voltage Effect: < ± 0.002% Span/Volt
Temperature Effect: < 200 PPM/C°
Reverse Polarity Protected
Noise Content: < 0.2% Span
Response Time: 0.1 second (1 sec. jumper selectable)
Overcurrent Limiting: 35 mA
Output Loop Indicator: LED illuminates when output loop is powered by proper polarity and blinks proportionally to the input frequency.

Mounting Styles

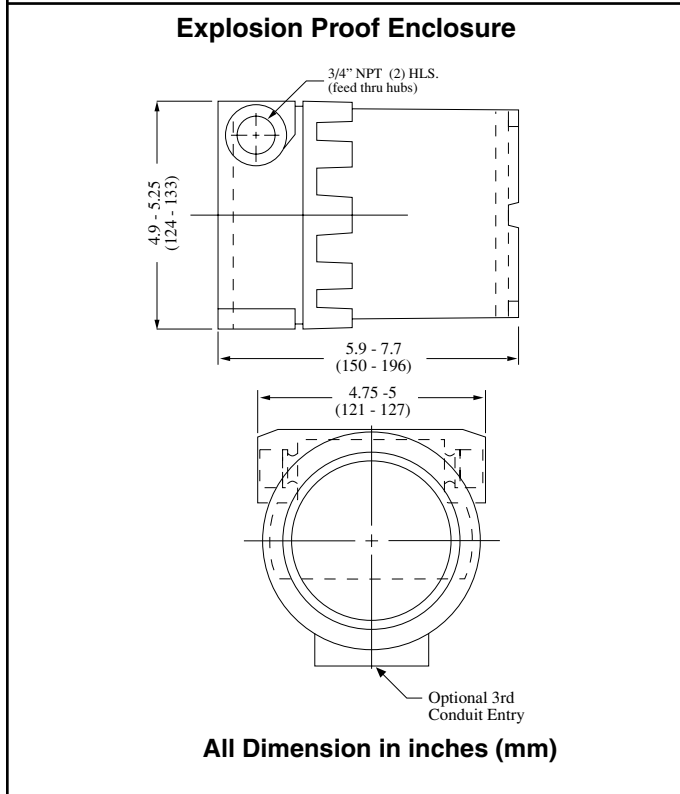
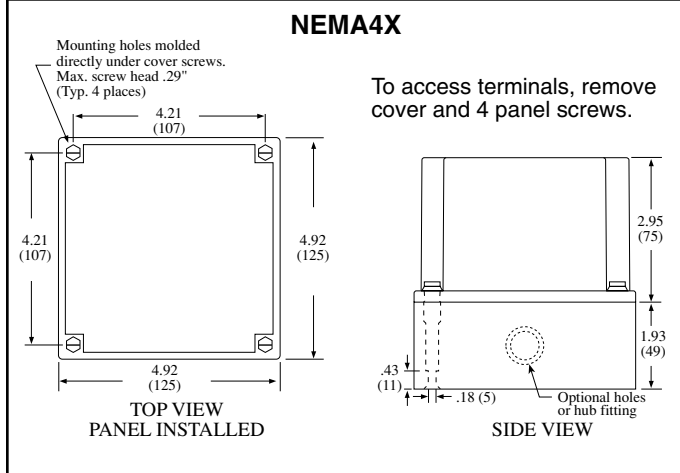
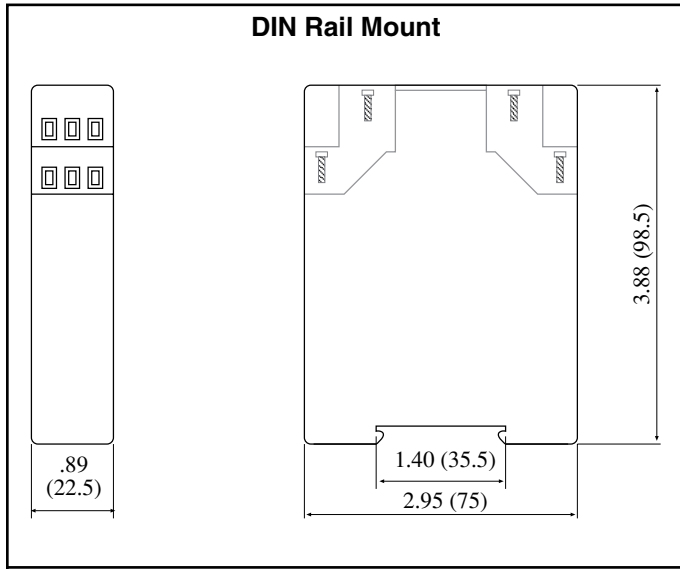
DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

NEMA 4X: 4.92" x 4.92" NEMA 4X Enclosure for wall mounting.

Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Listing: CE Compliant

Dimensions



Terminal Designations

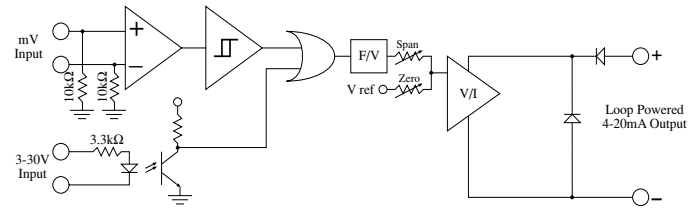
Standard Termination

- 1• Magnetic pickup
- 2• Magnetic pickup
- 3• Shield (common)
- 4• Opto-isolator In +
- 5• Opto-isolator In -
- 6• Shield (common)
- 7• Output +
- 8• Output -
- 9• Do Not Use

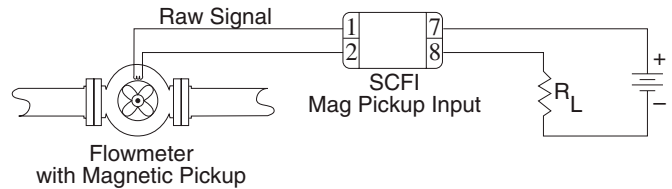
SCFI-X-L (low count speed) Termination

- 1• Do Not Use
- 2• Contact Input
- 3• Shield (common)
- 4• Opto-isolator In +
- 5• Opto-isolator In -
- 6• Shield (common)
- 7• Output +
- 8• Output -
- 9• Do Not Use

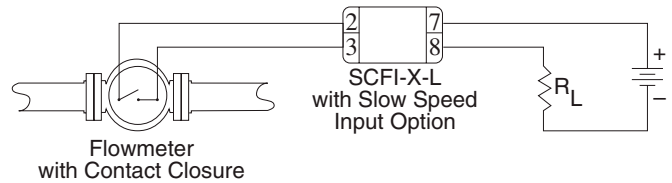
Simplified Block Diagram



**Typical Application
Magnetic Pickup Input**



**Typical Application
Contact Closure Input**



Ordering Information

Example	SC-FI	D	ET
Series	FI= Frequency to Current		
Mounting:	B= Nema 4X C= Explosion Proof D= DIN Rail		
Options:	ET= Extended Temp: -4° to 185°F (-20° to 85° C) L = Low Count Speed for Contact Closure Inputs T = Third 3/4" conduit entry for Explosion Proof Housing H2 = 0.875" Hole for NEMA4 mounting style HF2 = 0.5" Female NPT Hub fitting H3 = 1.125" Hole for NEMA4 mounting style HF3 = 0.75" Female NPT Hub fitting		

Accessories: (add to end of part number)
DR-4= 4" DIN Rail

SC-II SERIES

Current to Current Loop Powered Isolator

Features

- 4-20 mA Input (10-50 mA optional)
- 2-Wire, 4-20 mA Output (10-50 mA optional)
- Two Year Warranty
- Loop Powered
- Input & Output LED Indicators
- Various Mounting Styles



Description:

The SC-II loop powered isolator is a signal conditioner whose function is to provide a retransmitted, galvanically isolated 4-20 mA output signal in response to isolated 4-20 analog input.

The loop powered isolator may be applied in a similar manner as a conventional two wire transmitter.

The SC-II appears to the input loop as a series shunt resistor. A small sense resistor is used to measure the input current. The input loop derives its power from the input current loop.

This input current signal is then scaled and converted to a 0 to 10,000 Hz frequency signal by a Current to Frequency Converter. This frequency signal is then transmitted across an opto-isolator to the output stage.

The output stage derives its power from the output current loop. The output stage converts the 0-10000 Hz frequency signal into a current flowing in the output loop equal to that flowing in the input current loop.

The 10-50 mA range options are provided to enable the unit to perform range conversions as well as signal isolation.

Specifications:

Analog Input

Available Ranges: 4-20 mA (10-50 mA optional)

Input Type: Two Wire, Loop Powered

Equivalent Input Impedance: 525 Ω on 4-20 mA range
210 Ω on 10-50 mA range

Operational Range: 3.5-33 mA

Over Current Protection: 2.5 times rated span

Reverse Polarity Protection

Isolation Voltage: 500 V

Input Loop Indicator: LED illuminates when loop is powered by proper polarity

Analog Output

Accuracy: $\pm 0.10\%$ Span

Output Type: Two Wire, Loop Powered

Range: 4-20 mA (10 - 50 mA optional)

Compliance Voltage: 10 to 40 VDC

Loop Burden: < 10 VDC

Trim Controls: Zero & Span

Linearity: < $\pm 0.10\%$ Span

Output Voltage Effect: < $\pm 0.002\%$ Span/Volt

Temperature Effect: < 200 PPM/C°

Reverse Polarity Protected

Noise Content: < 0.2% Span

Overcurrent Limiting: 35 mA

Output Loop Indicator: LED illuminates when output loop is powered by proper polarity

Mounting Styles

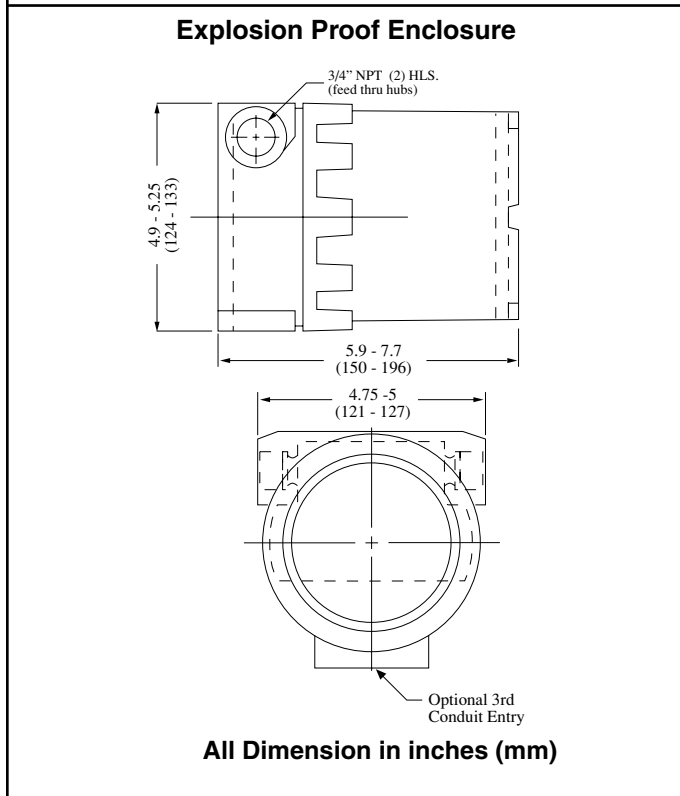
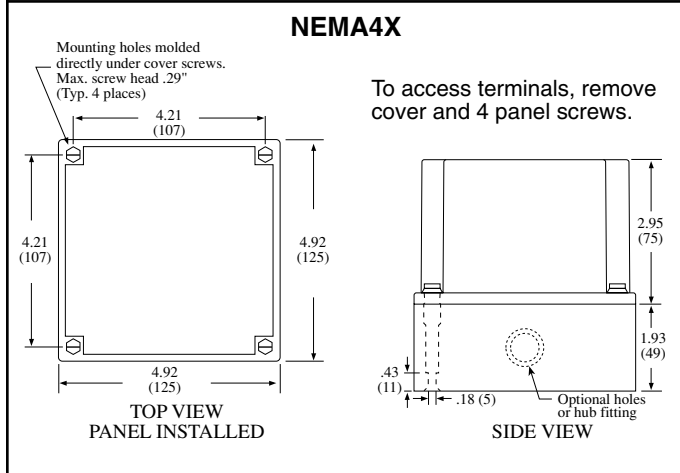
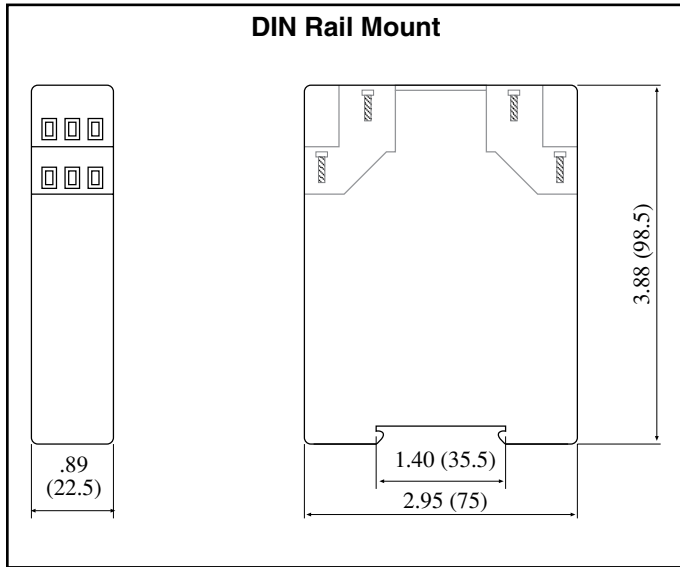
DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

NEMA 4: 4.92" x 4.92" NEMA 4 Enclosure for wall mounting.

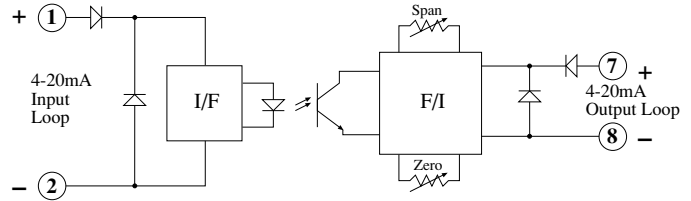
Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Listing: CE Compliant

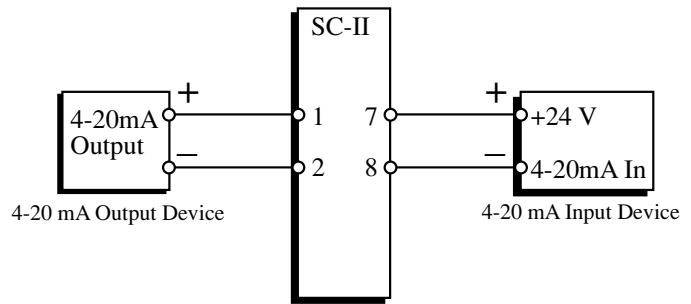
Dimensions



Simplified Block Diagram



Typical Wiring Hookup



Ordering Information

Example	SC-II	D	ET	
Series	II = Current to Current			
Mounting:	B = Nema 4X C = Explosion Proof D = DIN Rail			
Options:	ET = Extended Temp: -4° to 185°F (-20° to 85° C) T = Third 3/4" conduit entry for Explosion Proof Housing H2 = 0.875" Hole for NEMA4 mounting style HF2 = 0.5" Female NPT Hub fitting H3 = 1.125" Hole for NEMA4 mounting style HF3 = 0.75" Female NPT Hub fitting			
Accessories: (add to end of part number)	DR-4= 4" DIN Rail			

SC-IF SERIES

Current to Frequency Loop Powered Isolator

Features

- 4-20 mA Input (10-50 mA optional)
- 0 to 10 kHz Pulse Output
- Two Year Warranty
- Loop Powered
- Input & Output LED Indicators
- Various Mounting Styles



Description:

The SC-IF loop powered signal conditioner whose function is to provide a 0 - 10kHz frequency output signal in response to a 4-20mA analog input.

The SC-IF appears to the input loop as a series shunt resistor. A small sense resistor is used to measure the input current. The input loop derives its power from the input current loop.

This input current signal is then scaled and converted to a 0 to 10,000 Hz frequency signal by a Current to Frequency Converter. This frequency signal is then transmitted across an opto-isolator to the output stage.

The 10-50 mA range option is provided to enable the unit to perform range conversions as well as signal isolation.

Specifications:

Analog Input

Available Ranges: 4-20 mA (10-50 mA optional)

Input Type: Two Wire, Loop Powered

Equivalent Input Impedance: 525 Ω on 4-20 mA range
210 Ω on 10-50 mA range

Operational Range: 3.5-33 mA

Over Current Protection: 2.5 times rated span

Reverse Polarity Protection

Isolation Voltage: 500 V

Input Loop Indicator: LED illuminates when loop is powered by proper polarity

Pulse Output Option

Output Type: Open Collector Transistor

Low Cutoff: 1% of full scale

Range: 0 to 10,000 Hz

Duty Cycle: 50/50 Duty Cycle (nominal)

Maximum Off Voltage: 30 VDC

Minimum On Current: 10 mA

Maximum On Voltage: 1 VDC

Temperature Effect: Less than 200 ppm/degree C

Reverse Polarity Protection

Mounting Styles

DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

NEMA 4: 4.92" x 4.92" NEMA 4 Enclosure for wall mounting.

Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Listing: CE Compliant

SC-FF Series

Frequency to Frequency Pulse Isolator and Scaler

Features:

- Pulse Scaler with Isolation
- Pulse, Contact Closure or Magnetic Pickup Inputs
- Two Year Warranty
- Various Mounting Styles
- Output LED Indicator

Description:

The model SC-FF is a signal conditioner which permits the user to condition and scale the input pulses from a pulse producing sensor into a high level output where each pulse represents an engineering unit of measure.

Several pulse input types are supported including magnetic pickup, contact closure, and an isolated pulse input.

The pulse scaling permits a user to apply a scaling multiplier with a value of .0001 to .9999 with additional multipliers of 1, .1, .01, .001 and .0001. Pulse scaling is accomplished by rotary encoded and dip switch selections.

The pulse output is available in isolated, non-isolated and relay versions. User selections include output pulse duration and internal pullup resistors. The user may select his pulse output configuration by means of a dip switch.

The unit is powered to 8 - 35 VDC. Reverse polarity protection is provided. Power and Pulse input/output indicators are provided.

The unit is available in enclosures intended for either DIN rail, NEMA4X or Explosion Proof.

Specifications:

Pulse Input:

Isolated Pulse:

- Logic 1 (high): 3 - 30 VDC
- Logic 0 (low): 0-0.4 VDC
- Input Frequency Range: 0-10000 Hz
- Input Impedance: 3.3 k Ω
- Reverse Polarity Protection
- Isolation Voltage: 500 V

Contact Closure:

- Switch Debounce: 40 CPS maximum count rate
- 10000 ohm internal pullup to 5 VDC

Magnetic Pickup:

- Sensitivity: 30 mV p-p
- Bandwidth: 0-3500 Hz
- Over Voltage Protection to 30 VDC
- 10 Kohm input resistance



Pulse Output:

Pulse Duration: 50 uSec, 500 uSec 50 mSec (Switch selectable)

Open Collector Pulse:

- Maximum Voltage: 48 VDC
- Maximum Current: 100 mA @ .7V max
- Max. Output Speed: 10 kHz
- Reverse Polarity Protection
- Overcurrent Protection

Jumper selectable for 5 V and 24 V pulse output

Isolated Pulse:

- Maximum Voltage: 30 VDC
- Maximum Current: 10 mA
- Max. Output Speed: 1 kHz
- Isolation Voltage: 500 VDC
- Reverse Polarity Protected

Output Relay (optional):

- Contact Rating: 0.5 amps 240 VAC
- Output Form: Form A (SPST)
- Max. Output Speed: 10 KHz

Power Input:

- Input Voltage Range: 8.5 to 35 VDC
- Supply Current: 25 mA (nominal)
- Reverse Polarity Protection
- Transient Protection

Pulse Scaling:

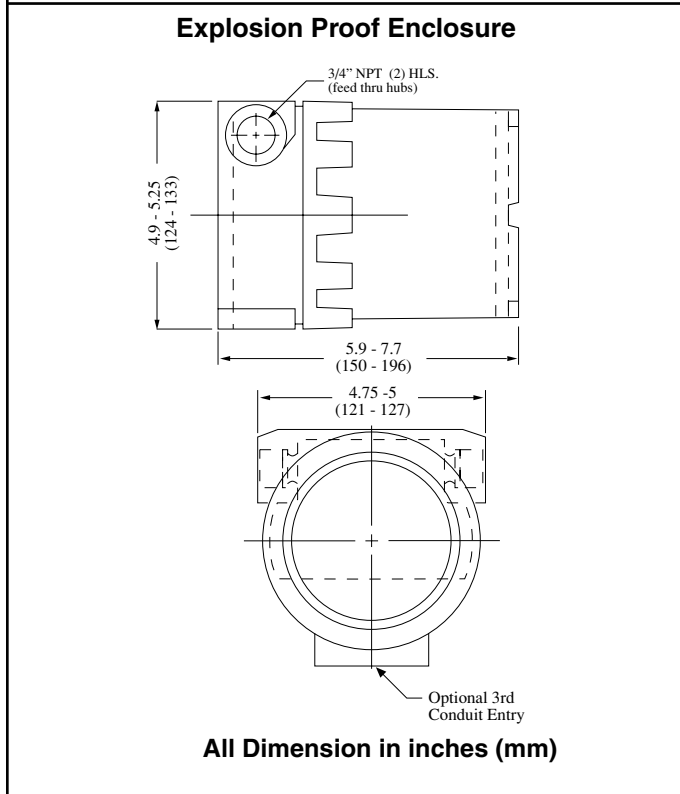
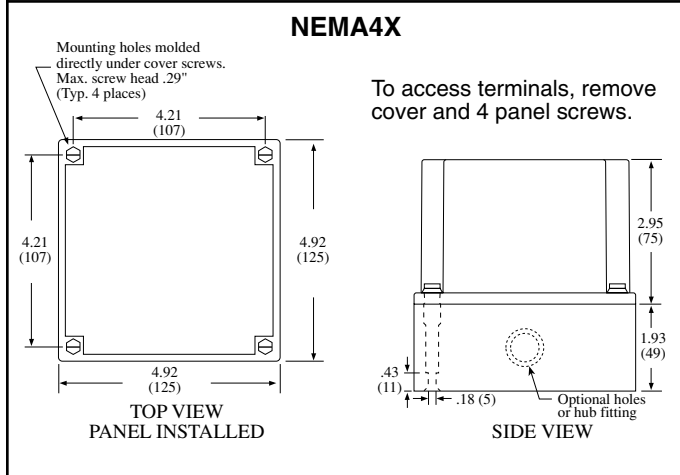
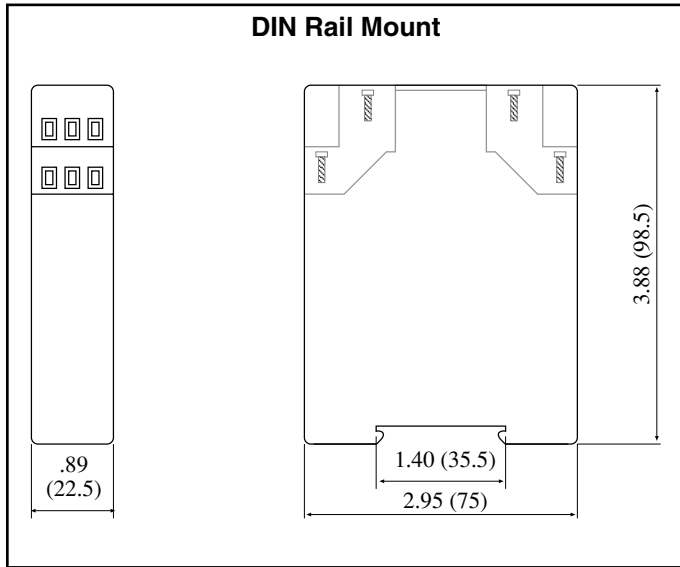
- Scaler: 0.0001 to .9999
- Multiplier: X1, X0.1, X0.01, X0.001, X0.0001

Mounting Styles

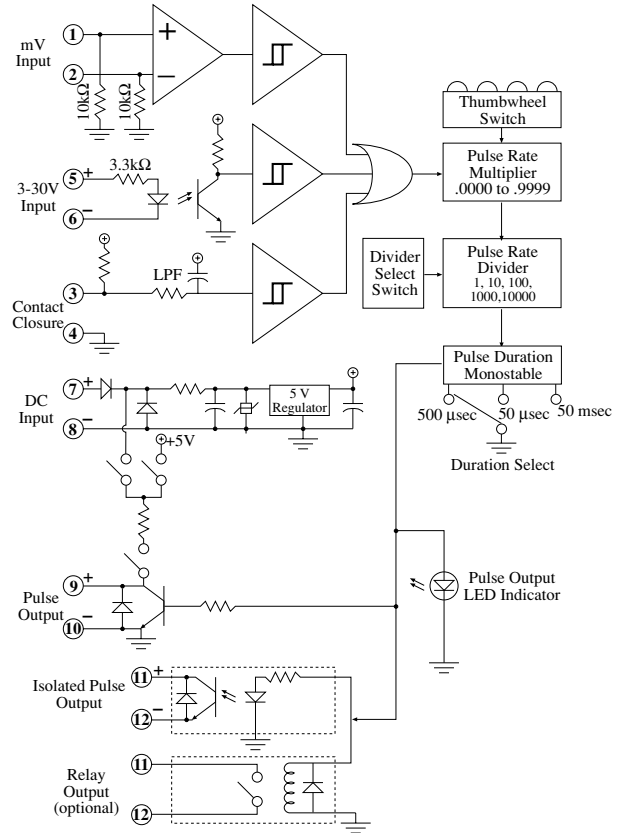
- DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.
- NEMA 4X: 4.92" x 4.92" NEMA 4X Enclosure for wall mounting.
- Explosion Proof: Aluminum enclosure for: Class I, Division 1, Groups B, C & D Class II, Division I, Groups E, F & G.

Listing: CE Compliant

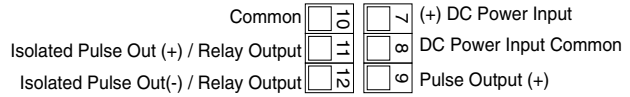
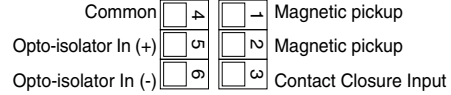
Dimensions



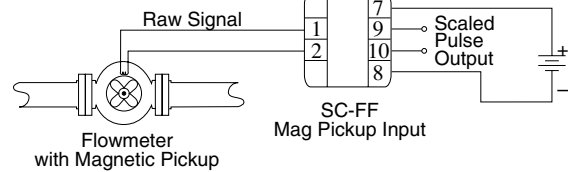
Simplified Block Diagram



Wiring:



Typical Application:



Ordering Information

Example	SC-FF	1	B	ET
Series	FF= Frequency to Frequency			
Output Type	1 = Open Collector & Isolated Pulse (STD) 2 = Open Collector & Relay Output			
Mounting:	B= Nema 4X C= Explosion Proof D= DIN Rail			
Options:	ET= Extended Temp: -4° to 185°F (-20° to 85° C) T = Third 3/4" conduit entry for Explosion Proof Housing H2 = 0.875" Hole for NEMA4 mounting style HF2 = 0.5" Female NPT Hub fitting H3 = 1.125" Hole for NEMA4 mounting style HF3 = 0.75" Female NPT Hub fitting			
Accessories: (add to end of part number)	DR-4= 4" DIN Rail			

AMP-1

Preamp & Signal Conditioner for Magnetic Pickups

Features:

- Ultra Low Speed to 15 kHz Operation.
- 20 mV to 50 V Sensitivity.
- 100 mA Current Sinking Output.
- 11 to 26 VDC Power Supply Range.
- Easy Mount Metal Housing.
- Screw Terminal Hookup.

Description:

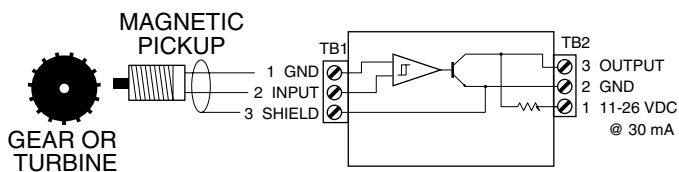
The KEP AMP 1 amplifies the low level signals from a magnetic pickup or flow transmitter by a factor of more than a hundred times to drive any ratemeter, counter or controller. The unit uses only 30 mA and operates from 11 to 26 VDC. It has a 2.7K pullup resistor attached to the open collector output and sinks a minimum of 100 mA to less than 1 V from a maximum of 26 VDC. It is mounted in a rugged 2" x 3" metal housing with screw terminals for easy installation. Operating temperature is 32 to 140° F (0 to 60° C).

Note: The low voltage line from the magnetic pickup to the AMP-1 should be less than 10 ft. in length, shielded and isolated from relays, solenoids or other sources of electrical noise (let the output line make the long run). If the input is too sensitive, lower the 1.1K input impedance by adding a 220 to 1K ohm resistor across TB1, pins 1 and 2, to increase noise immunity.

A special version, the AMP1-10k, is available with 10 kΩ impedance for use with turbine and paddle wheel flowmeters.

Listing: CE Compliant

Sample Hookup :



Ordering Information

Model

- AMP 1:** Standard unit
AMP-1-10k: AMP-1 with 10 kΩ input impedance
AMP-1-N: AMP-1 for Nemur Sensors

Options:

- E = Explosion Proof Housing (add E to end of part number)
 N4 = NEMA4 Housing (add N4 to end of part number)

AMP-1-N

Preamplifier & Signal Conditioners For NAMUR Sensors

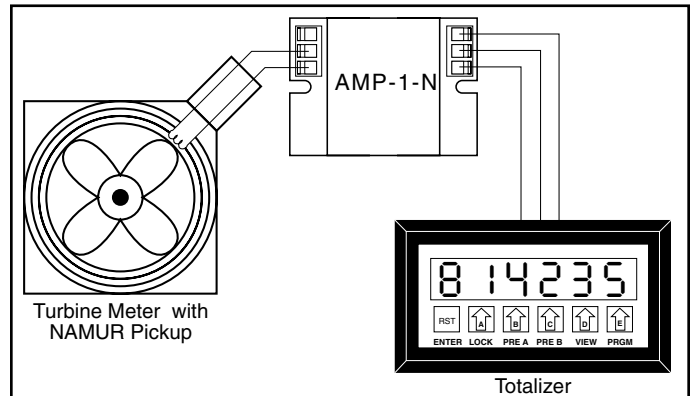
Features:

- NAMUR Compatible Sensitivity.
- 100 mA Current Sinking Output.
- 11 to 26 VDC Power Supply Range.
- Easy Mount Metal Housing.
- Screw Terminal Hookup.

Description

The KEP AMP-1-N powers and conditions the low level signals from NAMUR pickups, sensing gear teeth movement or flow, and provides a high level pulse output suitable to drive any KEP ratemeter, counter or controller.

Application



Specifications

Environmental

- Operating temperature: 32° to 140° F (0° to 60° C)
 Storage temperature: -40° to +85° C
 Humidity: 0 - 95% non-condensing

Power Input

- Power requirement: 11-26VDC; 30mA maximum
 Sensor Supply: 8VDC ± 1 VDC

Input Characteristics

- Input impedance: 1000 ohm nominal
 Input frequency : 0 - 10kHz
 Input current: High: > 3mA
 Low: < 1 mA

Output Characteristics

- Output Type: Open collector with internal 2700 ohm pull-up resistor to supply voltage.
 Max. sink current: 100mA sink to 1V or less

Approvals:

- CE approved; Light Industrial
 Fast transient: 500V (capacitive clamp)
 EMI: No effects at 3V/m
 ESD: 8kV (case grounded)

AMP-2

Features:

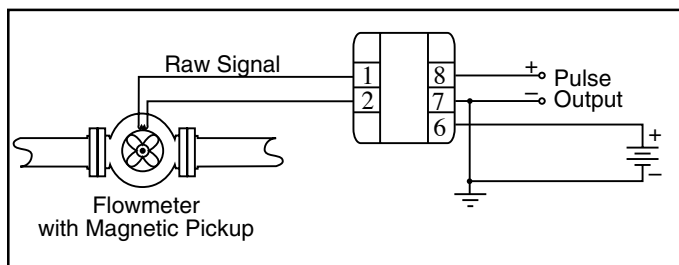
- Ultra Low Speed to 4 kHz Operation.
- 10 mV Sensitivity.
- High Level DC Voltage Pulse Output.
- 8.5 to 30 VDC Power Supply Range.
- Explosion Proof Housing.
- Screw Terminal Hookup.
- Explosion Proof, NEMA4 Wall Mount and Circuit Board Mounting Options

Description:

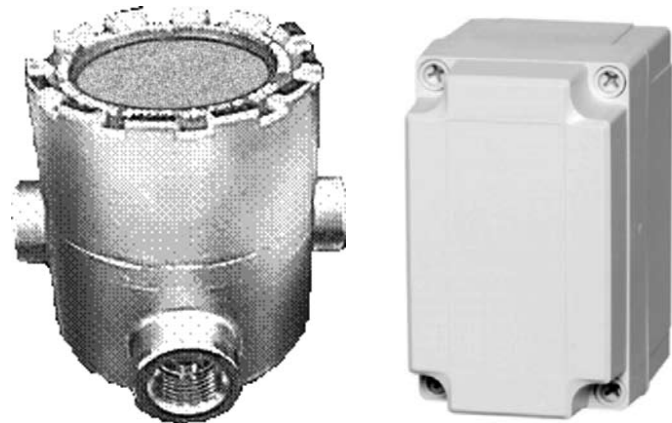
The KEP AMP-2 is a two channel amplifier for use with magnetic pickups. It amplifies and squares the low level signals from a magnetic pickup to drive any ratemeter, totalizer or controller. The unit operates from 8.5 to 30 VDC. It has a 10K pullup resistor attached to the open collector output and sinks a minimum of 20 mA to less than 1 V from a maximum of 30 VDC. It is available in OEM (PC board only), NEMA4X enclosure or in a rugged explosion proof housing with screw terminals for easy installation. Operating temperature is -40° to 65°C.

Note: The low voltage line from the magnetic pickup to the AMP-2 should be less than 10 ft. in length, shielded and isolated from relays, solenoids or other sources of electrical noise (let the output line make the long run). If the input is too sensitive, lower the 10K input impedance by adding a 1K ohm resistor across TB1, pins 1 and 2, 4 and 5 to increase noise immunity.

Typical Application:



Dual Preamp & Signal Conditioner for Magnetic Pickups



Specifications:

Environmental:

TEMPERATURE: -40° to 65°C

HUMIDITY: 0-95% Noncondensing

Power Input:

Input Voltage Range: 8.5 to 30 VDC

Supply Current: 25 mA (nominal)

Reverse Polarity Protection

Transient Protection: Surge Suppression Clamp at 36V

Magnetic Pickup:

Sensitivity: 10 mV p-p

Bandwidth: 0-4000 Hz

Over Voltage Protection to 30 VDC

10 Kohm input resistance

Type: Differential Preamplifier

Pulse Output:

Maximum Voltage: DC Input

Maximum Current: 100 mA @ .7V max

Reverse Polarity Protection

Overcurrent Protection

Surge Suppression Clamp at 36V

Listing for Ex-Proof Option:

CSA for Canada and USA

Class I Division 1 Groups B,C,D

Class II Division 1 Groups E,F,G

Class III

Enclosure: Type 4X

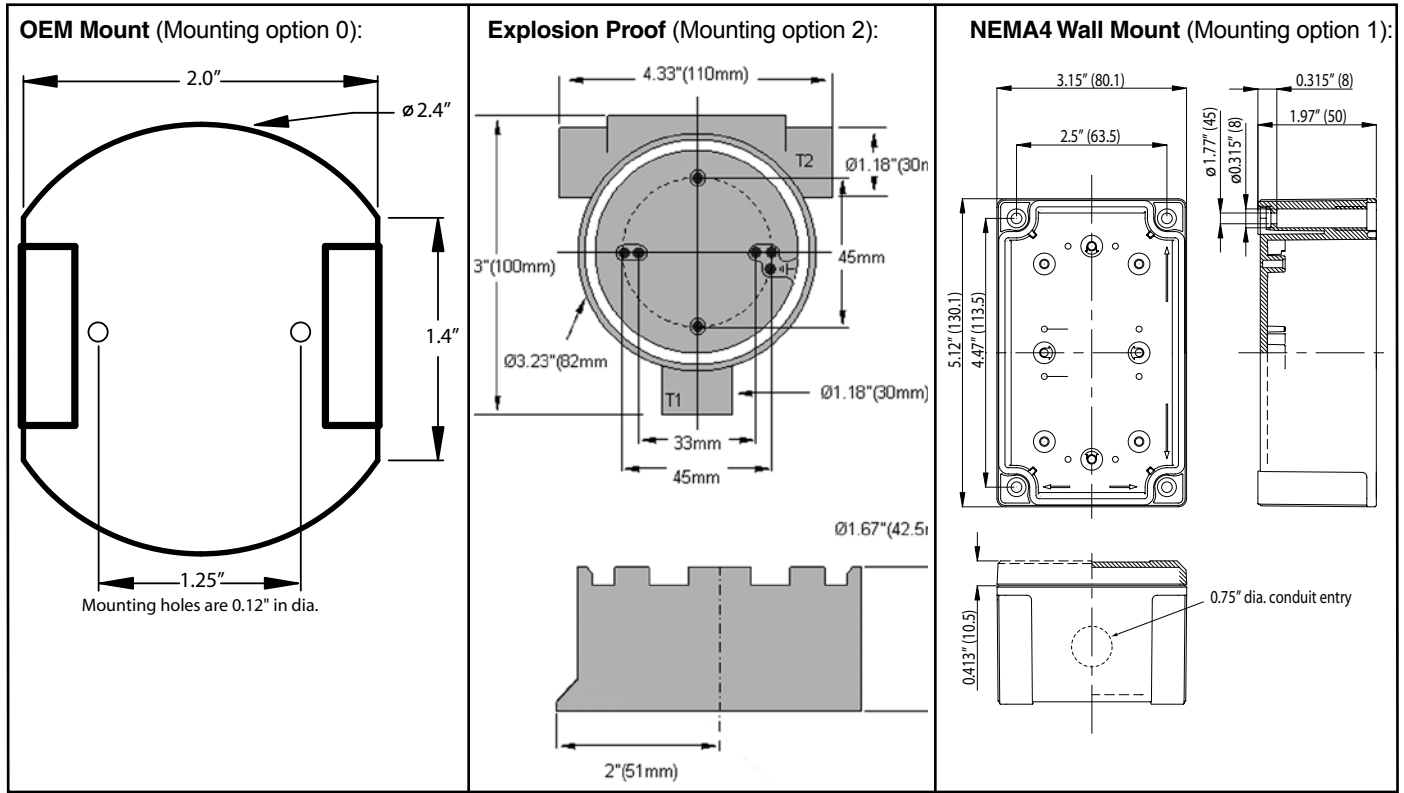
Enclosure:

0- OEM No Enclosure; for use in OEM mounting applications

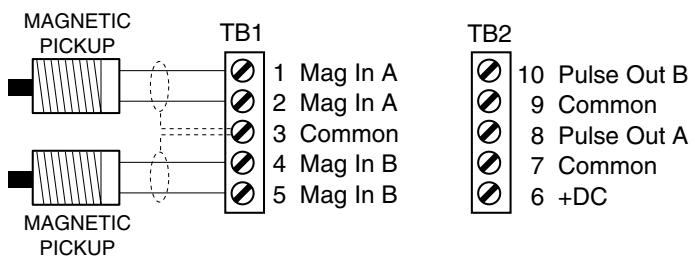
1- Ex Proof (FM/CSA), NEMA 4X, Die Cast Aluminum, 3 Port Instrument Housing With Blind Cover

2- NEMA4 NEMA 4X Wall Mount Enclosure

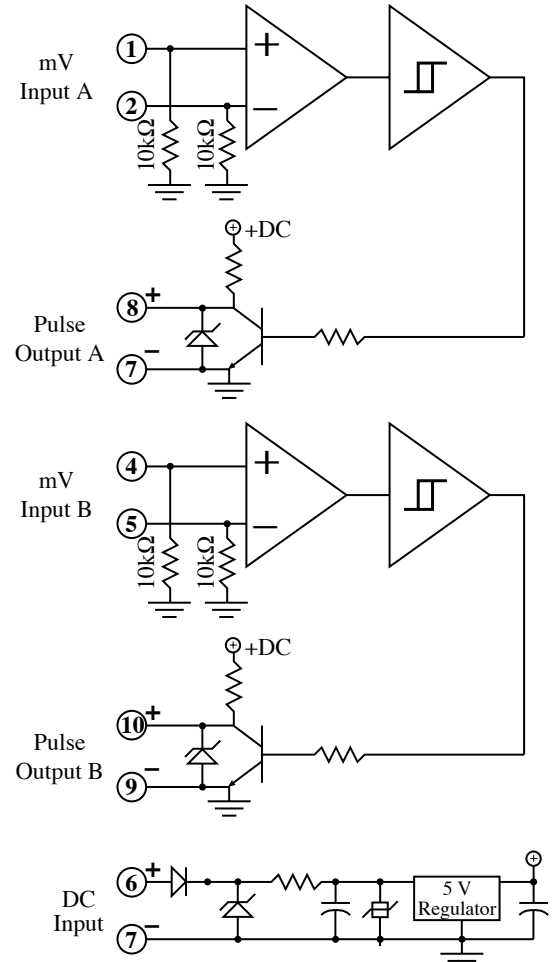
Dimensions:



Wiring:



Simplified Block Diagram



Ordering Information

EXAMPLE: AMP2 2

Series: _____

Mounting: _____

- 0 = OEM (board only)
- 1 = NEMA 4X Box
- 2 = Explosion Proof Housing

Accessories:

- TFM-MK -1 = Turbine Flow meter Mounting Kit for flow meters with a 1" Mle NPT riser
- TFM-MK -3/4 = Turbine Flow meter Mounting Kit for flow meters with a 3/4" Male NPT riser
- CA-TM-2-18-FL = 18" Turbine Flow meter Cable Assembly
- HF3 = 0.75" Female NPT Hub fitting for NEMA 4X style

Process, Level, Temperature Monitors Tutorial

What is a Process Indicator? This is a general purpose instrument that is intended to condition the electrical signal generated by a process sensor and scale the resulting information into a display in the units of measure desired by the end user. Additional, functionality such as alarms, analog output, and serial communications may also be provided. See the figure below for a typical system configuration.

What capabilities should I look for to assure compatibility with my type of sensor? Indicators are available to work with most process sensor types and most common electrical signals produced by these sensors. Some are termed "universal" and operate with many sensor types. Begin by selecting an instrument(s) that will work with the signal provided by the type of sensor you are considering. In some cases an amplifier or signal conditioner may be necessary. Next, decide on whether linearization or other forms of compensation will be required within the Indicator and on how the calibration will be represented within the instrument. Also determine if the Process Indicator can provide the power required for the sensor (if needed).

What are some basic areas of concern? Most customers begin selecting an indicator by looking for an instrument that will display the type of information that they prefer. It must work with the available power and must be available in a package that can be mounted in the desired location.

What is an analog output and why is it used? Process information is usually sent from one system to another as a 4-20mA. Some instruments permit the user to select what item of information is to be sent on the analog output. The corresponding span is user programmable. Additional features may include programmable damping.

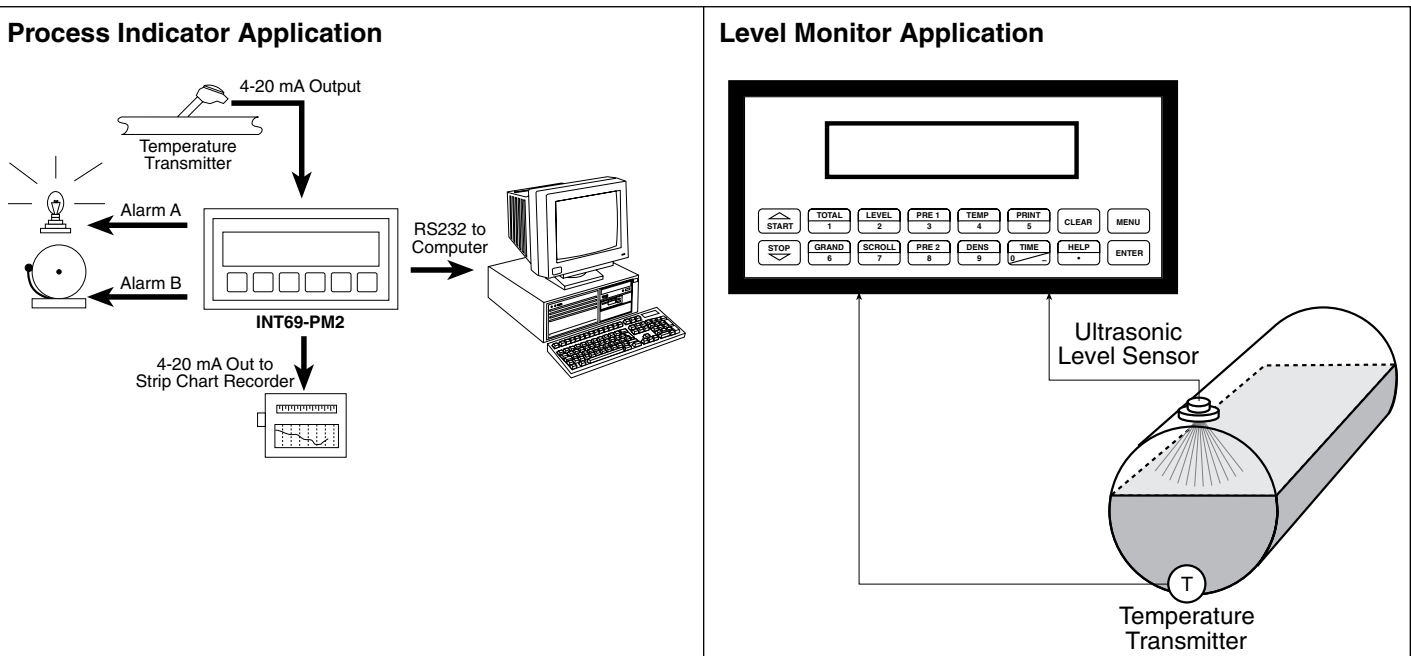
What is an alarm output and why is it used? Relays are often used as controls to activate alarms. An alarm will usually include a provision for setting the alarm point. Additional features may include a programmable delay before the alarm will activate, programmable alarm duration, and/or a programmable alarm hysteresis.

What are remote inputs and how are they used? Often there is a need to connect a remote switch near the operator for such purposes as remote alarm reset, or remote print. Some process indicators offer a variety of capabilities as remote inputs.

What is serial communications and why is it used? Serial communications is used to transmit information between two computers, or between a computer and a printer. There are several commonly used standard hardware interfaces. These include RS-232, RS-422 and RS-485. There are also a variety of communication protocols, or message formats, which are used. Some of these protocols are unique to an equipment manufacturer while others are industry standards. See also "Communication Solutions" section.

What are other areas of concern? Many areas where process indicators are installed are out of doors or are in hazardous areas. Special purpose enclosures are available for many instruments subject to these harsh conditions.

Typical Applications



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



- Two Button Programming
- 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

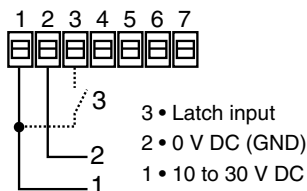
Control inputs: High: 4-30 V DC, Low: 0-2 V DC
 Supply current: 1 mA
 Supply line: 2-wire: max 20 Ω, programmable 3-wire, 4-wire: max 20 Ω, no balancing required
 Temp. ranges: Pt100 acc. to DIN IEC 751:
 -199.9 °C to +850.0 °C
 -327.8 °F to +1562.0 °F
 Ni100 acc. to DIN 43760:
 -60.0 °C to +250.0 °C
 -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

Ordering Information

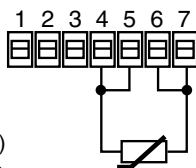
Order #:
 531 = Temperature Display with RTD Input
Accessories:
 E200 - Outdoor Enclosure (see Accessories section)

Wiring:

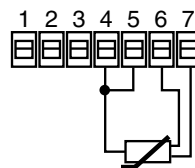
Power Supply



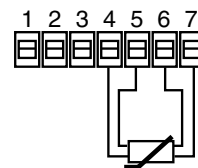
2-Wire RTD



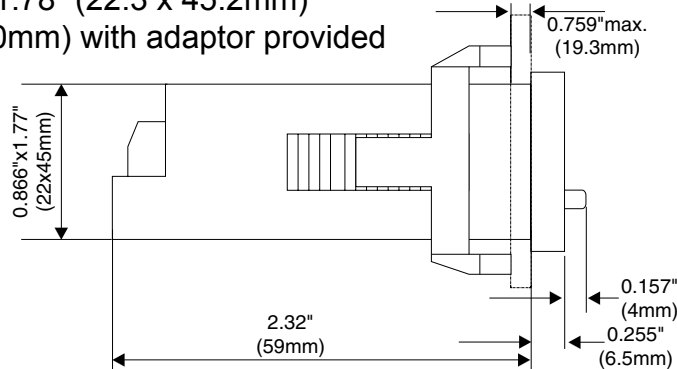
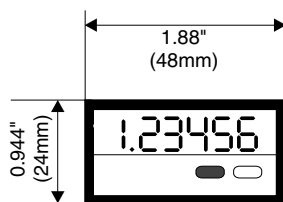
3-Wire RTD



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



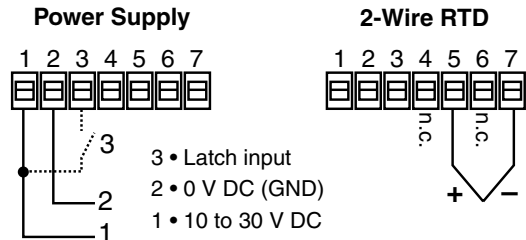
- J, K, N Thermocouples with External or Internal Cold Junction Compensation
- Two Button Programming

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

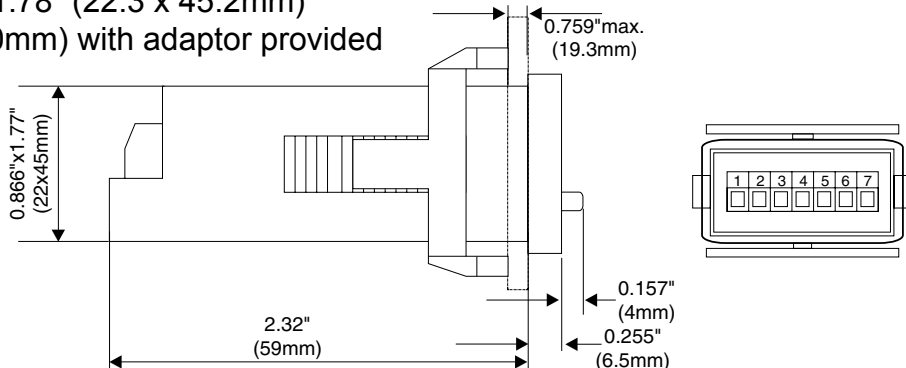
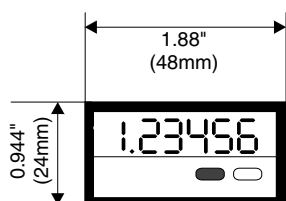
Wiring:



Ordering Information

Order #: 532 = Temperature Display with thermocouple Input
 Accessories: 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-550 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%, 30 mA
90..260 VAC: 24 VDC \pm 15%, 50 mA and 10 VDC \pm 2%, 30 mA
- Hum eliminator (50/60 Hz user selectable)
- Serial interface allows reading of the measured values and set-up programming.

TP554 Specifications:

Process controller for thermocouples, resistance thermometers and sensors with mV range; two preset limit values

Display range: -19.999..99.999

Input ranges:

- 0..400 Ω , 0..4000 Ω
- 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

Set Points: 2 programmable limit values (TP551; unit without presets, has only 2 buttons)

Outputs: Two (2) SPDT relays (250 VAC / 3A)

Hysteresis: Programmable hysteresis (on, off, on/off)

Reset: 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.

Measurement ranges

Thermocouples	Ranges	Accuracy
Type B	400,0 °C ... 1820,0 °C	\pm 1,5 °C
E	-200,0 °C ... 1000,0 °C	\pm 0,5 °C
J	-210,0 °C ... 1200,0 °C	\pm 0,5 °C
K	-200,0 °C ... 1372,0 °C	\pm 0,5 °C
N	-200,0 °C ... 1300,0 °C	\pm 0,5 °C
R	-50,0 °C ... 1760,0 °C	\pm 1,0 °C
S	-50,0 °C ... 1767,0 °C	\pm 1,0 °C
T	-210,0 °C ... 400,0 °C	\pm 0,5 °C

Resolution 0,1 °C (0,1 °F)

Cold-junction compensation internal or external (programmable)

Input for resistance thermometers (RTD probes)

Resistance thermometer Type	Ranges	Accuracy
Pt100	-200,0 °C ... 800,0 °C	\pm 1,0 °C
Pt1000	-200,0 °C ... 800,0 °C	\pm 1,0 °C

Resolution 0,1 °C (0,1 °F)

Type 2 wire, 3 wire and 4 wire technology, programmable

Current 800 μ A at Pt100; 80 μ A at Pt1000

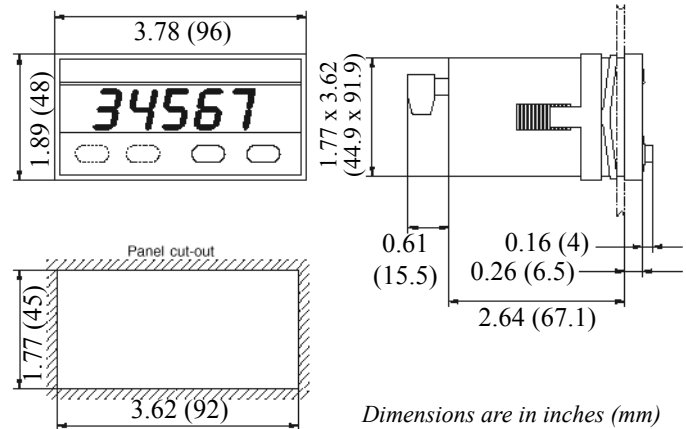
Temperature:

Ambient: -10°C ... +50°C

Storage: -20°C ... +70°C

Humidity: RH <75%, Noncondensing

Dimensions



Dimensions are in inches (mm)

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

Flow Instruments
PROCESS & LEVEL MONITORS

Electrical Connections

TB1

- 1 Measuring input 1 (Sense)
- 2 Measuring input 2 (- Ref)
- 3 Sensor (+Ref)
- 4 Current output for 0 .. 4000 Ω (+ Sense)
- 5 Current output for 0 .. 400 Ω (+ 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)

TB2

- 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)

TB3

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

Resistance measurements

(0 .. 400/4000 Ω or Pt 100/1000)

2 wire measurement (measuring resistance 0 .. 400/4000 Ω)
NOTE: Not recommended for long runs.

- Measuring input 1 (Sense) • 1
- Measuring input 2 (- Ref) • 2
- Sensor (+Ref) • 3
- Current out for 0 - 4000 Ω/Pt 1000 (+ Sense) • 4
- Current out for 0 - 400 Ω/Pt 100 (+ Sense) • 5
- Keys locking • 6
- Reference ground Reset / Key • 7
- Reset • 8
- GND for DC Output (Pins 10 & 11) • 9
- +10 VDC Out (30 mA) • 10
- +24 VDC Out (50 mA) (AC units only) • 11

3 wire measurement (measuring resistance 0 .. 400/4000 Ω)
NOTE: Jumper 1 & 2 at meter, wires 3 & 4 must go to sensor

- Measuring input 1 (Sense) • 1
- Measuring input 2 (- Ref) • 2
- Sensor (+Ref) • 3
- Current out for 0 - 4000 Ω/Pt 1000 (+ Sense) • 4
- Current out for 0 - 400 Ω/Pt 100 (+ Sense) • 5
- Keys locking • 6
- Reference ground Reset / Key • 7
- Reset • 8
- GND for DC Output (Pins 10 & 11) • 9
- +10 VDC Out (30 mA) • 10
- +24 VDC Out (50 mA) (AC units only) • 11

4 wire measurement (measuring resistance 0 .. 400/4000 Ω)
NOTE: All 4 wires must go to sensor

- Measuring input 1 (Sense) • 1
- Measuring input 2 (- Ref) • 2
- Sensor (+Ref) • 3
- Current out for 0 - 4000 Ω/Pt 1000 (+ Sense) • 4
- Current out for 0 - 400 Ω/Pt 100 (+ Sense) • 5
- Keys locking • 6
- Reference ground Reset / Key • 7
- Reset • 8
- GND for DC Output (Pins 10 & 11) • 9
- +10 VDC Out (30 mA) • 10
- +24 VDC Out (50 mA) (AC units only) • 11

Thermocouples

Negative leg of thermocouple
Positive leg of thermocouple

NOTE: For accurate readings, use only leads of same type thermocouple wire without junctions to dissimilar metals.

- Measuring input 1 (Sense) • 1
- Measuring input 2 (- Ref) • 2
- Sensor (+Ref) • 3
- Current output for 0 .. 4000 Ω (+ Sense) • 4
- Current output for 0 .. 400 Ω (+ Sense) • 5
- Keys locking • 6
- Reference ground Reset / Key • 7
- Reset • 8
- GND for DC Output (Pins 10 & 11) • 9
- +10 VDC Out (30 mA) • 10
- +24 VDC Out (50 mA) (AC units only) • 11

Voltage measurement (0 to 100mV or -100 to +100mV)

+/- Measuring input
Reference ground

- Measuring input 1 (Sense) • 1
- Measuring input 2 (- Ref) • 2
- Sensor (+Ref) • 3
- Current output for 0 .. 4000 Ω (+ Sense) • 4
- Current output for 0 .. 400 Ω (+ Sense) • 5
- Keys locking • 6
- Reference ground Reset / Key • 7
- Reset • 8
- GND for DC Output (Pins 10 & 11) • 9
- +10 VDC Out (30 mA) • 10
- +24 VDC Out (50 mA) (AC units only) • 11

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KEP Kessler-Ellis Products • 800-631-2165

Intellect-69PM2

Process Monitor with Analog Inputs

Features

- Analog Input 0-20 mA, 4-20 mA
0-5V, 0-10V or 1-5V
- Display Rate, Pressure, Level, Temperature,
Watts, etc., Peak & Valley
- Calibration, High and Low Values (-9999 to
49999) Fully Programmable Through Keypad
- NEMA 4X / IP65 Front
- +24V Output for Peripherals
- 16 Bit A/D Resolution
- 2 Form C SPDT Relays (optional)
- 2 Levels of Operator Password Lockout

Application:

Any process monitoring application where two set points and scaling are needed.

Description:

Featuring 4^{1/2} digits of bright, 7-segment LED displays, the Intellect-69PM2 is a process monitor which accepts analog signal inputs. The unit can be field programmed to accept 0-20mA, 4-20mA, 0-5V, 0-10V or 1-5V signals. Two assignable set points are standard for high/low alarm outputs. The high and low scaling settings (-9999 to 49999) are programmable from the front panel. By pressing the "view" button, the unit will display: process reading, peak or valley. Press the lock button once to freeze the display, press it again to resume normal operation. Press the lock button 4 times quickly to enter lock code for panel lockout. RS-232, RS-422 and 4-20mA analog out are available options for interfacing to a host computer or strip chart recorder.

Specifications:

Display:

4^{1/2} digit, .55" high, 7 segment, red orange, LED.

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

Current: 300 max. mA DC or 10.0 VA (10W) at rated AC voltage.

Output Power:

(AC powered units only) + 24VDC @ 50mA regulated \pm 5%. (100 mA available on request)

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 displayed value and control outputs.

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.

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

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 or panel.

Set Points: Two control set points are provided. The unit comes standard with two open collector control outputs. Two 5 Amp, Form C relays are optional. The outputs have a programmable alarm range from -9999 to 49999 with hysteresis.

Process Display: Updates 4 times per second, Accurate to 4.5 digits.

Programming: Decimal points, Scaling from -9999 to 49999, set points, input type and security 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.

Overvoltage Protection: 50 V

Over-current Protection: 50 mA

Temperature Stability: Will not drift more than 10 parts per million per °C from 0°C to 54°C

Accuracy: .1% (5 V inputs .16%)

Listing: CE Compliant, CSA (File No. LR91109), NRTL/C pending

Typical Hookups:

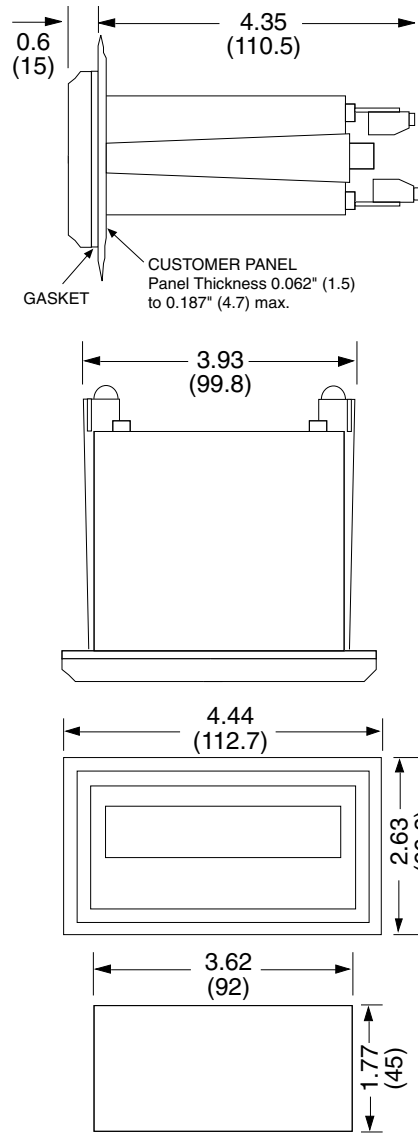
2-Wire 4-20mA Transmitter

3-Wire 0-10V Transmitter

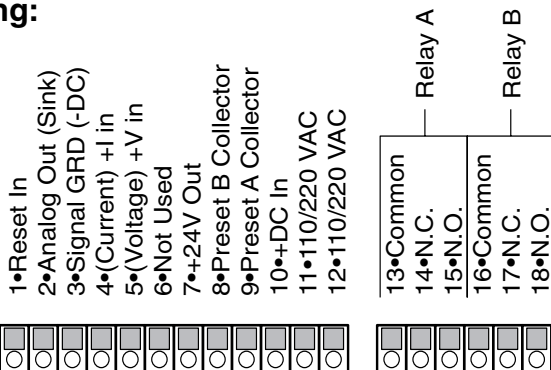
2-Wire 4-20mA Transmitter with Analog Output

Relay Output

DIMENSIONS:



Wiring:



Ordering Information

EXAMPLE: INT69PM2 A 1 A

Series _____
 INT69PM2= Process Monitor

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

Control outputs _____
 1= 2 - Open Collector Outputs
 2= 2 - 5 Amp Form C Relays

Options (multiple options available) _____
 A= Analog Output (4-20mA)
 C1= RS232 Communications
 C2= RS422 Communications
 CSA: CSA Approved Unit

Accessories
 Separate non keyboard panel order #34235
 Separate keyboard panel - order #34234
 Serial printer available, see P1000, P295
 Ethernet Port Server available, see IEPS
 RS-422/485 to RS-232 Communication Adaptor available, see CA285
 XHV Explosion Proof Housing (see Accessories)
 NEMA-1/8DIN NEMA 4 wall mount enclosure (see Accessories)

Squirt-R

Loop Powered Indicator

Features

- Linear or Square Root Extraction of Input
- 3 1/2 or 4 1/2 Digit Display (Selectable)
- Calibration, High and Low Values Fully Programmable Through Keypad
- NEMA 4X / IP65 Front
- No Dipswitches or Pots to Adjust
- 16 Bit A/D Resolution
- Password Protection of Menu

Description:

Featuring up to 4 1/2 digits of display, the Squirt-R is a loop powered indicator capable of accepting either linear or square root 4-20 mA inputs. Numeric password protection prevents unauthorized access to the menu. The easy-to-read menu prompts make the Squirt-R so easy to program that you will feel comfortable programming it without the use of a manual.

Specifications:

Power:

Loop powered 4-20 mA

Internal Battery (Setup memory storage only):

3 V 250 mA-H Lithium (2 yr. Standby life)

Display:

Display: (selectable decimal)

3.5 or 4.5 Digits (selectable), 0.35" High, Display updates once every two seconds.

Rate Descriptors: /SEC, /MIN, /HR or "blank"

Units Descriptors: GAL, LIT, FT3, M3, "blank"

Low Battery Error Detection: "BAT" descriptor & flashing display

Under/Over range Indication: Display flashes when out of range

Environmental:

OPERATING TEMPERATURE

-4°F (-20°C) to + 158°F (70°C)

Extended Temp: -22°F (-30°C) to + 158°F (70°C)

HUMIDITY

0 - 90% Noncondensing

Listing: CE Compliant



Accuracy: (Indication @ 20°C)

0.1% Full Scale Resolution

Temperature Drift:

50 ppm/°C Typical

200 ppm/°C Worst Case

Lockout:

Password: Unauthorized menu changes can be prevented by entering a user selectable password (5 digit number).

Jumper: An internal jumper shunt is provided for a "sealed" menu lockout. Install the jumper to enable the lock.

Inputs:

Signal Input:

Full Scale Range: 4 to 20 mA DC

Loop Voltage Drop: 6 Volts Maximum

Reverse Polarity Protected

Over Current Protection to 60 mA

16 Bit resolution; 1 sample every 2 seconds

Low Cutoff supplied to inhibit indications at low flow rates.

Calibration & Operation:

Input Scaling: Via front keypad

Calibration: Via front keypad

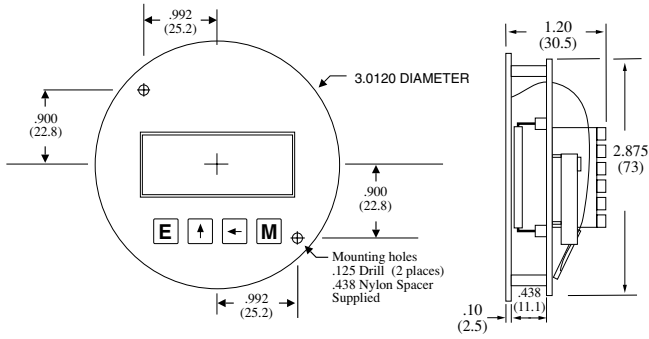
Decimal Point: Via front keypad

Keypad: 4 tactile feedback keys

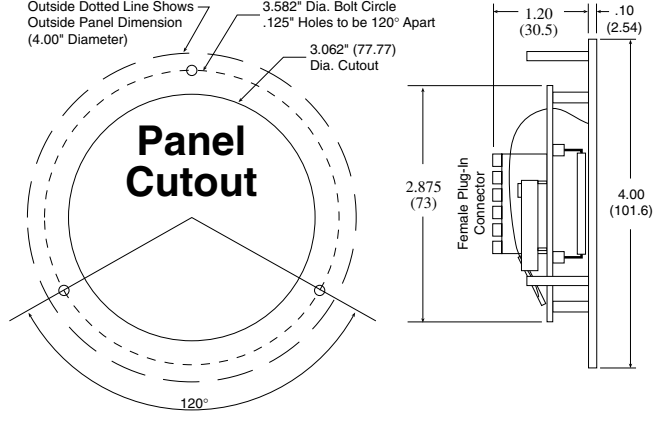
Mounting Styles:

- | | |
|----------------------|---|
| 0- Circuit Board - | OEM option (consult factory) |
| 1- Panel Mount - | NEMA 4X Clear Front |
| 2- Wall Mount - | NEMA 4X Enclosure (unit mounted behind clear cover) |
| 3- Explosion Proof - | Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G |
| 5- Wall Mount - | NEMA 4X with keypad mounted outside opaque cover |

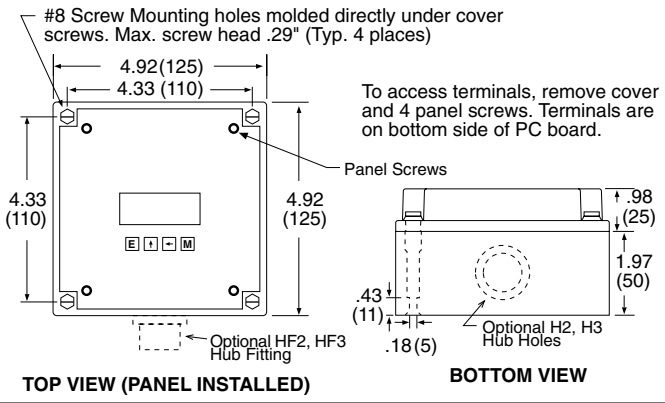
SquirrR-0



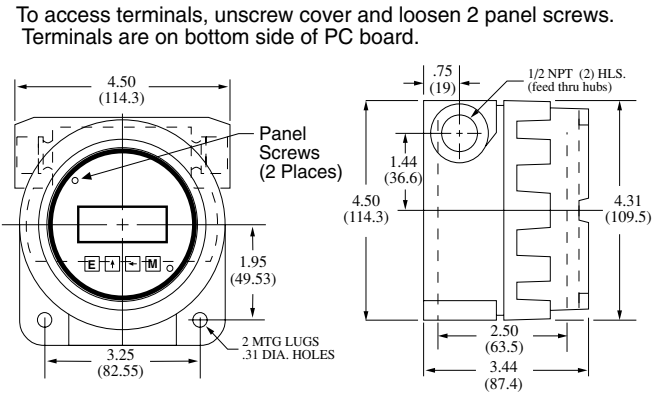
SquirrR-1



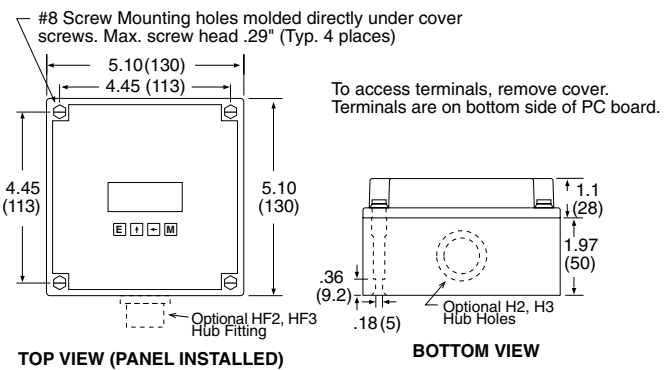
SquirrR-2



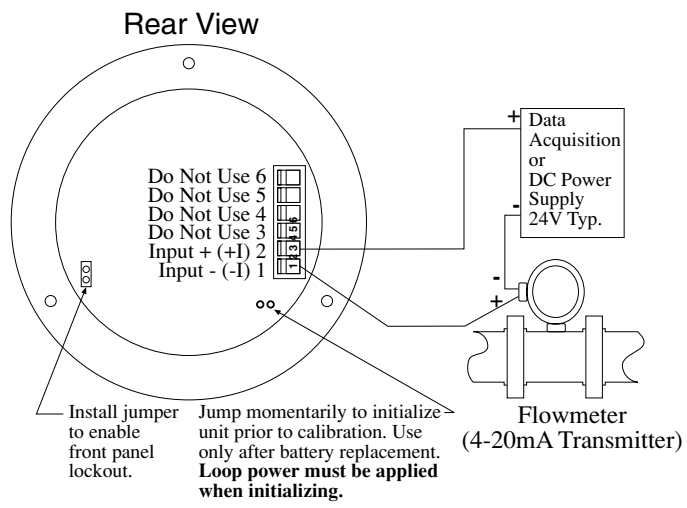
SquirrR-3



SquirrR-5



Typical Wiring: (2-Wire Transmitter)



Ordering Information

Example: SQUIRTR 3 ET

SQUIRTR _____

Loop powered; Rate Only

Mounting: _____

0 = OEM

1 = Panel Mount

2 = NEMA 4X Box (Squirr behind clear cover)

3 = Explosion Proof Housing

5 = NEMA 4X Box (Squirr outside opaque cover)

Options: _____

ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)

H2 = 0.875" Hole for mounting styles 2 and 5

HF2 = 0.5" Female NPT Hub fitting for mounting styles 2 and 5

H3 = 1.125" Hole for mounting styles 2 and 5

HF3 = 0.75" Female NPT Hub fitting for mounting styles 2 and 5

LEVELtrol II

Multi-Function Level Indicator, Controller & Batcher

Features

- Level and Tank Volume/Mass Indicator
- Batching by Level
- Level Control, Tank Volume, Corrected Volume and Mass Calculations
- Menu Selectable Hardware & Software Features
- Two Line LCD or VFD Display
- Isolated Outputs Standard
- RS-232 Port Standard, RS-485 Optional Windows™ Setup Software
- DIN Enclosure with Two Piece Connectors
- DDE Server & HMI Software Available
- NEW! - Attractive Wall Mount Enclosure



Description:

The LEVELtrol II Flow Computer satisfies the instrument requirements for a variety of level sensor types in liquid applications. Multiple tank geometries, fluid equations and instrument functions are available in a single unit with many advanced features.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling are supported

The versatility of the LEVELtrol II permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/output while configuring the instrument. Consider the following illustrative examples.

The isolated analog output can be chosen to follow level, tank volume, corrected tank volume, tank mass, temperature, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for data logging, transaction printing, or for connection to a modem for remote meter reading.

Specifications:

Environmental

Operating Temperature: 0°C to +50°C
Storage Temperature: -40°C to +85°C
Humidity: 0-95% Non-condensing
Materials: U.L. approved

Listing: UL/C-UL Listed (File No. E192404), CE Compliant

Display

Type: 2 lines of 20 characters
Types: Backlit LCD and VFD ordering options
Character Size: 0.3" nominal
User programmable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad
Number of keys: 16

Enclosure

Style: See Ordering Code for Available Mounting Options
Size: See Dimensions
Depth behind panel: 6.5" including mating connector
Type: DIN
Materials: Plastic, UL94V-0, Flame retardant
Bezel: Textured per matt finish

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.

110 VAC Power Option: 85 to 127 Vrms, 50/60 Hz

220 VAC Power Option: 170 to 276 Vrms, 50/60 Hz

DC Power Option:

12 VDC (10 to 14 VDC)

24 VDC (14 to 28 VDC)

Power Consumption

AC Power: 11.0 V/A (11W)

DC Power: 300 mA max.

Level Inputs:

Analog Input:

Accuracy: 0.01% FS at 20° C

Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Basic Measurement Resolution: 16 bit

Update Rate: 4 updates/sec

Automatic Fault detection:

Signal over/under-range,
Current Loop Broken

Calibration: Software Calibration (no trimmers) and Auto-zero Continuously

Extended calibration:

Learns Zero and Full Scale of each range using special test mode.

Sensor Types Supported:

Differential Pressure, Ultrasonic, Many Others

Tank Geometries:

Horizontal, vertical, spherical and 32 point strapping table

Auxiliary / Compensation Input

The auxiliary/compensation input is menu selectable for temperature, density or not used. This input is used for the compensated input when performing compensated tank volume and mass calculations. It can also be used as a general purpose input for display and alarming.

Available Input Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD

Control Inputs

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Alarm Acknowledge, Print or Not Used.

Relay Outputs

The relay outputs are menu assignable to Level, Tank Volume, Temperature, Density, Batch Control or Malfunction

Number of relays: 2 (4 optional)

Contact Ratings: 5 amp, 240 VAC or 30 VDC

Isolated Analog Output

The analog output is menu assignable to correspond to the Level, Tank Volume/Mass, Temperature or Density.

Type: Isolated 4-20 mA Current Sourcing

Excitation Voltage (AC powered units only)

24 VDC @ 100 mA (fault protected)

Isolated Pulse output

The isolated pulse output is menu assignable to generate pulse outputs when tank fills, empties or both.

Pulse Output Form: Isolated Photomos Relay

Maximum On Current: 25 mA

Maximum Off Voltage: 30 VDC

Pulse Duration: 10 msec or 100 msec

Serial Communication

The serial port can be used for printing, datalogging, modem connection and communication with a computer. Windows setup software is included for easy programming using a PC.

RS-232:

Device ID: 01-99

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Handshaking: None, Software, Hardware

Print Setup: Configurable print list and formatting

RS-485: (coming soon)

Device ID: 01-247

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Real Time Clock

LEVELtrol II is equipped with a battery backed real time clock with display of time and date.

Format:

12 or 24 hour time display

Day, Month, Year date display

Fig. 1: Standard Dimensions

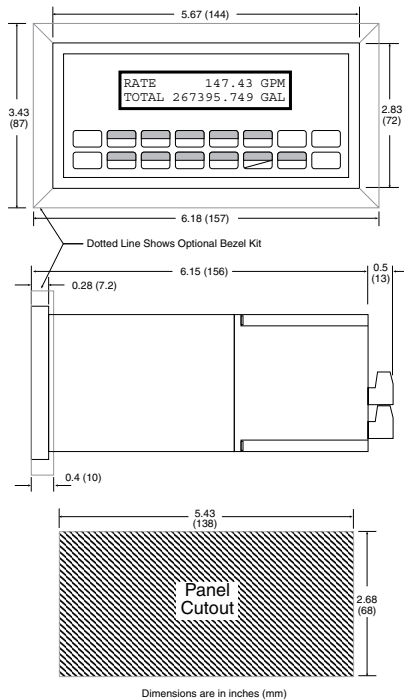
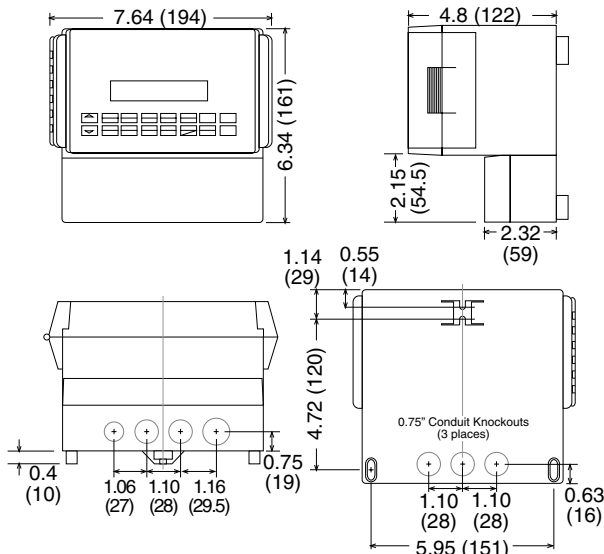


Fig. 2: Wall Mount ("W" mounting option) Dimensions



Terminal Designations:

1	DC OUTPUT	LEVEL IN	COMMON	RTD EXCIT +	RTD SENS +	RTD SENS -	CNTR IN 1	CNTR IN 2	CNTR IN 3	COMMON	PULSE OUTPUT +	PULSE OUTPUT -	ANALOG OUTPUT +	ANALOG OUTPUT -	4-20 mA	NC	COM RLY1	COM RLY2	COM RLY3	NC	NC	NC	POWER IN
2	Vin +			Vin +												25	26	27	28	29	30	DC +	
3	lin +															19	NO	NO	NO	NO	NO	DC -	
4																17	18	19	20	21	22		
5																25	26	27	28	29	30		
6																17	18	19	20	21	22		
7																17	18	19	20	21	22		
8																17	18	19	20	21	22		
9																17	18	19	20	21	22		
10																17	18	19	20	21	22		
11																17	18	19	20	21	22		
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15																17	18	19	20	21	22		
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19																17	18	19	20	21	22		
20																17	18	19	20	21	22		
21																17	18	19	20	21	22		
22																17	18	19	20	21	22		
23																17	18	19	20	21	22		
24																17	18	19	20	21	22		

Ordering Information

Example LT2 L 1 B 0 P

Series: LT2 = LEVELtrol II

Display Type: L = LCD, V = VFD

Input Type: 1 = 110 VAC, 2 = 220 VAC, 3 = 12 VDC (10 to 14 VDC), 4 = 24 VDC (14 to 28 VDC)

Relays: A = 2 SPDT Relays, B = 4 SPDT Relays

Network Card: 0 = None (STD), 2 = RS485/Modbus (available soon) (optional 2nd COM port)

Mounting: P = Panel Mount, N = NEMA 4 Wall Mount, W = NEMA 12/13 Wall Mount w/ Clear Cover, E = Explosion Proof (No Button Access), X = Explosion Proof (with Button Access)

Options: ET = Extended Temperature (-4°F to 131°F (-20°C to 55°C)), IM = Internal Modem, M = Modem Power Option

Accessories: KEPS-KEP1-32 = KEP RS232 for SUPERtrol 1, SUPERtrol 1LE, SUPERtrol 2 and LEVELtrol 2 • 32 Bit DDE Server

Modem Available, see MPP-2400N (requires M option)

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

Remote metering and data collection software available, see TROLlink

Field Indicators Tutorial

Field indicators are signal conditioner/converter devices with a display. Field Indicators are intended for mounting on or near the flow sensor. They perform many of the same roles of signal conditioner/converters plus that of providing a convenient local display.

Many “smart” Field Indicators provide additional, advanced functionality such as sensor linearization.

Field Indicators are ancillary display devices also intended to amplify, filter, condition, scale, and convert the low level “raw” signals produced by many transducers and convert it into the desired, industry standard high level signal before transmitting it across a potentially noisy environment. Display indication is also provided. In some cases, a secondary function is providing signal isolation.

Generally, the output signals may be in the form of either a pulse and/or analog current/voltage that is proportional to the span of the signal being measured. Open collector transistors are common as pulse output signals. The most common analog signal is a 4-20mA current signal.

In many flowmeter types the frequency of the raw input signal carries the flow information. The frequency is related to flow rate. Each pulse or cycle is related to a small equivalent quantity of flow. The quantity represented by each pulse varies with each individual meter and must be scaled to obtain engineering units.

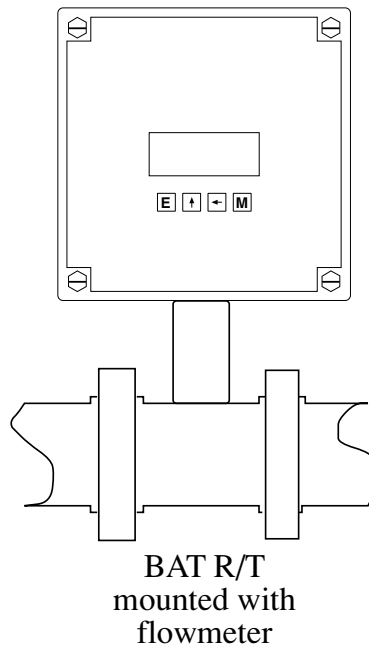
The input signal to a pulse signal conditioner may be a contact closure, a magnetic pickup, or a low level pulse. Some conditioner/converters scale the pulse signal such that each pulse represents an engineering quantity of flow, for example 1 pulse per gallon). Some converters convert the variable frequency signal into a current proportional to flow rate.

In many cases, the field indicator is intended to be powered either by an internal battery, or by the 4-20mA output current loop, or by a DC supply voltage normally available in most instruments with 24 VDC being the most common.

Enclosures are available for outdoor weatherproof and also hazardous locations. Most have provisions for mounting on the flowmeter and/or near the flowmeter.

Field Rate/Total Indicators are applied in most PLC and PC based control systems to adapt the process signals into the standardized levels provides on I/O Cards while at the same time providing a display of information in the field.

Typical Application



SQUIRT

Loop Powered Indicator

Features

- Linear or Square Root Extraction of Input
- 3 ^{1/2} or 4 ^{1/2} Digit Rate Display (Selectable)
- 8 Digit Totalizer Display
- Calibration, High and Low Values Fully Programmable Through Keypad
- No Dipswitches or Pots to Adjust
- 16 Bit A/D Resolution
- Isolated Scaled Pulse Output
- Password Protection of Menu and Totalizer

Description:

Featuring up to 4^{1/2} digits of rate and 8 digits of total, the Squirt is a loop powered indicator capable of accepting either linear or square root 4-20 mA inputs. An isolated scaled pulse output is available for hook up to a remote totalizer. Numeric password protection prevents unauthorized access to menu. The easy-to-read menu prompts make the Squirt so easy to program that you will feel comfortable programming it without the use of a manual.

Specifications:

Power:

Loop powered 4-20 mA
Internal Battery (Setup & totalizer memory storage only):
3 V 250 mA-H Lithium (2 yr. Standby life)

Display:

Rate Display: (selectable decimal)
3.5 or 4.5 Digits (selectable), 0.35" High, Display updates once every two seconds.

Rate Descriptors: /SEC, /MIN, /HR or "blank"

Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"

Low Battery Error Detection: "BAT" descriptor

Under/Over range Indication: Flashing display

Environmental:

OPERATING TEMPERATURE

-4°F (-20°C) to + 158°F (70°C)

Extended Temp: -22°F (-30°C) to + 158°F (70°C)

HUMIDITY

0 - 90% Noncondensing

Accuracy: (Rate @ 20°C)

0.1% Full Scale Resolution, ±1 count

Temperature Drift:

50 ppm/°C Typical

200 ppm/°C Worst Case



Listing: CE Compliant

Inputs:

Signal Input:

Full Scale Range: 4 to 20 mA DC

Loop Voltage Drop: 6 Volts Maximum

Reverse Polarity Protected

Over Current Protection to 60 mA

16 Bit resolution; 1 sample every 2 seconds

Low Cutoff supplied to inhibit indications at low flow rates.

Reset Input: (contact closure)

Internal Pullup Resistor: 100 kΩ to +3 VDC

High (logic 1): Open or 3-30 VDC

Low (logic 0): Less Than .5 VDC

Minimum On : 25 msec

Pulse Output:

The pulse output advances with the least significant digit of the totalizer.

Type: Opto-isolated open collector transistor.

Max. voltage (off state): 30 VDC

Current (on state): 5 mA @ .9 V drop, .1mA @ .7 drop

Pulse Duration: 15 msec

Pulse Output Rate: 25 CPS max.

Pulse output divider: User selectable, ÷1, ÷10, ÷100 or off

Calibration & Operation:

Input Scaling: Via front keypad

Calibration: Via front keypad

Decimal Point: Via front keypad

Reset Input: Via front keypad or remote dry contact closure

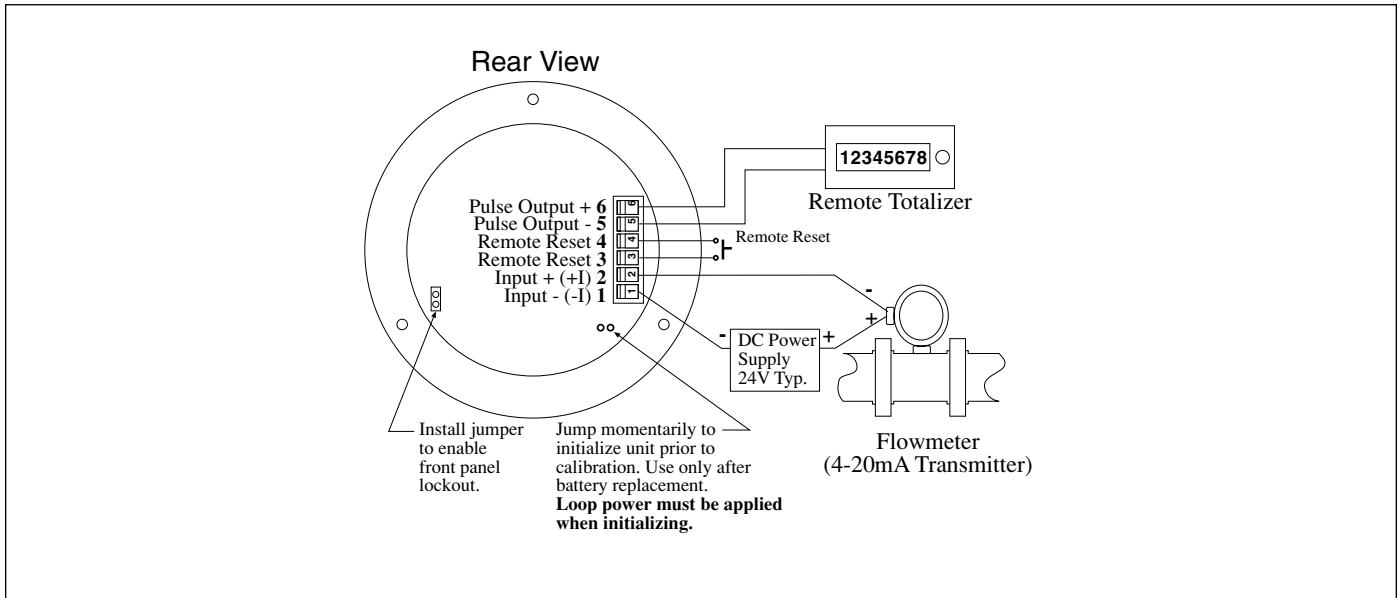
Keypad: 4 tactile feedback keys

Mounting:

- | | |
|----------------------|---|
| 0- Circuit Board - | OEM option (consult factory) |
| 1- Panel Mount - | NEMA 4X Clear Front |
| 2- Wall Mount - | NEMA 4X Enclosure with Squirt mounted behind clear cover |
| 3- Explosion Proof - | Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G |
| 5- Wall Mount - | NEMA 4X with Squirt mounted outside opaque cover |

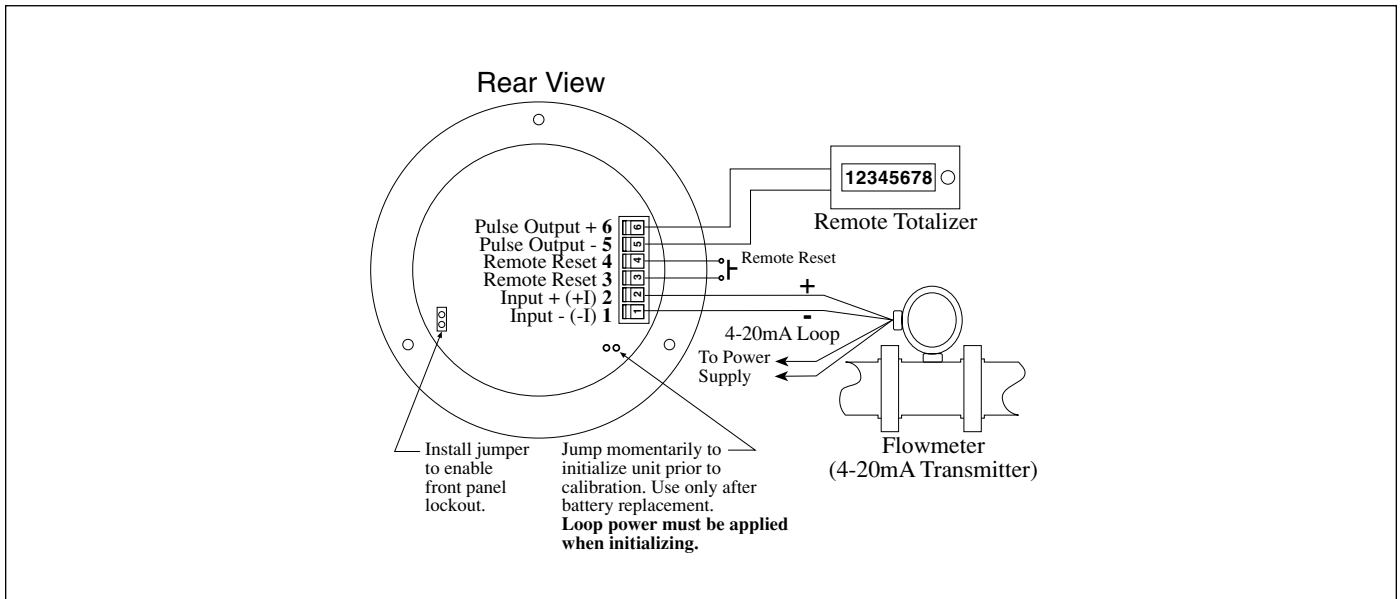
Wiring:

2-Wire Transmitter

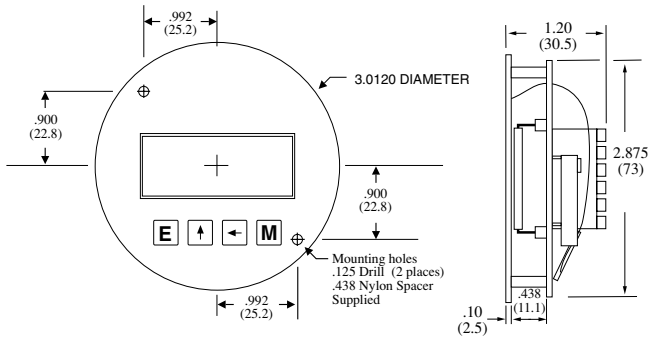


Flow Instruments
FIELD INDICATORS

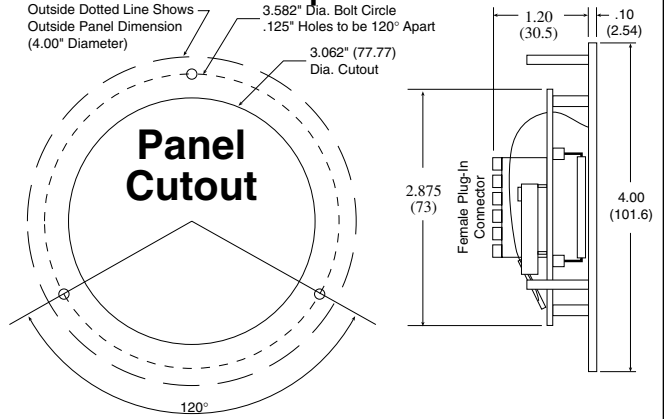
4-Wire Transmitter



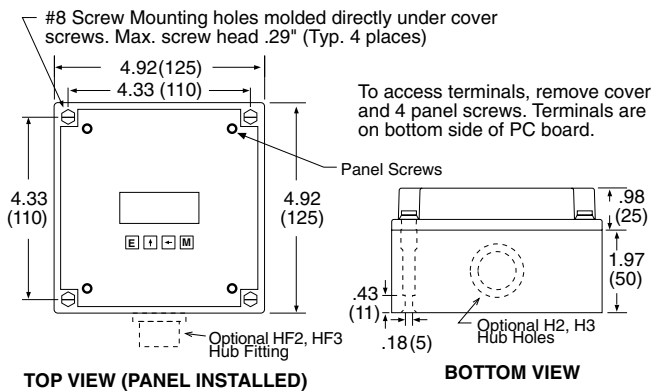
Squirt-0



Squirt-1

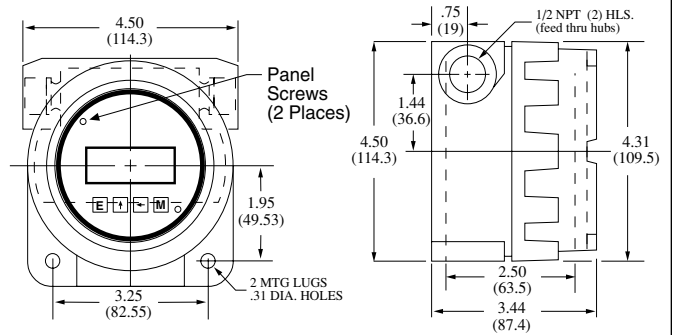


Squirt-2

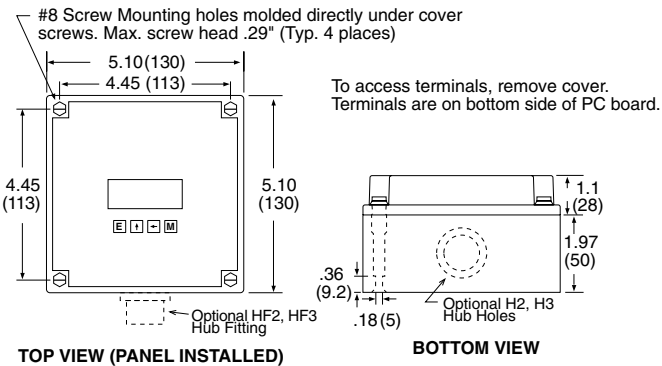


Squirt-3

To access terminals, unscrew cover and loosen 2 panel screws. Terminals are on bottom side of PC board.



Squirt-5



Ordering Information

Example: **SQUIRT** **3** **ET**

SQUIRT

Loop powered; Rate & Total

Mounting:

0 = OEM

1 = Panel Mount

2 = NEMA 4X Box (Squirt behind clear cover)

3 = Explosion Proof Housing

5 = NEMA 4X Box (Squirt outside opaque cover)

Options:

ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)

R = External Magnetic Reset

for NEMA4X & Explosion Proof Enclosures

RX = NEMA7 Explosion Proof Reset Switch

for Explosion Proof Enclosure with

3/4" straight thread side entry

H2 = 0.875" Hole for mounting styles 2 and 5

HF2 = 0.5" Female NPT Hub fitting for mounting styles 2 and 5

H3 = 1.125" Hole for mounting styles 2 and 5

HF3 = 0.75" Female NPT Hub fitting for mounting styles 2 and 5

BAT R/T MILLENNIUM

Battery or Loop Powered Ratemeter & Totalizer

Features

- UL/C-UL Intrinsically Safe Listed
- Accepts Inputs From: Magnetic Pickups, Contact Closures, DC Pulses (Optically Isolated) from Pulse Producing Flowmeters
- Displays Rate & Total Simultaneously
5 Digit Rate Display, 8 Digit Totalizer Display
- 4-20mA Analog Output Option (8 updates/sec)
- Powered From Internal Battery, External DC Supply or 4-20 mA Output Loop
- 20 Point Linearization (optional);
10 Point Linearization with Data Logger option
- Isolated Scaled Pulse Output

Description

Featuring 5 digits of rate and 8 digits of total, the BAT R/T Millennium edition (BATRT-M) is a battery or loop powered indicator capable of accepting magnetic pickup, DC pulse and switch closure inputs from pulse producing flowmeters. The unit can be ordered with an optional 4-20mA output. The BATRT-M uses the 4-20mA loop to provide power when this output is used.

Specifications

Power:

BATTERY POWERED

Supplied with 1 or 2 C size Lithium battery pack.

EXTERNAL POWER INPUT

Voltage: 8.5 to 30 VDC

Current: Less than 5 mA

Supplied with 1 C size lithium battery

Protection: Reverse Polarity Protection on DC Power Input

LOOP POWERED

Voltage: 8.5 to 30 VDC

Supplied with 1 or 2 C size lithium battery(ies)

Protection: Reverse Polarity Protection on Current Loop

Loop Burden: 8.5V maximum

BATTERY LIFE EXPECTANCY:

Expected Years of Operation for BATRT-M of various powering options at equipment duty cycles

MODEL	RUN TIME			
	Idle	2hrs/day	8hrs/day	24hrs/day
BATRT-M-A	10 yrs	10 yrs	10 yrs	9.1 yrs
BATRT-M-A-4	10 yrs	10 yrs	10 yrs	8.4 yrs
BATRT-M-B/C	10 yrs	10 yrs	10 yrs	10 yrs
<u>standby-operation</u>				
BATRT-M -B/C	Indefinite operation when externally powered			
External or loop power				

NOTE: Battery shelf life is rated at 10 years by manufacturer Life expectancy based on rated battery capacity at 20°C The above table is shown with pulse output inactive. Use of pulse output shortens battery life.
Example: A pulse output of 0.06 sec. duration, once per second, would derate the battery life by 20%.

DISPLAY:

Rate Display: (selectable decimal)

5 Digits (99999), 0.35" High, Display updates once per second with battery power, 8X per second with DC or Loop power

Rate Descriptors: /SEC, /MIN, /HR
/MIN, /HR, /DAY with "D" option

Min. Input Frequency: 0.01 Hz to 10 Hz (selectable delay of 0.1 to 99.9 seconds) Selectable Rate Display Damping



- Nonvolatile Flash Memory of Setup Data
- RS485 Modbus RTU Communications and Data Logger (optional)
- Setup Software Available for Easy Programming and Monitoring Using a PC and Special Serial Cable

Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"
GAL, BBL, MCF, M3, "blank" with "D" option

Warning Displays: Low battery warning

PULSE OUTPUT:

The pulse output advances with the least significant digit of the totalizer or decimal multiples thereof (see Pulse scale divider).

Type: Isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100mA

Pulse Duration: Selectable 0.5, 0.25, 0.125, 0.0625 seconds

Pulse Scale divider (Pulscale): User selectable, +1, +10, +100 or OFF

NOTE: Select OFF for max. battery life.

ACCURACY:

0.01% Reading, ±1 count

Temperature Drift: 50 ppm/°C Worst Case

SAFETY LISTINGS:

UL/C-UL File E225832

CLASS 1, DIV 1, GROUPS B, C, D

See Installation DWNG 17075-1

ENVIRONMENTAL:

OPERATING TEMPERATURE

-4°F (-20°C) to +158°F (70°C)

Extended Temp: -22°F (-30°C) to +158°F (70°C)

HUMIDITY

0 - 90% Noncondensing

MOUNTING STYLES:

- 0- Circuit Board - OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure
(keypad mounted behind clear cover)
- 3- Explosion Proof - Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G
- 5- Wall Mount - NEMA 4X Enclosure
(keypad mounted on cover)
- 6- Double Ended Explosion Proof - Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G
(contact factory for details)

NOTE: Meter mounting kits available for styles 2, 3 and 5
Consult Factory

INPUTS:

MAGNETIC PICKUP INPUT

Frequency Range: 0 to 3500 Hz
 Trigger Sensitivity: 10 mV p-p
 Over Voltage Protected: ± 30 VDC

OPTO-ISOLATED DC PULSE INPUT

High (logic 1): 4-30 VDC
 Low (logic 0): Less Than 1 VDC
 Minimum Current: .5 mA
 Hysteresis: 0.4 VDC
 Frequency Range: 0 to 5 kHz
 Min. Pulse Width: 0.1 msec

CONTACT CLOSURE INPUT (contact closure to common)

Internal Pullup Resistor: 100 KΩ to +3.6 VDC
 High (logic 1): Open or 4-30 VDC
 Low (logic 0): Less Than .5 VDC
 Internal Switch Debounce Filter: 0 to 40 Hz

NOTE: Sustained contact closure will shorten battery life.

RESET INPUT (contact closure to common)

Internal Pullup Resistor: 100 KΩ to +3.6 VDC
 High (logic 1): Open or 4-30 VDC
 Low (logic 0): Less Than .5 VDC
 Minimum On : 25 msec

NOTE: Sustained contact closure will shorten battery life.

K-FACTOR

Range: 0.001 to 99999999
 Decimal Point Locations: XXXX.XXXX to XXXXXXXXX

20 Point Linearization Option (10 Point with Data Logger option)

This feature allows the user to enter 20 different frequencies with 20 different corresponding K-Factors to linearize non linear signals.

ANALOG OUTPUT OPTION:

Type: 4-20 mA follows rate display, Two wire hookup
 Accuracy: 0.025% Full Scale at 20° C
 Temperature Drift:
 50 ppm/°C Typical
 Reverse Polarity Protected
 Update Rate: 8 times/second

NOTE: The BATRT-M uses the 4-20 mA loop power as its primary power source when this option is used. The battery is still required for standby battery operation.

DATA STORAGE:

Setup Information: Stored in flash memory
 Totalizer: Stored in battery backed RAM but can be saved to flash memory by operator for recall after battery change out.

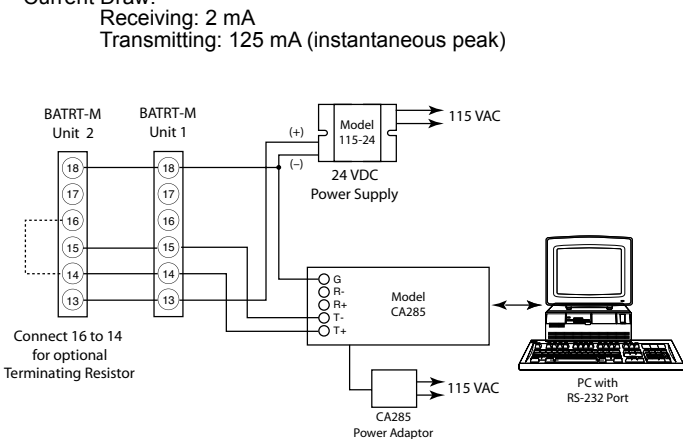
COMMUNICATIONS OPTION (S1):

RS232 SERIAL SETUP SOFTWARE OPTION:

This option enables you to access a variety of process parameters through serial communications. PC compatible communications software is included with this option. With this software and a BAT R/T-M Serial Adapter Cable (BSAC1) you will be able to setup the BAT R/T-M through your PC.

RS-485 MODBUS and DATA LOGGER OPTION (S2):

The optional RS-485 card utilizes Modbus RTU protocol to access a variety of process parameters. The Data Logger stores the totalizer to flash memory once every 24 hours at the time you set. The data logger can hold 27 days of totals, on the 28th day the oldest total in the logger is dropped. Requires external DC power: 6-28VDC (input is reverse polarity protected)
 Current Draw:
 Receiving: 2 mA
 Transmitting: 125 mA (instantaneous peak)



Typical Wiring:

CONTACT INPUT / PULSE OUTPUT / BATTERY POWERED
(Power option A or B)

DC In (+) 12 1 Mag Input 1
 Not Used 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common/ DC In (-)

MAG INPUT / 4-20 mA LOOP POWERED
(Power option C or AC)

4-20mA (+) 12 1 Mag Input 1
 4-20mA (-) 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common

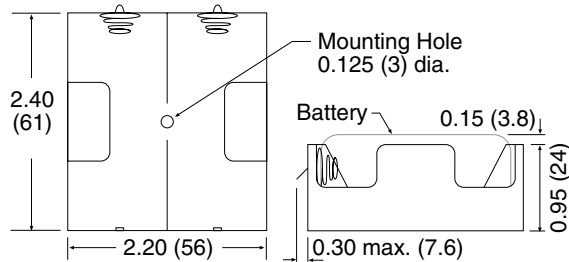
MAG INPUT / BATPACK POWERED
(Power option A or B)

DC In (+) 12 1 Mag Input 1
 Not Used (-) 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common/ DC In (-)

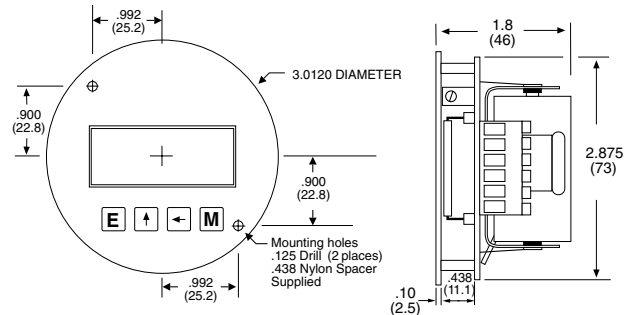
MAG INPUT / DC POWERED
(Power option A or B)

DC In (+) 12 1 Mag Input 1
 Not Used (-) 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common/ DC In (-)

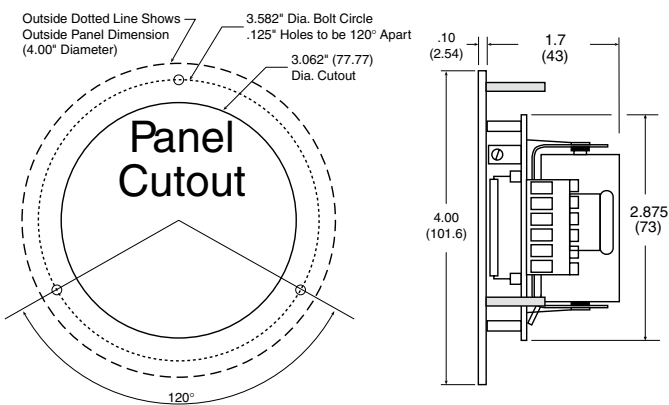
BATPACK



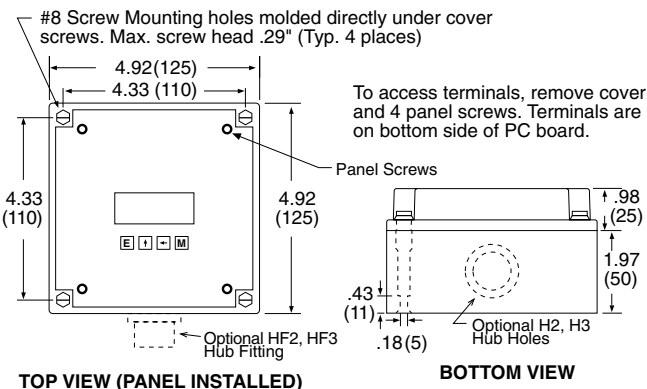
BATRT-M-0



BATRT-M-1

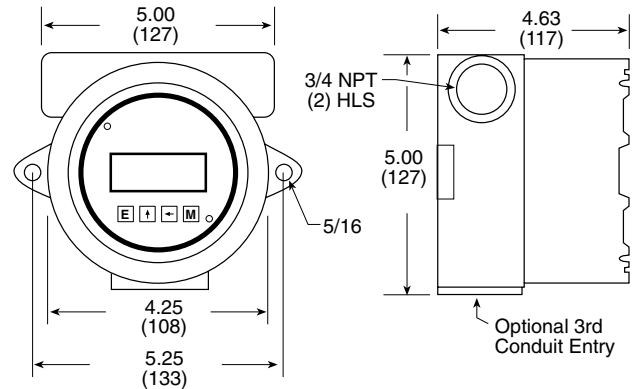


BATRT-M-2

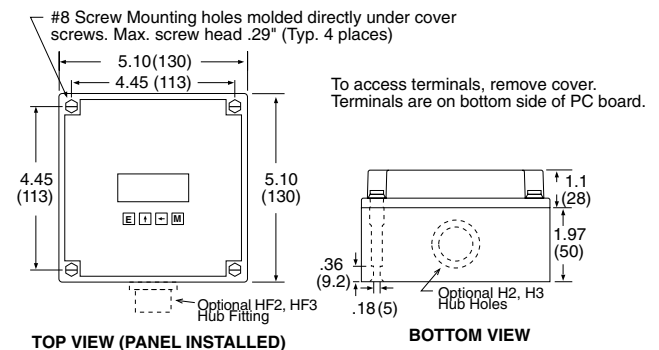


BATRT-M-3

To access terminals, unscrew cover and loosen 2 panel screws. Terminals are on bottom side of PC board.



BATRT-M-5



Ordering Information

EXAMPLE: BATRTM 3 A 4 ET

- Series:** _____
- Mounting:** _____
- * 0 = OEM
 - * 1 = Panel Mount
 - 2 = NEMA 4X Box (Bat R/T-M behind clear cover)
 - 3 = Explosion Proof Housing
 - 5 = NEMA 4X Box (Bat R/T-M outside opaque cover)
 - 6 = Double Ended Explosion Proof Housing (consult factory)
- Power Supply:** _____
- * A = Battery (2 supplied)
 - B = External Power Supply (8.5 to 30 VDC)
 - C = Loop Powered with 4-20 mA Output
 - AC = Loop Powered with 4-20 mA Output and 2 Batteries
- Options (Multiple Options Available)** _____
- S1 = Serial Setup Software for use with BSAC1
 - S2 = RS485/Modbus/Data Logger - Isolated (power options B, C only)
 - 4 = 20 Point Linearization (10 point with S2 option)
 - D = Rate per Day, Hour or Minute
 - ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)
 - CE** = CE Compliant
 - CSA** = CSA Listed Explosion Proof
 - IS** = UL/C-UL Listed IS
 - TRX = NEMA7 Explosion Proof Reset Switch (mounting style 3 only)
 - RN = External Magnetic Reset
 - T = Third Conduit Entry in Ex-Proof Housing (mounting style 3)
 - H2 = 0.875" Hole for mounting styles 2 and 5
 - HF2 = 0.5" Female NPT Hub fitting for mounting styles 2 and 5
 - H3 = 1.125" Hole for mounting styles 2 and 5
 - HF3 = 0.75" Female NPT Hub fitting for mounting styles 2 and 5

Accessories:

- BATPACK= External Batt. Pack with 2 C Size Batteries & 12" leads
- BATC = Single Battery: Tadiran P/N TL2200/S 3.6V 7200mAh or equal
- 115-24 = 115 VAC to 24 VDC power supply
- BSAC1 = RS232 Serial Adapter Cable with setup software

* External battery pack supplied with models BATRTM0A & BATRTM1A
 ** Contact factory for latest information

NOTE: Additional entry holes may be provided on styles 2 and 5.

BAT RAT MILLENNIUM

Battery Powered Ratemeter & Totalizer with Alarm Output

Features

- UL/C-UL Intrinsically Safe Listed
- Magnetic Pickup Input, Contact Closure Input, DC Pulse Input (Optically Isolated)
- Displays Rate & Total Simultaneously
- 5 Digit Rate Display, 8 Digit Totalizer Display
- 4-20mA Analog Output (optional)
- Powered From Internal Battery, External DC Supply or 4-20 mA Output Loop
- 20 Point Linearization (optional); 10 Point Linearization with Data Logger option
- Isolated High/Low Flow Rate Alarm Output
- Nonvolatile Flash Memory of Setup Data



- RS485 Modbus Communications and Data Logger (optional)
- Setup Software Available for Easy Programming and Monitoring Using a PC and Special Serial Cable (optional)

Description

Featuring 5 digits of rate and 8 digits of total, the BAT RAT Millennium (BATRAT-M) is a battery powered indicator with flow rate alarm output. It is capable of accepting magnetic pickup, DC pulse and switch closure inputs from pulse producing flowmeters. The unit can be ordered with an optional 4-20mA output. The BAT RAT uses the 4-20mA loop to provide power when this output is used.

Specifications

Power:

BATTERY POWERED

Supplied with 2 C size Lithium battery pack.

EXTERNAL POWER INPUT

Voltage: 8.5 to 30 VDC

Current: Less than 5 mA

Supplied with 1 C size lithium battery for standby operation

Protection: Reverse Polarity Protection on DC Power Input

LOOP POWERED

Voltage: 8.5 to 30 VDC

Supplied with 1 C size lithium battery for standby operation

Protection: Reverse Polarity Protection on Current Loop

Loop Burden: 8.5V maximum

BATTERY LIFE EXPECTANCY:

Expected Years of Operation for BATRAT-M of various powering options at equipment duty cycles

MODEL	RUN TIME			
	Idle	2hrs/day	8hrs/day	24hrs/day
BATRAT-M-A	10 yrs	10 yrs	10 yrs	9.1 yrs
BATRAT-M-A-4	10 yrs	10 yrs	10 yrs	8.4 yrs
BATRAT-M-B/C	10 yrs	10 yrs	10 yrs	10 yrs
standby-operation				
BATRAT-M -B/C Indefinite operation when externally powered				
External or loop power				

NOTE: Battery shelf life is rated at 10 years by manufacturer. Life expectancy based on rated battery capacity at 20°C. The above table is shown with alarm output inactive. Use of alarm output shortens battery life.

Display:

Rate Display: (selectable decimal)

5 Digits (99999), 0.35" High, Display updates once per second with battery power, 8X per second with DC or Loop power

Rate Descriptors: /SEC, /MIN, /HR

/MIN, /HR, /DAY with "D" option

Min. Input Frequency: 0.01 Hz to 10 Hz (selectable delay of 0.1 to 99.9 seconds)*

Selectable Rate Display Damping

Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"

GAL, BBL, MCF, M3, "blank" with "D" option

Warning Displays: Low battery warning

Alarm Output:

Combination High-Low flow rate alarm output activates when flow rate is less than low set point or greater than high set point.

Type: Opto-isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100 mA

Mounting Styles:

- 0- Circuit Board - OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure with BAT RAT mounted behind clear cover
- 3- Explosion Proof - Class I, Division I, Groups B, C & D; Class II, Division I, Groups E, F & G
- 5- Wall Mount - NEMA 4X with keypad mounted outside opaque cover

ACCURACY:

0.01% Reading, ±1 count

Temperature Drift: 50 ppm/°C Worst Case

SAFETY LISTINGS:

UL/C-UL File E225832

CLASS 1, DIV 1, GROUPS B, C, D

See Installation DWNG 17075-1

ENVIRONMENTAL:

OPERATING TEMPERATURE

-4°F (-20°C) to + 158°F (70°C)

Extended Temp: -22°F (-30°C) to + 158°F (70°C)

HUMIDITY

0 - 90% Noncondensing

MOUNTING STYLES:

- 0- Circuit Board- OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure
(keypad mounted behind clear cover)
- 3- Explosion Proof - Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G
- 5- Wall Mount - NEMA 4X Enclosure
(keypad mounted on cover)
- 6- Double Ended Explosion Proof - Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G
(contact factory for details)

NOTE: Meter mounting kits available for styles 2, 3 and 5
Consult Factory

INPUTS:

MAGNETIC PICKUP INPUT

Frequency Range: 0 to 3500 Hz
Trigger Sensitivity: 10 mV p-p
Over Voltage Protected: ± 30 VDC

OPTO-ISOLATED DC PULSE INPUT

High (logic 1): 4-30 VDC
Low (logic 0): Less Than 1 VDC
Minimum Current: .5 mA
Hysteresis: 0.4 VDC
Frequency Range: 0 to 5 kHz
Min. Pulse Width: 0.1 msec

CONTACT CLOSURE INPUT (contact closure to common)

Internal Pullup Resistor: 100 KΩ to +3.6 VDC
High (logic 1): Open or 4-30 VDC
Low (logic 0): Less Than .5 VDC
Internal Switch Debounce Filter: 0 to 40 Hz

NOTE: Sustained contact closure will shorten battery life.

RESET INPUT (contact closure to common)

Internal Pullup Resistor: 100 KΩ to +3.6 VDC
High (logic 1): Open or 4-30 VDC
Low (logic 0): Less Than .5 VDC
Minimum On : 25 msec

NOTE: Sustained contact closure will shorten battery life.

K-FACTOR

Range: 0.001 to 99999999
Decimal Point Locations: XXXX.XXXX to XXXXXXXX

20 Point Linearization Option (10 Point with Data Logger option)

This feature allows the user to enter 20 different frequencies with 20 different corresponding K-Factors to linearize non linear signals.

ANALOG OUTPUT OPTION:

Type: 4-20 mA follows rate display, Two wire hookup
Accuracy: 0.025% Full Scale at 20° C
Temperature Drift:
50 ppm/°C Typical
Reverse Polarity Protected
Update Rate: 8 times/second

NOTE: The BATRT-M uses the 4-20 mA loop power as its primary power source when this option is used. The battery is still required for standby battery operation.

COMMUNICATIONS OPTION (S1):

RS232 SERIAL SETUP SOFTWARE OPTION:

This option enables you to access a variety of process parameters through serial communications. PC compatible communications software is included with this option. With this software and a BATRT-M Serial Adapter Cable (BSAC1) you will be able to setup the BATRT-M through your PC.

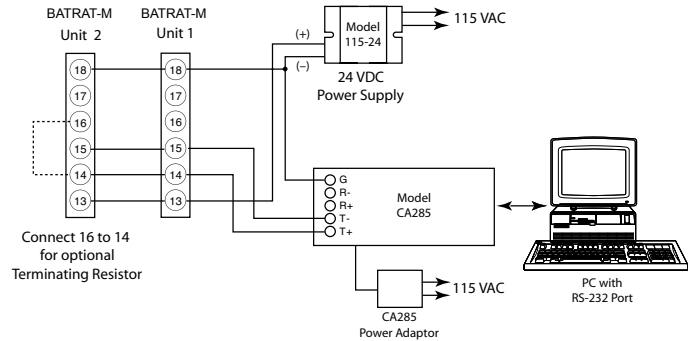
DATA STORAGE:

Setup Information: Stored in flash memory

Totalizer: Stored in battery backed RAM but can be saved to flash memory by operator for recall after battery change out.

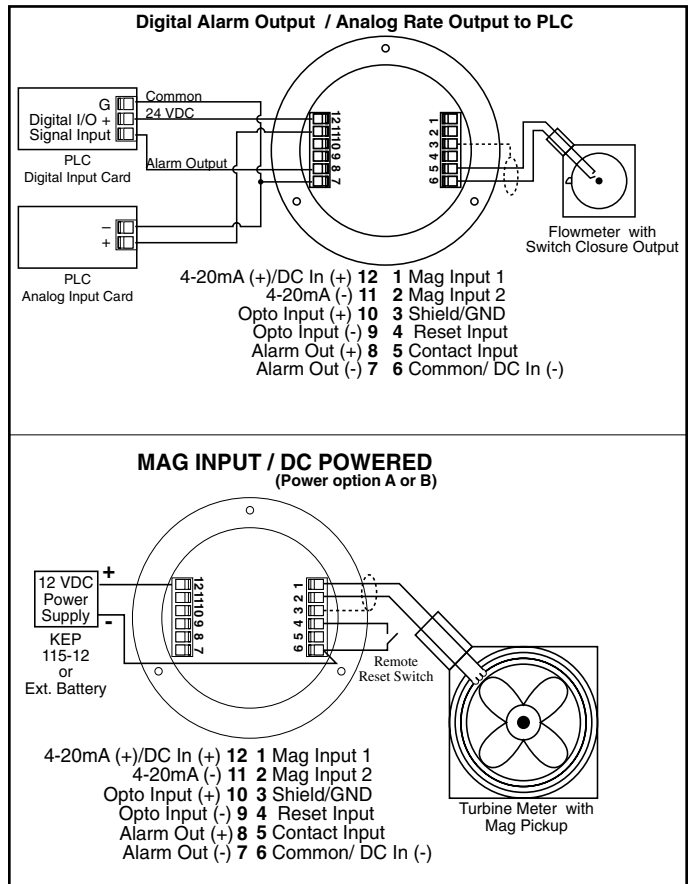
RS-485 MODBUS and DATA LOGGER OPTION (S2):

The optional RS-485 card utilizes Modbus RTU protocol to access a variety of process parameters. The Data Logger stores the totalizer to flash memory once every 24 hours at the time you set. Requires external DC power.

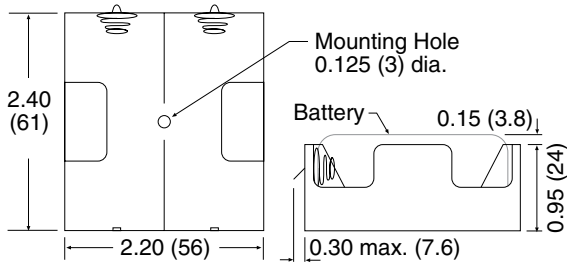


Flow Instruments
FIELD INDICATORS

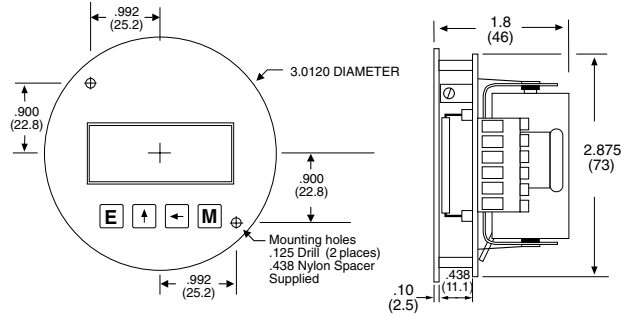
Typical Wiring:



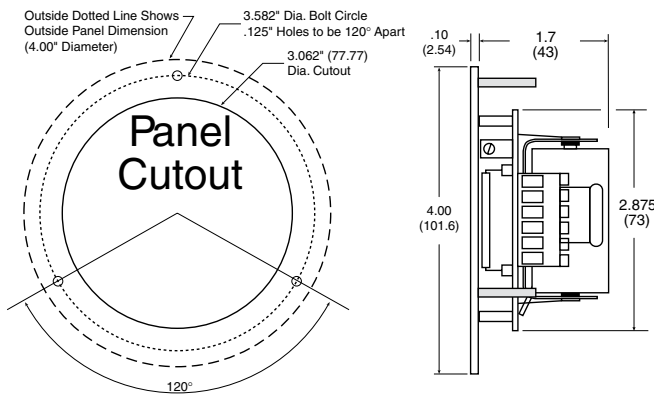
BATPACK



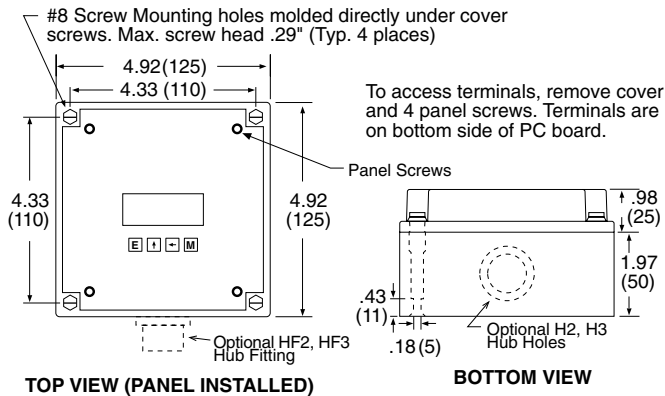
BATRAT-M-0



BATRAT-M-1

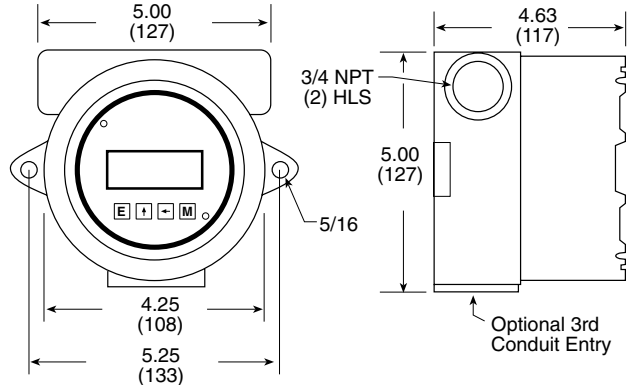


BATRAT-M-2

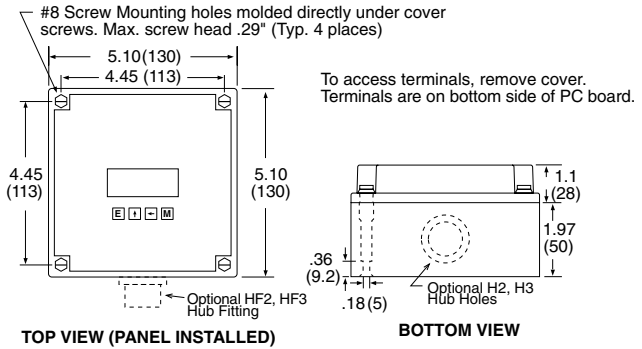


BATRAT-M-3

To access terminals, unscrew cover and loosen 2 panel screws. Terminals are on bottom side of PC board.



BATRAT-M-5



Ordering Information

EXAMPLE: BATRATM 3 A 4 ET

- Series:** _____
- Mounting:** _____
- * 0 = OEM
 - * 1 = Panel Mount
 - 2 = NEMA 4X Box (BATRATM behind clear cover)
 - 3 = Explosion Proof Housing
 - 5 = NEMA 4X Box (BATRATM outside opaque cover)
 - 6 = Double Ended Explosion Proof Housing (consult factory)

- Power Supply:** _____
- * A = Battery (2 supplied)
 - B = External Power Supply (8.5 to 30 VDC)
 - C = Loop Powered with 4-20 mA Output
 - AC = Loop Powered with 4-20 mA Output and 2 Batteries

- Options (Multiple Options Available)** _____
- S1 = Serial Setup Software for use with BSAC1
 - S2 = RS485/Modbus/Data Logger - Isolated (power options B, C only)
 - 4 = 20 Point Linearization (10 point with S2 option)
 - D = Rate per Day, Hour or Minute
 - ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)
 - CE** = CE Compliant
 - CSA** = CSA Listed Explosion Proof
 - IS** = UL/C-UL Listed IS
 - TRX = NEMA7 Explosion Proof Reset Switch (mounting style 3 only)
 - RN = External Magnetic Reset
 - T = Third Conduit Entry in Ex-Proof Housing (mounting style 3)
 - H2 = 0.875" Hole for mounting styles 2 and 5
 - HF2 = 0.5" Female NPT Hub fitting for mounting styles 2 and 5
 - H3 = 1.125" Hole for mounting styles 2 and 5
 - HF3 = 0.75" Female NPT Hub fitting for mounting styles 2 and 5

- Accessories:**
- BATPACK= External Batt. Pack with 2 C Size Batteries & 12" leads
 - BATC = Single Battery: Tadiran P/N TL2200/S 3.6V 7200mAh or equal

- 115-24 = 115 VAC to 24 VDC power supply
- BSAC1 = RS232 Serial Adapter Cable with setup software

- * External battery pack supplied with models BATRATM0A & BATRATM1A
- ** Contact factory for latest information

NOTE: Additional entry holes may be provided on styles 2 and 5.

BAT D/T MILLENNIUM

Features

- UL/C-UL Intrinsically Safe Listed
- Magnetic Pickup Input, Contact Closure Input, DC Pulse Input (Optically Isolated)
- Displays 5 Digit Resettable Total
8 Digit Grand Total
- 4-20mA Analog Output (optional)
- Powered From Internal Battery, External DC Supply or 4-20 mA Output Loop
- 20 Point Linearization (optional);
10 Point Linearization with Data Logger option
- Isolated Pulse Output
- Nonvolatile Flash Memory of Setup Data

Description

Featuring 5 digits of resettable total and 8 digits of grand total, the BAT D/T Millennium (BATDTM) is a battery powered indicator capable of accepting magnetic pickup, DC pulse and switch closure inputs from pulse producing flowmeters. A scaled pulse output is standard. A 4-20mA loop and/or linearization is optional.

Specifications

POWER:

BATTERY POWERED

Supplied with 2 C size Lithium battery pack.

EXTERNAL POWER INPUT

Voltage: 8.5 to 30 VDC

Current: Less than 5 mA

Supplied with 1 C size lithium battery for standby operation

Protection: Reverse Polarity Protection on DC Power Input

LOOP POWERED

Voltage: 8.5 to 30 VDC

Supplied with 1 or 2 C size lithium battery(ies) for standby operation

Protection: Reverse Polarity Protection on Current Loop

Loop Burden: 8.5V maximum

BATTERY LIFE EXPECTANCY:

Expected Years of Operation for BATDT-M of various powering options at equipment duty cycles

MODEL	RUN TIME			
	Idle	2hrs/day	8hrs/day	24hrs/day
BATDT-M-A	10 yrs	10 yrs	10 yrs	9.1 yrs
BATDT-M-A-4	10 yrs	10 yrs	10 yrs	8.4 yrs
BATDT-M-B/C	10 yrs	10 yrs	10 yrs	10 yrs
standby-operation				
BATDT-M -B/C	Indefinite operation when externally powered			
External or loop power				

NOTE: Battery shelf life is rated at 10 years by manufacturer Life expectancy based on rated battery capacity at 20°C The above table is shown with pulse output inactive. Use of pulse output shortens battery life. **Example:** A pulse output of 0.06 sec. duration, once per second, would derate the battery life by 20%.

LCD Dual Totalizer (Resettable & Non-Resettable)



- RS485 Modbus Communications and Data Logger (optional)
- Setup Software Available for Easy Programming and Monitoring Using a PC and Special Serial Cable

DISPLAY:

Resettable Total Display

5 Digits (99999), 0.35" High, Display updates once every second (8 times per second if loop powered)

Grand Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

Totalizer Descriptors: GAL, LIT, FT3, M3, "blank"

Warning Displays: Low battery warning

PULSE OUTPUT:

The pulse output advances with the least significant digit of the totalizer or decimal multiples thereof (see Pulse scale divider).

Type: Isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100mA

Pulse Duration: Selectable 0.5, 0.25, 0.125, 0.0625 seconds

Pulse Scale divider (Pulscale): User selectable, +1, +10, +100 or OFF

NOTE: Select OFF for max. battery life.

ACCURACY:

±1 count

SAFETY LISTINGS:

UL/C-UL File E225832

CLASS 1, DIV 1, GROUPS B, C, D

See Installation DWNG 17075-1

ENVIRONMENTAL:

OPERATING TEMPERATURE

-4°F (-20°C) to +158°F (70°C)

Extended Temp: -22°F (-30°C) to +158°F (70°C)

HUMIDITY

0 - 90% Noncondensing

MOUNTING STYLES:

- 0- Circuit Board - OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure
(keypad mounted behind clear cover)
- 3- Explosion Proof - Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G
- 5- Wall Mount - NEMA 4X Enclosure
(keypad mounted on cover)
- 6- Double Ended Explosion Proof - Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G
(contact factory for details)

NOTE: Meter mounting kits available for styles 2, 3 and 5 Consult Factory

INPUTS:

MAGNETIC PICKUP INPUT

Frequency Range: 0 to 3500 Hz
 Trigger Sensitivity: 10 mV p-p
 Over Voltage Protected: ± 30 VDC

OPTO-ISOLATED DC PULSE INPUT

High (logic 1): 4-30 VDC
 Low (logic 0): Less Than 1 VDC
 Minimum Current: .5 mA
 Hysteresis: 0.4 VDC
 Frequency Range: 0 to 5 kHz
 Min. Pulse Width: 0.1 msec

CONTACT CLOSURE INPUT (contact closure to common)

Internal Pullup Resistor: 100 KΩ to +3.6 VDC
 High (logic 1): Open or 4-30 VDC
 Low (logic 0): Less Than .5 VDC
 Internal Switch Debounce Filter: 0 to 40 Hz

NOTE: Sustained contact closure will shorten battery life.

RESET INPUT (contact closure to common)

Internal Pullup Resistor: 100 KΩ to +3.6 VDC
 High (logic 1): Open or 4-30 VDC
 Low (logic 0): Less Than .5 VDC
 Minimum On : 25 msec

NOTE: Sustained contact closure will shorten battery life.

K-FACTOR

Range: 0.001 to 99999999
 Decimal Point Locations: XXXX.XXXX to XXXXXXXX

20 Point Linearization Option (10 Point with Data Logger option)

This feature allows the user to enter 20 different frequencies with 20 different corresponding K-Factors to linearize non linear signals.

ANALOG OUTPUT OPTION:

Type: 4-20 mA follows rate computation, Two wire hookup
 Accuracy: 0.025% Full Scale at 20° C
 Temperature Drift:
 50 ppm/°C Typical
 Reverse Polarity Protected
 Update Rate: 8 times/second

NOTE: The BATDT-M uses the 4-20 mA loop power as its primary power source when this option is used. The battery is still required for standby battery operation. Selectable analog output damping.

COMMUNICATIONS OPTION (S1):

RS232 SERIAL SETUP SOFTWARE OPTION:

This option enables you to access a variety of process parameters through serial communications. PC compatible communications software is included with this option. With this software and a BATDTM Serial Adapter Cable (BSAC1) you will be able to setup the BATDTM through your PC.

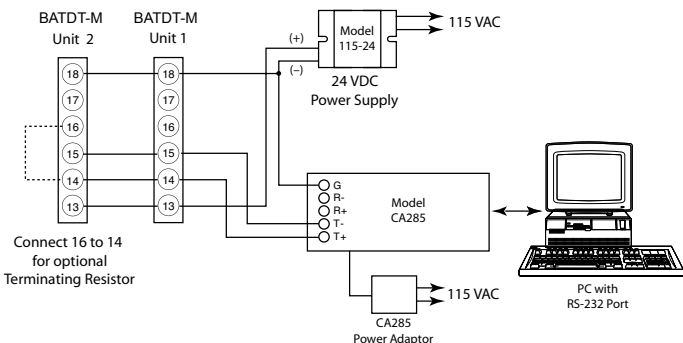
DATA STORAGE:

Setup Information: Stored in flash memory
 Totalizer: Stored in battery backed RAM but can be saved to flash memory by operator for recall after battery change out.

RS-485 MODBUS and DATA LOGGER OPTION (S2):

The optional RS-485 card utilizes Modbus RTU protocol to access a variety of process parameters. The Data Logger stores the totalizer to flash memory once every 24 hours at the time you set. The data logger can hold 24 days of totals, on the 25th day the oldest total in the logger is dropped. Requires external DC power: 6-28VDC (input is reverse polarity protected)
 Current Draw:

Receiving: 2 mA
 Transmitting: 125 mA (instantaneous peak)



Typical Wiring:

CONTACT INPUT / PULSE OUTPUT / BATTERY POWERED
(Power option A or B)

DC In (+) 12 1 Mag Input 1
 Not Used 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common/ DC In (-)

MAG INPUT / 4-20 mA LOOP POWERED
(Power option C or AC)

4-20mA (+) 12 1 Mag Input 1
 4-20mA (-) 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common

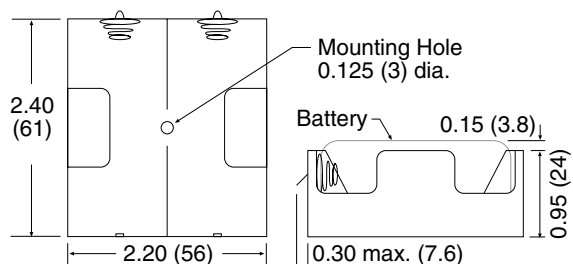
MAG INPUT / BATPACK POWERED
(Power option A or B)

DC In (+) 12 1 Mag Input 1
 Not Used (-) 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common/ DC In (-)

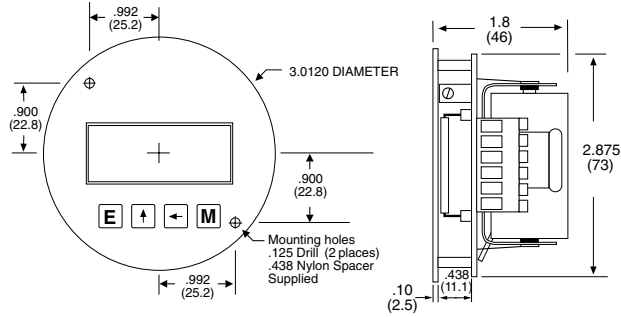
MAG INPUT / DC POWERED
(Power option A or B)

DC In (+) 12 1 Mag Input 1
 Not Used (-) 11 2 Mag Input 2
 Opto Input (+) 10 3 Shield/Common
 Opto Input (-) 9 4 Reset Input
 Opto Out (+) 8 5 Contact Input
 Opto Out (-) 7 6 Common/ DC In (-)

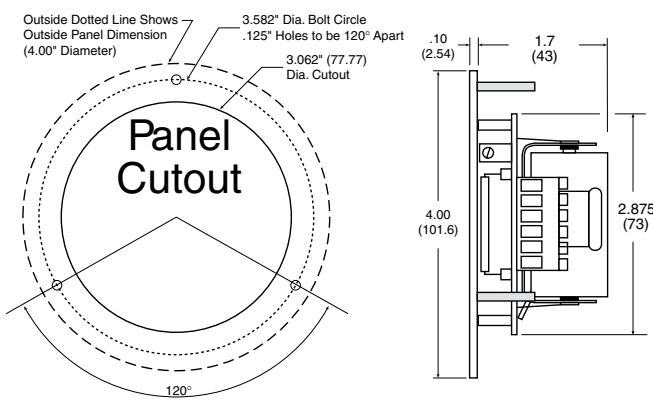
BATPACK



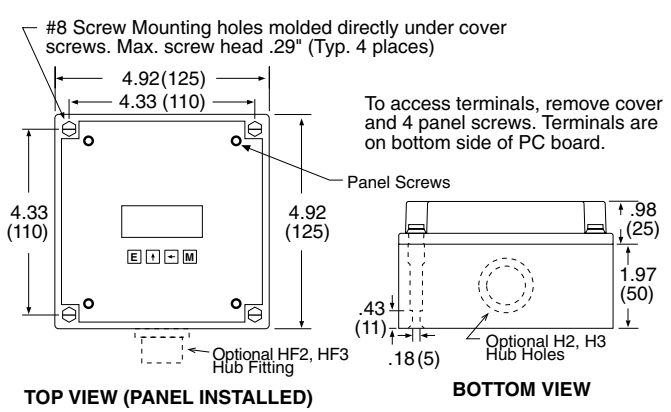
BATDT-M-0



BATDT-M-1

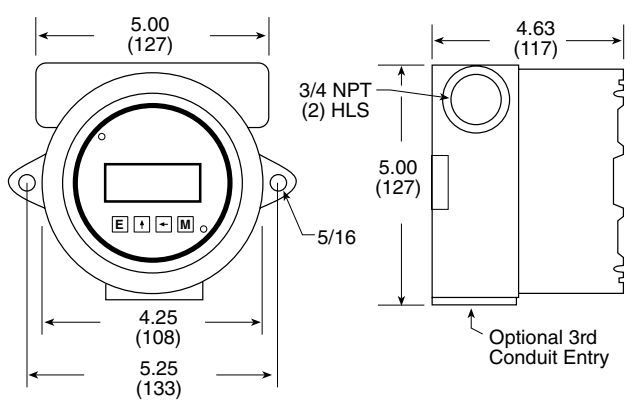


BATDT-M-2



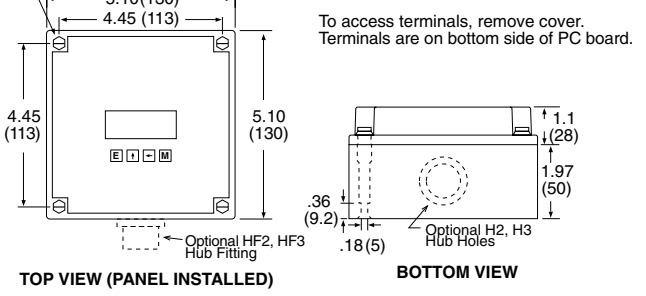
BATDT-M-3

To access terminals, unscrew cover and loosen 2 panel screws. Terminals are on bottom side of PC board.



BATDT-M-5

#8 Screw Mounting holes molded directly under cover screws. Max. screw head .29" (Typ. 4 places)



Ordering Information

EXAMPLE: BATDTM 3 A 4 ET

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- Mounting:** _____
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 - 5 = NEMA 4X Box (BATDTM outside opaque cover)
 - 6 = Double Ended Explosion Proof Housing (consult factory)

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 - S2 = RS485/Modbus/Data Logger - Isolated (power options B, C only)
 - 4 = 20 Point Linearization (10 point with S2 option)
 - D = Rate per Day, Hour or Minute
 - ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)
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 - IS** = UL/C-UL Listed IS
 - TRX = NEMA7 Explosion Proof Reset Switch (mounting style 3 only)
 - RN = External Magnetic Reset
 - T = Third Conduit Entry in Ex-Proof Housing (mounting style 3)
 - H2 = 0.875" Hole for mounting styles 2 and 5
 - HF2 = 0.5" Female NPT Hub fitting for mounting styles 2 and 5
 - H3 = 1.125" Hole for mounting styles 2 and 5
 - HF3 = 0.75" Female NPT Hub fitting for mounting styles 2 and 5

- Accessories:**
- BATPACK = External Batt. Pack with 2 C Size Batteries & 12" leads
 - BATC = Single Battery: Tadiran P/N TL2200/S 3.6V 7200mAh or equal
 - 115-24 = 115 VAC to 24 VDC power supply
 - BSAC1 = RS232 Serial Adapter Cable with setup software
- * External battery pack supplied with models BATDTM0A & BATDTM1A
 ** Contact factory for latest information

Ratometer / Totalizer Tutorial

What is a Rate/Totalizer Indicator? This is a general purpose instrument which conditions the electrical signal generated by the flowmeter and scales the resulting flow information into a flow rate and flow total display in the units of measure desired by the end user. Additional functionality such as alarms, analog output, pulse output, and serial communications may also be provided. Also see the section on flow computers. See the figure below for a typical system configuration.

What capabilities should I look for to ensure compatibility with my type of flowmeter? Rate/Totalizers are available to work with most flowmeter types and most common electrical signals produced by flowmeters. Begin by selecting an instrument(s) that will accept the signal provided by the flowmeter. In some cases an amplifier or signal conditioner may be necessary. Next decide whether linearization will be required within the Rate/Totalizer and how the calibration will be represented within the instrument. Also determine if the Rate/Totalizer can provide the correct power required to operate the flow sensor (if needed).

What are basic areas of concern? Most customers begin a selection by looking for the instrument that has the type of information display they prefer, that will work with the available power, and is available in a package which can be mounted in the desired location.

What is an analog output and why is it used? Flow rate information is usually sent from one system to another as a 4-20mA signal. Some instruments permit the user to select what item of information is to be sent on the analog output. The corresponding span is user programmable. Additional features include programmable damping and user selectable ranges.

What is a pulse output and why is it used? Flow total information is usually sent from one system to another as a pulse which represents a quantity of flow. The remote system may sum these pulses to compute the flow total. Attributes of a pulse output include provisions for user scaling of the amount of flow each pulse represents, and the width of the pulse. Specifications will usually list the electrical drive ratings for the pulse output.

What is an alarm output and why is it used? Relays are often used as controls to activate alarms. A alarm will usually include a provision for setting the alarm point. Additional features may include a programmable delay before the alarm will activate, a programmable alarm duration, and/or a programmable alarm hysteresis.

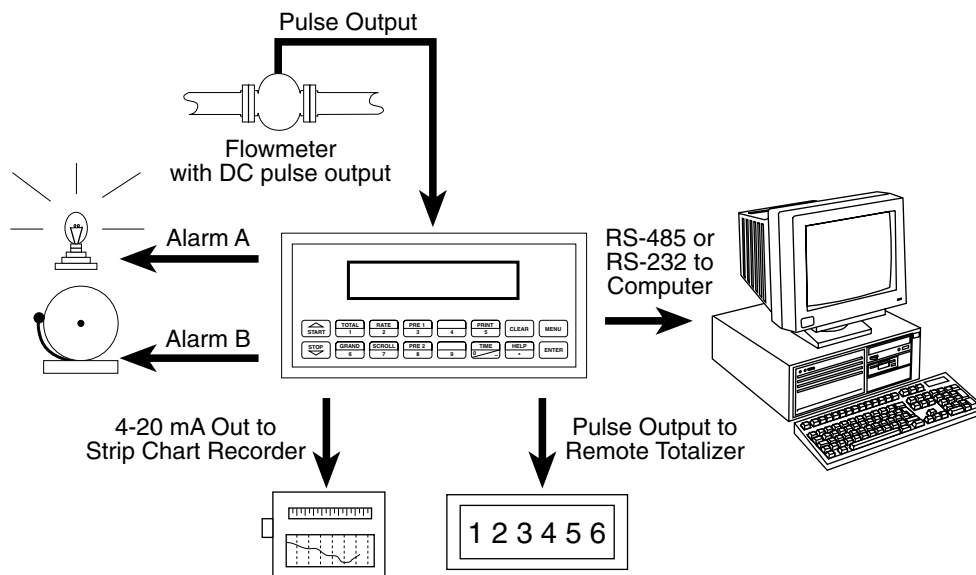
What are remote inputs and how are they used? Often there is a need to connect a remote switch near the operator for such purposes as remote reset, or remote print. Many Rate/Totalizers offer a variety of capabilities as remote inputs.

What is serial communications and why is it used? Serial communications is used to transmit information between two computers, or between a computer and a printer. There are several commonly used standard hardware interfaces. These include RS-232, RS-422, and RS-485. There are also a variety of communication protocols, or message formats, which are used. Some of these are unique to the equipment manufacturer, others are industry standards. See also the section on communication solutions.

What is temperature compensation? In some cases the temperature may also be used to estimate the fluid density from stored fluid properties. Many customers prefer to correct their flow readings to the equivalent mass or corrected volume at a desired reference temperature.

What are other areas of concern? Many areas where rate/totalizer indicators are installed are out of doors or are located in hazardous areas. Special purpose enclosures are available for many instruments to ensure that the equipment will be protected in these environments. A NEMA-4 rating is weather proof. A NEMA-7 rating is explosion proof.

Typical Ratometer/Totalizer Application



130K

Battery Powered Totalizer with LCD Display

Features

- Low price and high efficiency
- Large (8 mm) 8-digit LCD display,
- Optional backlighting
- NEMA4/IP65 Front Panel
- Screw terminals, RM 5 mm
- Lifetime of the battery approximately 8 years
- Locking of the reset key
- All versions for positive or negative counting edge



- Debounce filter function for counting with mechanical contacts.

Specifications

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
Display range: -9999999 to 9999999, with overflow display
Reset: manual and electrical
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

D. Reset Input
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

E. Electrical reset key locking

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

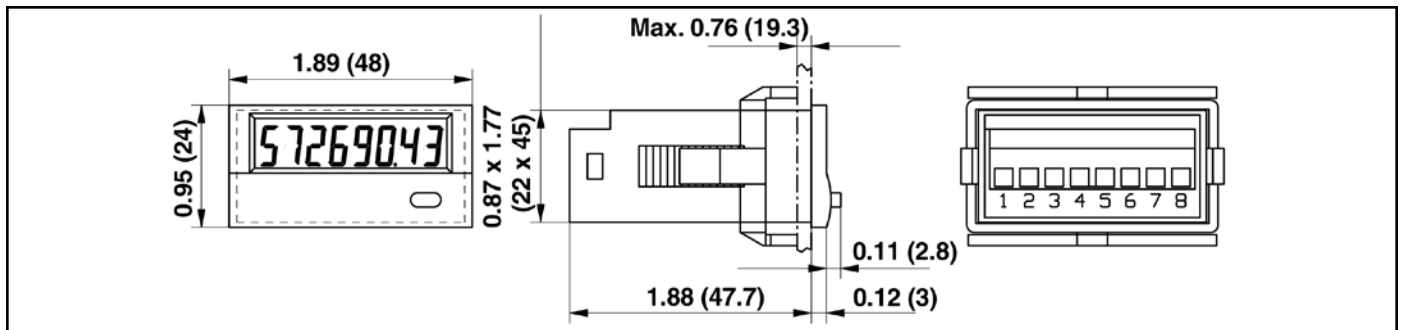
Operating temperature:
 -10 to +55 °C

Ambient temperature:
 -10 to +60 °C

Storage temperature:
 -20 to +70 °C

Protection: NEMA4/IP65 front
Weight: approximately 50 g

Dimensions



Order Table

Type	Input type	Counting inputs							
		INP A				INP B			
130K.012.8x0	Count ¹⁾	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	

X: 5 = no backlight
 X: 6 = with backlight
 1): one-channel, adding or subtracting counting

Accessories:

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

525K, 529K & 530K

Rate and Total Indicators with Pulse or Analog Inputs

Features

- 6 digit, LED display with very high luminosity 0.315" (8mm) digit height
- DIN housing, 1.88"x.944" (48x24mm)
- Two button programming
- Connection with screw terminal
- IP65 NEMA 4X (front)
- DC Powered



525K

Totalizer and Ratemeter

- 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 totalizer / ratemeter (0.00001...99.9999)
- Operating mode: Rate meter: 1/Tau (average value at higher frequencies)

Order #: 525K.2

Accessories:

E200 - Outdoor Enclosure (see Accessories section)

529K & 530K

Analog Displays

- Display range -19999..0..99999 with leading zero blanking
- Resolution 14 bit
- 5 digit rate 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

Listing: UL listed (file#: E128604)

Order #:

529K.2 = Rate Display Only

530K.2 = Rate and Total Display

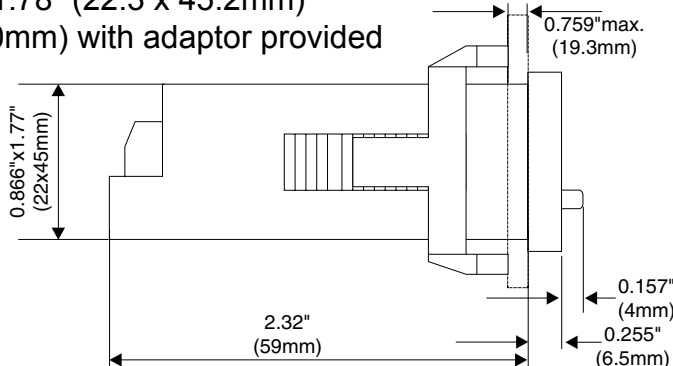
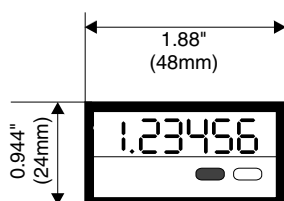
Accessories:

E200 - Outdoor Enclosure (see Accessories section)

Electrical characteristics:

- Supply Voltage: 10 to 30 VDC (50 mA)
- 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 (525K)
- Input resistance: 10 k ohm (525K)
- 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



INTELLECT-69

Ratometer / Totalizer From Analog Inputs

Features

- High/Low Scaling From Front Panel
- 2 Set Points Assignable To Rate or Total
- Display Rate, Integrated Total and Peak & Valley
- 0-5V, 0-10V, 1-5V, 4-20mA or 0-20mA Analog Input
- NEMA 4X/IP 65 Front Panel
- +24V Output Power For Peripherals
- RS422/232 Serial Communications (optional)
- 4-20mA Output (optional)
- Square Root Extraction (optional)
- Rate Per Day Feature (optional)

Description:

Featuring 6 digits of bright, 7-segment LED displays, the Intellect-69 is an integrating totalizer/ratometer 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 to transmit linear signal other peripherals. Two assignable set points are standard. 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. 300mA DC or 10.0VA (10W) at rated AC voltage.

Output Power: (AC powered units only) + 24VDC @ 50mA regulated \pm 5% (100 mA available on request)

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 ten 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 Ω ; Voltage: 115K Ω

Overvoltage Protection: 50 V

Overcurrent Protection: 50 mA

Resolution: 14.5 Bits



Listing: CE Compliant, CSA Listed (File No. LR91109), NRTL/C pending

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.

Set Points: The two control set points can be set at any number from 0 to 59999. 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 2 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.

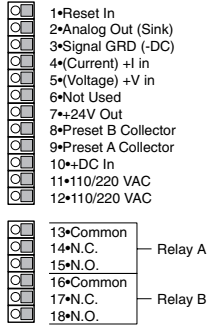
Accuracy:

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%

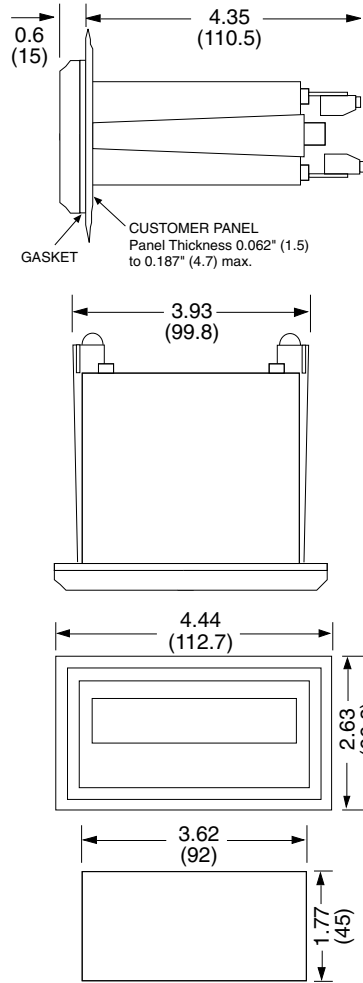
Square Law: (above 5% of bottom range) 0.1%
(5V inputs .4%) Worst case over complete range: 2%

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

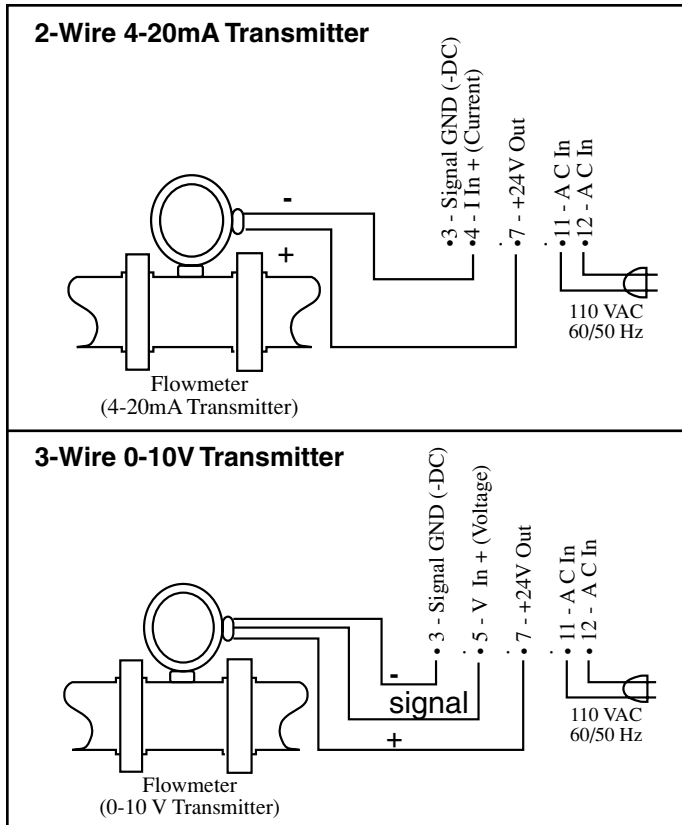
WIRING:



Dimensions:



Flow Instruments
RATEMETERS/TOTALIZERS



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 - 5 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

Accessories

- Separate non keyboard panel order #34235
- Separate keyboard panel - order #34234
- NEMA 4X wall mount enclosure available, see NEMA-1/8DIN
- XHV 7/4 Explosion Proof Housing available, see XHV7/4
- Serial printer available, see P1000, P295
- Ethernet Port Server available, see IEPS
- RS-422/485 to RS-232 Communication Adaptor available, see CA285

ES-756

Features

- Set Scaling From Front Panel
- Separate Scaling of Rate and Total
- 2 Set Points Assignable To Rate or Total
- Display Rate, Integrated Total and Peak & Valley
- 0-5V, 0-10V, 1-5V, 4-20mA or 0-20mA Analog Input
- NEMA 4X/IP 65 Front Panel
- +24V Output Power For Peripherals
- Scaled Pulse Output on Output A or B
- 4-20mA Output (optional)
- Square Root Extraction (optional)

Description:

Featuring 6 digits of bright, 7-segment LED displays, this unit is an integrating totalizer/ratemeter which accepts analog signal inputs. The unit can be field programmed to accept 0-20mA, 4-20mA, 0-5V, 0-10V or 1-5V signals. A 4-20mA output option is available to control strip recorders or other peripherals. A scaled pulse output setting is available and can be assigned to either Output A or B. The full scale setting is programmable from the front panel. By pressing the "view" button, the unit will display: integrated total, rate, peak or valley.

Specifications:

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

Input Power: 110 VAC \pm 15% or 12 to 24VDC.

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

Output Power: (AC powered units only) + 24VDC @ 100mA regulated \pm 5%

Temperature:

Operating: +41°F (5°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 displayed values and control outputs.

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

Output:

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

Usage: rate alarm, total alarm, scaled pulse output for remote totalizers.

Analog Out: The full scale setting is programmable from the front panel. A sinking driver generates a corresponding linear current through the external devices. The output updates with each update of the rate. Accuracy is \pm 0.25% 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).

Ratemeter / Totalizer From Analog Inputs with Separate Scaling of Rate & Total



Input:

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

Input Impedance: Current: 100 Ω ; Voltage: 115K Ω

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.

Set Points: Two set points are provided. The set point outputs can be assigned to rate or total or pulse scaling. The unit comes standard with two open collector control outputs. The outputs are programmable from 0.01 to 599.99 sec or latched until reset when assigned to the total or pulse and a hysteresis (alarm range) when assigned to the rate.

Rate Display: Updates 5 times per second, Accurate to 4.5 digits.

Totalizer: Integrates from the rate reading and accumulates up to 6 digits of total count. The time base (seconds, minutes, hours or days) and totalize conversion factor are field programmable from the front panel.

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 4/IP65 front panel).

Shipping Weight: 2 lbs.

Overvoltage Protection:

50 V

Overcurrent Protection:

50 mA

Resolution: 14.5 Bits

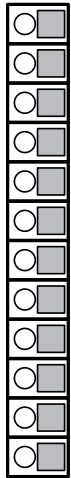
Accuracy:

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

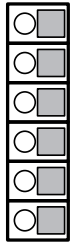
Square Law: (above 5% of bottom range) 0.1%
(5V inputs .4%) Worst case over complete range: 2%

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

WIRING:

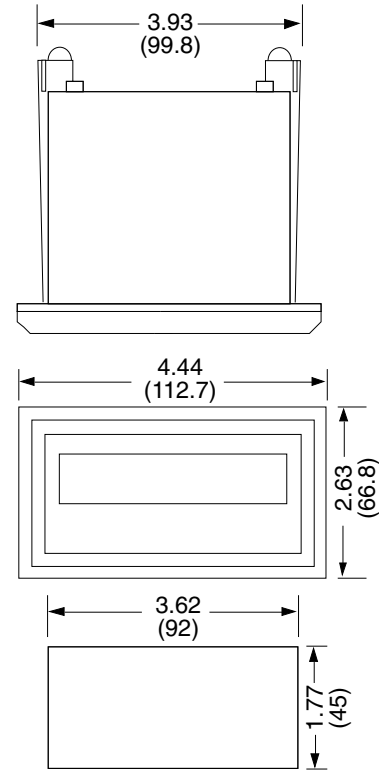
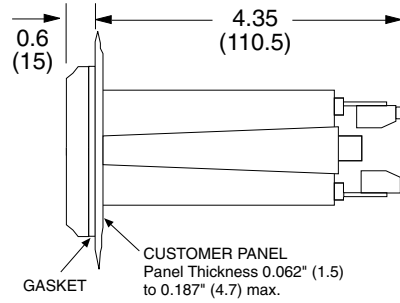


- 1•Reset In
- 2•Analog Out (Sink)
- 3•Signal GRD (-DC)
- 4•(Current) +I in
- 5•(Voltage) +V in
- 6•Not Used
- 7•+24V Out
- 8•Preset B Collector
- 9•Preset A Collector
- 10•+DC In
- 11•110/220 VAC
- 12•110/220 VAC



- 13•Common
 - 14•N.C.
 - 15•N.O.
 - 16•Common
 - 17•N.C.
 - 18•N.O.
- Relay A
- Relay B

Dimensions:



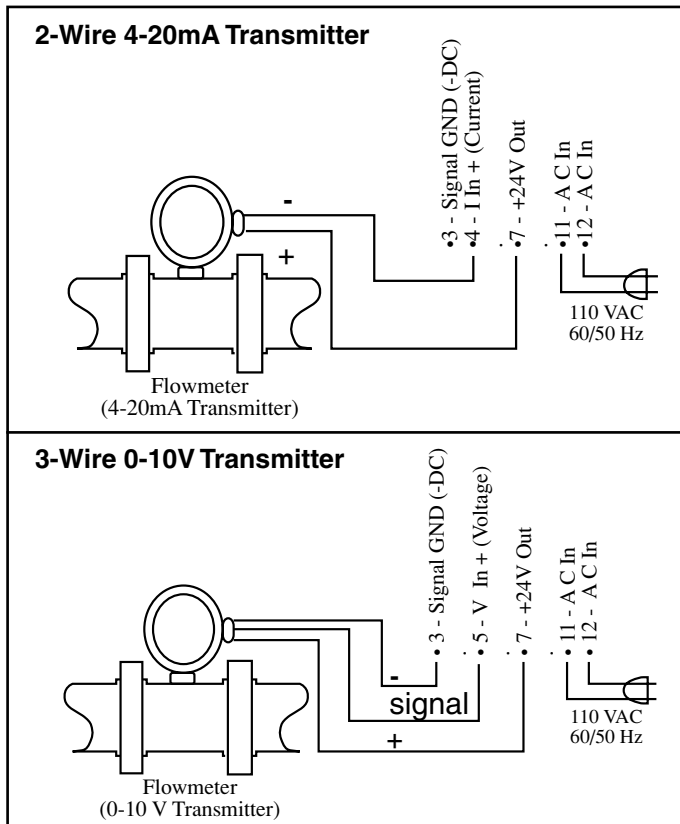
ES756INT69 Ratemeter/Totalizer

Example: ES756INT69RT A L 1 A

- Series:** ES756 INT69RT = Ratemeter / Totalizer
- Operating Voltage:**
 A = 110 VAC ± 15% or 12 to 24 VDC
 B = 220 VAC ± 15% or 12 to 24 VDC
- Inputs:**
 L = Linear
 S = Square Law (Linear or Square Law menu selectable)
- 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)

Accessories

- Separate non keyboard panel order #34235
- Separate keyboard panel - order #34234
- NEMA 4X wall mount enclosure available, see LCN4X & NEMA-1/8DIN
- XHV 7/4 Explosion Proof Housing available, see XHV7/4



Flow Instruments
RATEMETERS/TOTALIZERS

MRT (MINITROL)

Low Cost, Pulse Input Totalizer/Ratemeter

Features

- Separate Scaling Factors For A & B Inputs
- Display Rate & Total
- Pulse Input - 10 kHz Max.
- RS422/RS232 Serial Communication (optional)
- Modbus RTU RS422/RS485/RS232 (optional)
- NEMA 4X / IP65 Front Panel
- Separate Add/Subtract Simultaneous Inputs
- Quadrature and Up/Down Direction Control Inputs (optional)
- 30mV Magnetic Pickup Inputs (optional)

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.



- 4-20mA or 0-20mA Analog Output (optional)
- CSA Listed

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 Ω imp. 10 kHz max. speed. Accepts simultaneous inputs.

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

5: 4-30 V Count pulses on Input A, 4-30 V Direction Control input (level) on Input B.

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.

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 rate-meter (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 (± 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, 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 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.

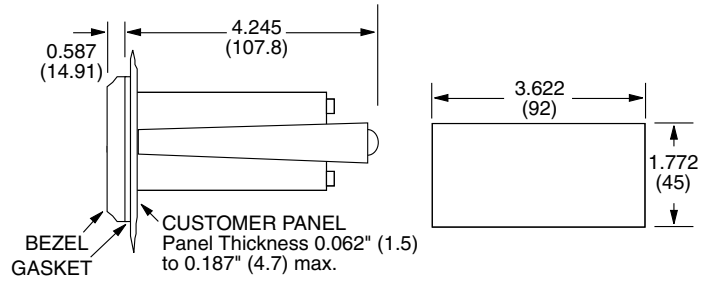
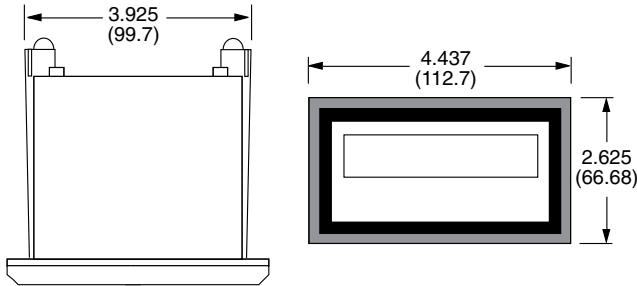
Device ID: 01-247

Baud Rates: 300, 600, 1200, 2400, 4800, 9600

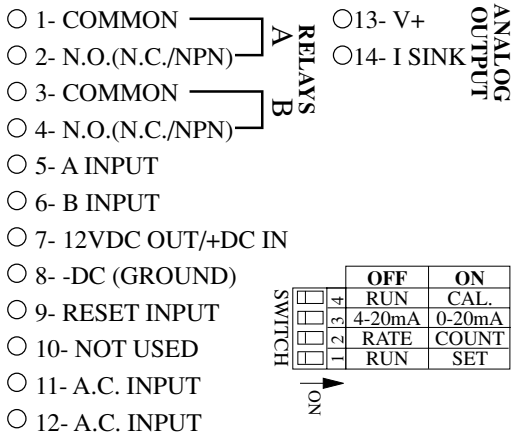
Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Mounting:



Termination:



Ordering Information

Example: MRT A 3 1

Series: _____

MRT= 6 digits, ratemeter/totalizer with presets and scaling.

MC2= 6 digits, totalizer only with presets and scaling.

MR2= 5 digits, rate only 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

5 = 4-30 V pulses on Input A, 4-30 V Direction Control input on Input B.

5M = 30 mV pulses on Input A, 4-30 V Direction Control input on Input B

9 = Quadrature, accepts 4-30 V pulses

9MB = Quadrature, accepts 30 mV pulses (A & B)

Options _____

1= RS232 Communications

2= RS422 Communications

3= Modbus RTU RS232

4= Modbus RTU RS422/RS485

A= Analog Output (4-20/0-20 mA)

NOTE: RS232/RS422/RS485 & Analog Output options can not be combined

Accessories

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

NEMA4 wall mount enclosure available, see NEMAtrol

Explosion proof enclosure available, see XHV

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

Modbus DDE/OPC Server available, see KEPServer

Flow Instruments
RATEMETERS/TOTALIZERS

MINITROL-S

Totalizer/Ratemeter with Separate Scaling of Rate/Total

Features

- Separate Scaling Factors For Rate & Total
- Display Rate & Total
- 30mV Magnetic Pickup Inputs (optional)
- Count Inhibit Input for Meter Proving
- Security Lockout
- RS422/RS232 Serial Communication (optional)
- NEMA 4X / IP65 Front Panel
- 4-20mA or 0-20mA Analog Output (optional)
- CSA Listed

DESCRIPTION:

The totalizer and ratemeter display each have their own 5 digit dividing scale factor. The two 5 AMP preset relay outputs can be programmed by the user to apply to the "A" total counter or the "A" ratemeter. The user can view the rate, total and grand total. The B relay can be used to create a scaled pulse output. Magnetic pickup input, analog output and RS232 communication options are available.

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

24 VAC \pm 15% or 12 to 15 VDC

CURRENT: 250 mA DC max. or 6.5 VA (6.5W) 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)

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 Ω imp. 10 kHz max. speed.

3M: Mag. Input, Rate/total input only, accepts 30mV input (50 V max. P/P) signals 10 K Ω imp. 5 kHz max. (Inhibit input, 4-30V)

NOTE: The Mag. input has filtering as follows: 30mV trigger level up to 300Hz, 0.25 V trigger level at 5KHz

RESET:

Front Panel: Resets displayed total value and control output.

Remote: 4-30 VDC negative edge resets the A total and relay control output.

NOTE: The remote reset does not reset the grand total.

LISTING: CSA (File No. LR91109), CE Compliant, NRTL/C pending

K FACTOR/SCALING:

The K-Factors 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 rate and total permitting rate display to be in a different unit of measure than the total.



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 via solder jumpers.

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

Compliance Voltage: 3 to 30 VDC non inductive.

RS232/RS422

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 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)

PRESETS:

Two control outputs are provided. To set relay A or B's functionality, press "menu" button until "Relay" appears on the display, the A and B outputs can be assigned to the rate alarm (high/low), or for total/grand total. A 5 digit value can be entered for both presets A and B. 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 corresponding totalizer will auto reset at the preset. This may be used to create a relay scaled pulse output.

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.

RATEMETER

Accurate to 4 1/2 digits (±1 display digit). The rate meter can be programmed to:

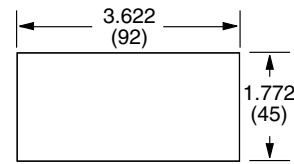
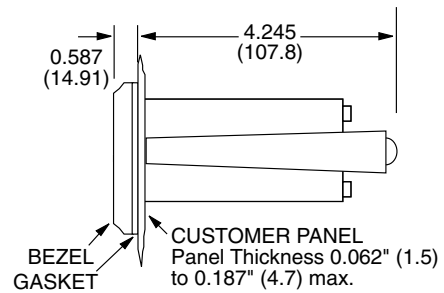
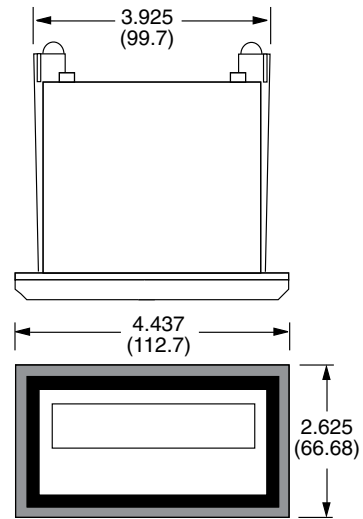
- accept almost any number of pulses per unit of measurement
- determine rate for slow pulsing signals (up to 24 sec).
- auto-range up to 5 digits of significant information.

The display can be programmed to read in units per Second (SEC), Minute (MIN), Hour (HOUR), or Day (DAY).

TOTALIZER:

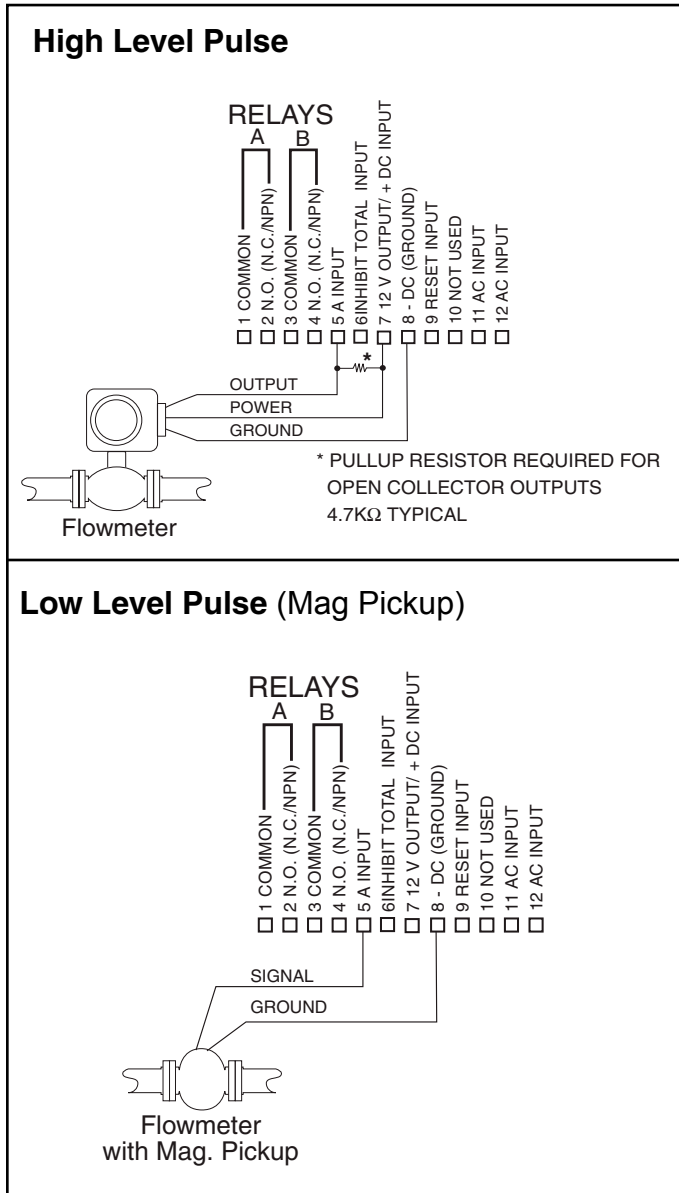
The two 6-digit totalizers can count at 10kHz speed. They share a 5-digit dividing scale factor. The totalizer advances on the positive edge of each pulse.

Dimensions



Flow Instruments
RATEMETERS/TOTALIZERS

TYPICAL SENSOR HOOKUP:



Ordering Information

Example: MRTS A 3 1

Series: _____

MRTS= 6 digit counter / 5 digit 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, rate/total input only, 30mV input (Inhibit input, 4-30V)

Options

1= RS232 Communications

2= RS422 Communications

3= Modbus RTU RS232

4= Modbus RTU RS422/RS485

A= Analog Output (4-20/0-20 mA)

NOTE: RS232/RS422/RS485 & Analog Output options can not be combined

Accessories

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

NEMA4 wall mount enclosure available, see NEMAtr0l

Explosion proof enclosure available, see XHV

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

Modbus DDE/OPC Server available, see KEPServer

MINITROL-PW

Totalizer/Ratemeter for Paddle or Pelton Wheel Turbine Flowmeters

Features

- Display Rate & Total
Flowrate Display = $\frac{\text{Input Frequency} + \text{Offset B}}{\text{Factor A}}$
- 30mV Magnetic Pickup Inputs (optional)
- RS422/RS232 Serial Communication (optional)
- NEMA 4X / IP65 Front Panel
- 4-20mA or 0-20mA Analog Output (optional)



DESCRIPTION:

The Minitrol-PW is a single input counter/ratemeter intended for use with low flow paddle or pelton wheel turbine flowmeters. Two scale factors are used to describe the flowmeter calibration characteristics. The two 5 AMP preset relay outputs can be programmed by the user to apply to the "A" total counter or the "A" ratemeter. The user can view the rate, total and grand total.

SPECIFICATIONS:

Electrical Specifications: See MINItrol-S

Dimensions: See MINItrol-S

K FACTOR/SCALING

The K-Factor is used to convert the input pulses to engineering units. The two 5 digit scale factors, with decimal keyed into any position, allow easy direct entry of any scaling factor from 0.0001 to 99999. Factor A is used to enter the linearized K-Factor and Factor B is used to enter the offset frequency.

LOW FLOW CUTOFF:

A low flow cutoff is provided to inhibit operation in low flow out of range regions.

RATEMETER

Accurate to 4 1/2 digits (± 1 display digit). The rate meter can be programmed to accept almost any number of pulses per unit of measurement and auto-range up to 5 digits of significant information. The display can be programmed to read in units per Second (SEC), Minute (MIN), Hour (Hour), or Day (DAY).

COUNTER

The two 6-digit totalizers can count at 10kHz speed. They share a 5-digit dividing scale factor. The totalizer performs as follows:

If Freq. In > Cutoff

$$\text{Total increment} = \frac{\text{Freq. Offset} \cdot \Delta \text{Time} + \text{Pulses In}}{\text{K Factor A}}$$

$$\text{Rate} = \frac{(\text{Freqin} + \text{Freq offset}) \cdot \text{time base}}{\text{K Factor A}}$$

Time base: Sec = 1, Min = 60, Hour = 3600, Day = 86400

If Freq. In < Cutoff

$$\begin{aligned} \text{Total Increment} &= 0 \\ \text{Rate} &= 0 \end{aligned}$$

Total B (grand total) increments with Total A.

THEORY OF OPERATION

Low flow, Pelton Wheel turbine flowmeters have a transfer characteristic which can best be represented by the following equation for frequencies above the minimum usable flowrate for the device:

$$\text{frequency} = \left(\frac{K_{\text{linearized}} \cdot \text{GPM}}{60} \right) - \text{Offset Frequency}$$

Where: $K_{\text{linearized}}$ and offset frequency are scaling constants determined during flow sensor calibration.

This transfer characteristic applies within the meter manufacturers published range. Below some minimum flow meter output frequency, the flow rate should be considered as 0 and the totalization inhibited. This is called the "cutoff" frequency.

Ordering Information

Example: M RTPW A 3 1

Series: _____

M RTPW = 6 digit counter / 5 digit ratemeter with presets and scaling.

Operating Voltage:

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

Count Inputs:

3 = Standard, 4-30 VDC simultaneous inputs.

3M = Mag. Input, rate/total input only, 30mV input (Inhibit input, 4-30V)

Options

1 = RS232 Communications

2 = RS422 Communications

A = Analog Output (4-20/0-20 mA)

NOTE: RS232/RS422 & Analog Output options can not be combined

Accessories

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

NEMA4 wall mount enclosure available, see NEMAtr0l

Explosion proof enclosure available, see XHV

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

NAMUR R/T

Low Cost, NAMUR Input Ratemeter/Totalizer

Features

- CSA Listed
- Separate Scaling Factors For A & B Inputs
- Display Rate & Total
- NAMUR Input - 10 kHz Max.
- RS422/RS232 Serial Communication (optional)
- Modbus RTU RS422/RS485/RS232 (optional)
- NEMA 4X / IP65 Front Panel
- Separate Add/Subtract Simultaneous Inputs
- Quadrature and U/D Direction Control Inputs
- 4-20mA or 0-20mA Analog Output (optional)

Application:

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

Description:

The NAMUR R/T (NRT) 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 NAMUR R/T is also available in 2 other versions. NC2: a two preset totalizer with scaling, NR2: a high/low alarm ratemeter with scaling. If only one input is required, the unit will display the total and rate from that one channel. The NAMUR R/T 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 preset total or stay latched until reset.

Several units can communicate to a host computer on a single RS232 or RS422 loop. Each unit can be assigned its own I.D. number.

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.

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)

Terminal 7: +12 VDC @ 50 mA, unregulated -10 + 50%

Terminal 10: +8VDC @ 50mA

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:

NAMUR Input:

Logic 0 < 1 mA; Logic 1 > 3 mA

Input Resistance 1000 ohms (typ.)

4-30VDC Input:

Logic 0 open or < 1V, Logic 1 > 4V

Input Resistance 10K ohms (typ.)

3N:

NAMUR input on Input A

4-30 VDC input on Input B

3NB:

NAMUR input on Input A and Input B

5N:

NAMUR input on Input A

4-30 V Direction Control input on Input B.

5NB:

NAMUR input on Input A and Input B

Direction Control input on Input B

9NB:

Quadrature, accepts NAMUR inputs on Input A and Input B 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 (75 - 240 V AC/DC, Input 8) 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 available with solder jumpers.)

Analog Output:

An optional 4-20mA (0-20mA) output is available for the NAMUR R/T 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.

Ratemeter: Accuracy: 0.01% FS (± 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, 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 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.

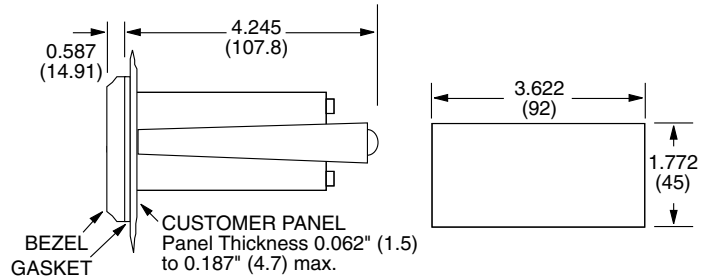
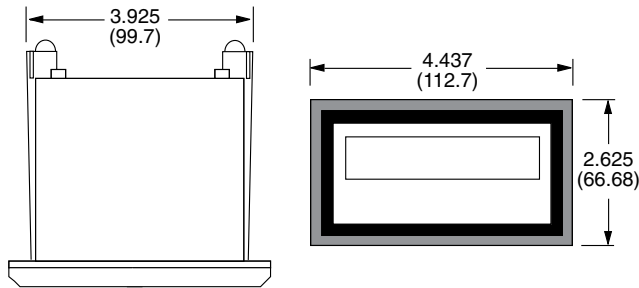
Device ID: 01-247

Baud Rates: 300, 600, 1200, 2400, 4800, 9600

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Mounting:



Termination:

- 1- COMMON
 - 2- N.O.(N.C./NPN)
 - 3- COMMON
 - 4- N.O.(N.C./NPN)
 - 5- A INPUT (NAMUR)
 - 6- B INPUT
 - 7- +12VDC OUT/+DC IN (unregulated)
 - 8- -DC (GROUND)
 - 9- RESET INPUT
 - 10- +8VDC @ 50mA
 - 11- A.C. INPUT
 - 12- A.C. INPUT
 - 13- V+
 - 14- I SINK
- RELAYS A B
ANALOG OUTPUT
- | | | |
|--------------------------|--------|--------|
| | OFF | ON |
| <input type="checkbox"/> | RUN | CAL. |
| <input type="checkbox"/> | 4-20mA | 0-20mA |
| <input type="checkbox"/> | RATE | COUNT |
| <input type="checkbox"/> | RUN | SET |
- SWITCH ON

Ordering Information

Example: **NRT A 3 1**

Series: _____

NRT = 6 digits, ratemeter/totalizer with presets and scaling.
 NC2 = 6 digits, totalizer only with presets and scaling.
 NR2 = 5 digits, rate only 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: _____

3N = NAMUR input on Input A, 4-30 VDC input on Input B.
 3NB = NAMUR input on Input A and Input B
 5N = NAMUR input on Input A, 4-30 V Direction Control input on Input B.
 5NB = NAMUR input on Input A and Input B Direction Control input on Input B
 9NB = Quadrature, accepts NAMUR inputs on Input A and Input B with 90° phase shift for direction detection.

Options

- 1= RS232 Communications
- 2= RS422 Communications
- 3= Modbus RTU RS232
- 4= Modbus RTU RS422/RS485
- A= Analog Output (4-20/0-20 mA)

NOTE: RS232/RS422/RS485 & Analog Output options can not be combined

Accessories

- Separate keyboard panel - order #34242
- NEMA4 wall mount enclosure available, see NEMAtrol
- Explosion proof enclosure available, see XHV
- Serial printer available, see P1000, P295
- Ethernet Port Server available, see IEPS
- RS-422/485 to RS-232 Communication Adaptor available, see CA285
- Modbus DDE/OPC Server available, see KEPServer

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



- 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 (6.5W) 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.

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; 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 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 Compliant

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:

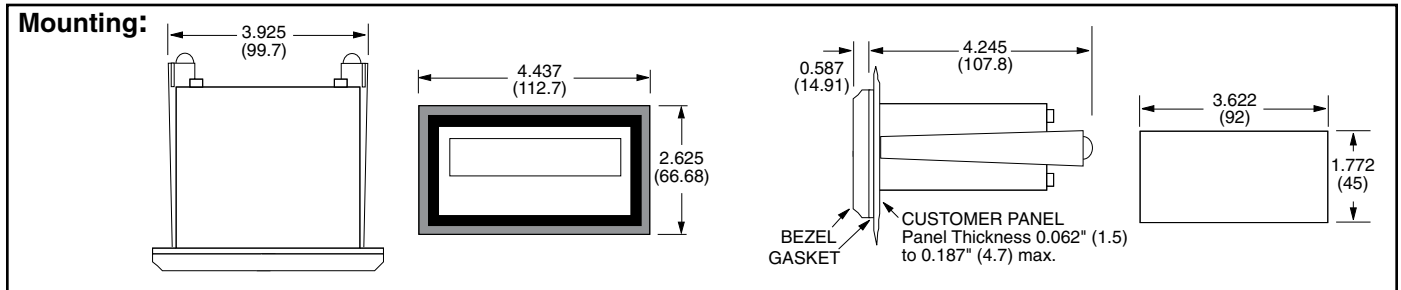
If the serial interface option is supplied, multiple units can be linked together. (The terminal addressing the unit must be capable of driving all loads in the loop.) Unit status and new set points can be communicated by serial communication. Mode changes, however, must always be made on the front panel.

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
- NO

Ordering Information

Example: DRT A 3 1

Series: DRT= 6 digit counter / 5 digit 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

NOTE: RS232/RS422/RS485 & Analog Output options can not be combined

Accessories

- Separate non keyboard panel order #34235
- Separate keyboard panel - order #34234
- NEMA4 wall mount enclosure available, see NEMAtril
- Explosion proof enclosure available, see XHV
- Serial printer available, see P1000, P295
- Ethernet Port Server available, see IEPS
- RS-422/485 to RS-232 Communication Adaptor available, see CA285
- Modbus DDE/OPC Server available, see KEPserver

NAMUR DRT

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 (optional)
- Pulse Input - 10 kHz Max.
- Security Lockout
- NEMA 4X / IP65 Front Panel
- NAMUR Input - 10 kHz Max.



- 4-20mA or 0-20mA Analog Output (optional)
- CSA Listed

DESCRIPTION:

The NAMUR DRT (NDRT) 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 (6.5W) 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:

NAMUR Input:

Logic 0 < 1 mA; Logic 1 > 3 mA

Input Resistance 1000 ohms (typ.)

3NB: NAMUR input on Input A and Input B

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; 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 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 Compliant

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:

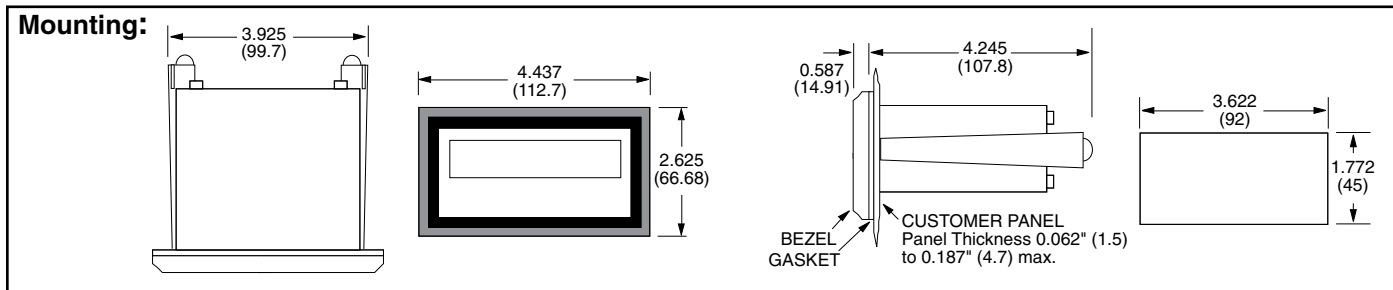
If the serial interface option is supplied, multiple units can be linked together. (The terminal addressing the unit must be capable of driving all loads in the loop.) Unit status and new set points can be communicated by serial communication. Mode changes, however, must always be made on the front panel.

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 (NAMUR)
 - 6- B INPUT
 - 7- +12VDC OUT/+DC IN (unregulated)
 - 8- -DC (GROUND)
 - 9- RESET INPUT
 - 10- +8VDC @ 50mA
 - 11- A.C. INPUT
 - 12- A.C. INPUT
 - 13- V+
 - 14- I SINK
- RELAYS** (A, B)
ANALOG OUTPUT
SWITCH (OFF, ON, RUN, CAL., RATE, COUNT, RUN, SET)

Ordering Information

Example: NDRT A 3 1

Series: NDRT= 6 digit counter / 5 digit 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: 3NB = NAMUR input on Input A and Input B

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

NOTE: RS232/RS422/RS485 & Analog Output options can not be combined

Accessories
Separate non keyboard panel order #34235
Separate keyboard panel - order #34234
NEMA4 wall mount enclosure available, see NEMAtr0l and LCN4X
Explosion proof enclosure available, see XHV
Serial printer available, see P1000, P295
Ethernet Port Server available, see IEPS
RS-422/485 to RS-232 Communication Adaptor available, see CA285
Modbus DDE/OPC Server available, see KEPServer

SUPERtrol-I LE

Economical Flow Totalizer, Ratemeter and Batcher

Features

- EZ Setup Feature Speeds Instrument Setup
- Setup Diskette
- Advanced Batching Features, Including Quick Batching Sequence
- Menu Selectable Hardware Features
- Two Line LCD or VFD Display
- NEW! - 0-20mA or 4-20mA Analog Output
- NEW! - Attractive Wall Mount Enclosure
- Isolated Pulse Output Standard
- RS-232 Port Standard, RS-485 Optional
- Advanced Printing Capabilities
- Data Logging & Modem Remote Metering Support
- DIN Enclosure with Two Piece Connectors
- DDE Server & HMI Software Available

Description:

The SUPERtrol-I LE Flow Computer satisfies the instrument requirements for a variety of pulse producing flowmeter types in liquid applications.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling is supported. An EZ Setup feature rapidly guides the user through the basic setup.

The SUPERtrol-I LE can be programmed for rate/total indication or batching. The various pulse inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each feature while configuring the instrument. A 0-20mA or 4-20mA analog output is standard.

The user can assign the standard RS-232 Serial Port for data logging, transaction printing, or for connection to a modem for remote meter reading. An optional RS-485 serial port using Modbus RTU protocol is available.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs. The system setup can also be printed.

Specifications:

Environmental

Operating Temperature: 0°C to +50°C
Storage Temperature: -40°C to +85°C
Humidity: 0-95% Non-condensing
Materials: U.L. approved

Listing: UL/C-UL Listed (File No. E192404), CE Compliant

Display

Type: 2 lines of 20 characters
Types: Backlit LCD and VFD ordering options
Character Size: 0.3" nominal
User programmable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad
Keypad Rating: Sealed to Nema 4
Number of keys: 16



Enclosure

Depth behind panel: 6.5" including mating connector
Type: DIN
Materials: Plastic, UL94V-0, Flame retardant
Bezel: Textured per matt finish

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.

110 VAC Power Option: 85 to 127 Vrms, 50/60 Hz
220 VAC Power Option: 170 to 276 Vrms, 50/60 Hz
DC Power Option:
12 VDC (10 to 14 VDC)
24 VDC (14 to 28 VDC)

Flow Inputs:

Pulse Inputs:

Number of Flow Inputs: one (single or quadrature)
Input Impedance: 10 K Ω nominal
Pullup Resistance: 10 K Ω to 5 VDC (menu selectable)
Pull Down Resistance: 10 K Ω to common
Trigger Level: (menu selectable)

High Level Input

Logic On: 3 to 30 VDC
Logic Off: 0 to 1 VDC

Low Level Input (mag pickup)

Sensitivity:
10 mV or 100 mV

Minimum Count Speed:

User selectable (as low as 1 pulse/99 seconds)

Maximum Count Speed:

Selectable: 40 Hz, 3000 Hz or 20kHz

Overvoltage Protection: 50 VDC

Linearization: Average K or 16 Point linearization with separate forward and reverse tables

Control Inputs

Number of Inputs: 3

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used.

Control Input Specifications

Input Scan Rate: 10 scans per second

Logic 1: 4 - 30 VDC

Logic 0: 0 - 0.8 VDC

Input Impedance: 100 K Ω

Control Activation:

Positive Edge or Pos. Level based on product definition for switch usage.

Excitation Voltage

Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected)

Data Logging

The data logger captures print list information to internal storage for approximately 1000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

Batching Features

Quick batching sequence, single or dual stage batching, slow fill, auto-batch restart and batch overrun compensation.

KEPTROL R/T

TOTALIZER / RATEMETER

Features

- Pulse or Analog Input Ordering Options
- Display Total, Rate or Grand Total
- Two Alarm Outputs, User Selectable for Total, Rate or Grand Total
- Pulse Input to 20 kHz Count Frequency
- K-Factor Programmable to 8 Places
- Password Protection
- Two Way RS232/422/ Communications Option
- NEMA 4X/IP 65 Front Panel
- Scalable Analog Output of Rate or Total (optional)
- 16 Point Linearization Option



Description:

Featuring 8 digits of bright, .55", alphanumeric display, the pulse input version of the KEPTrol R/T can accept up to 20,000 pulses per second. The analog input version accepts inputs, such as 4 to 20mA or 1 to 5V. The standard KEPTrol R/T has two separate, 8 digit, floating decimal, "K" factors to convert the inputs to meaningful total and rate data. An optional 16 point K-factor can linearize flow from meter outputs. The user, with the push of a button, can toggle back and forth to view the total, the rate of flow and the grand total count. Two control outputs can be assigned independently by the user to activate at preset limit of total, rate or grand total for .1 to 9.9 seconds or until reset.

A scaled pulse output is also provided by an open collector driver. Since the output frequency is user selectable at 10, 200, 2K or 20K Hz, the unit can transmit the total data to remote electromechanical or electronic totalizers as well as computers, programmable controllers or other monitor equipment.

An optional analog output allows the user to select low and high settings to control strip chart recorders or other peripherals.

Up to 15 units can be connected to optional RS232 or RS422 communications port to set control points or access data.

Specifications:

Display: 8 Digit, .55" High, 15 Segment, Red Orange, LED.

Input Power (Internally Fused)

A: 110 VAC $\pm 15\%$ or 12 to 27 VDC

B: 220 VAC $\pm 15\%$ or 12 to 27 VDC

Current: Maximum 250mA DC or 3.2VA (3.2W) at rated AC voltage.

Output Power: (On AC powered units only)

+12 VDC at 100mA. Separate Isolated 12 VDC at 100mA to allow +12 VDC or +24 VDC regulated $\pm 5\%$ worst case.

DC Outputs are supplied with resettable fuses.

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

Pulse Inputs:

3A: Standard, High impedance pulse input. Open or 0 to 1 VDC (low), 3 to 30 VDC (high), 10K Ohm impedance, 20 kHz max. input speed (min. on/off 25 μ sec.).

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

Analog Inputs:

The current loop or voltage input is converted to a highly linear 0 to 10 kHz frequency. This frequency can then be scaled by the 8 digit K-Factors to total or display rate in separate engineering units.

Accuracy over full temperature range:

Zero error: +0.175% full scale max.

Overall error: +0.5% full scale max.

5A/7A: 4-20mA, 250 Ohm impedance

5B/7B: 0-20mA, 250 Ohm impedance

5C/7C: 1-5 VDC, 15K Ohm impedance

5D/7D: 0-5 VDC, 15K Ohm impedance

5E/7E: 0-10 VDC, 15K Ohm impedance

6A: 4-20 mA, Square Law, 250 Ohm impedance

Reset:

Front push button: "Clear" resets displayed number and control output. Remote: 3 to 30 VDC positive edge resets the totalizer and control output. Impedance: 10K to ground

Minimum pulse: 5 msec.

Temperature:

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

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

ET: Extended Temperature -40° to 158°F (-40° to 70° C)

ET not available with analog inputs or outputs

Humidity: 0-90% Noncondensing

Listing: CE Compliant

Totalizer: Each of the total and grand total counters have 8 digits. In the set-up mode choose "R0" (reset to zero) for adding operation or "SP" (set to preset) for subtracting operation. While viewing the total, the display can be made to flash the grand total by pressing "ENT". Activating "CLR" while the grand total is flashing, resets the grand total counter.

Ratemeter: Accurate to 5 1/2 digits (± 1 display digit). The rate meter can be programmed to accept almost any number of pulses per unit of measurement for pulse rate as low as one pulse every 24 seconds, and autorange up to 6 digits of significant information. The rate meter with a "K" factor of 1 displays the rate of pulses per second. Simply dial in the proper "K" factor to display in minutes, hours or other units of measurement. Press the "C" button while the unit is displaying the total to display the rate as indicated by "R" displayed on the left side of the display.

Password Lockout: Two stage lockout is available for allowing change of presets only or total lockout of front panel parameter changes. Unauthorized front panel changes can be prevented by entering a user selected four digit password code.

Factored Output: The KEPtrol R/T gives one pulse out for each factored total count. Open collector sinks 30 VDC maximum to 1 volt maximum at 100mA maximum. Output speed is user selectable (see table below). An internal buffer holds up to 10,000 pulses for output at the selected frequency before "DATA LOST" flashes, indicating output pulses were lost. If factored rate exceeds 7 digits "RFF..." flashes. This alarm indicates that the maximum displayed rate has been exceeded.

Speed(Hz)	10	200	2000	20000
Min. on/off (mSec)	47.5	2.0	0.2	0.013

Control Outputs: (Each of two outputs)

1. NPN Transistor Version: (Optional)
Open collector sinks max. 250mA from 30 VDC when active.
2. SPDT Relay Version:
10A 120/240 VAC or 28 VDC (Standard).

Analog Output: Digital input or analog input (except Square Law) versions can be ordered with an analog output of the rate or total reading. User keys in the low and high settings at set-up.

Current Outputs:

A sinking driver generates a corresponding linear current through the external devices, updating with each update of the rate display. Accuracy is $\pm 5\%$ worst case. Compliance voltage must be 3 to 24 VDC, non inductive. (The KEPtrol R/T can provide the DC source as long as the drop across all devices being driven does not exceed 21 V).

Voltage Outputs:

When the voltage out option is ordered, a controlled voltage output is located at terminal 3 and referenced to pin 12 (ground). Accuracy is $.1\% @ 20^\circ\text{C}$ (max. drift $.01\%/C^\circ$).

Preset Alarms: Two control alarms are provided on the KEPtrol R/T. The preset numbers can be made to flash without interrupting the control function by pressing "A" (Preset A) or "B" (Preset B). Press "ENT" to return to rate or total display. Change the preset by clearing the flashing preset number and keying in a new setpoint number before pressing the "ENT" button. (Count pulses may be lost if the preset is changed while pulses are coming in.) In the "Relay Set-Up" the user selects either or both preset outputs to be activated by the total, grand total or rate. If selected for total or grand total the outputs can be set to activate at the preset total for 0.1 to 9.9 seconds or latch (0.0 setting) until reset. If selected for rate control, the rate will be compared with the preset at each display update and the output activated if the rate is equal to or greater than the preset. The output drops out again only if the rate drops below the preset. If the rate goes out of scale the display will show all "F" and the output will remain in the state prior to going out of scale.

K-Factor: In the standard unit a fixed K-Factor is used to convert the input pulses or frequency generated internally by the analog input to engineering units. The 8 digit K-Factor dividers, with decimal keyed into any position, allow easy direct entry of any K-Factor greater than 0.0001 to 99999999. Separate K-Factors

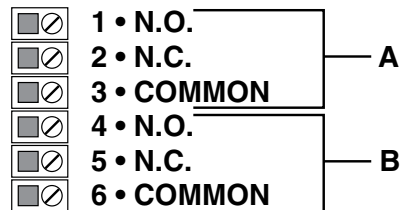
may be entered for the total and rate section. Thus, you may totalize in gallons and display rate in liters per hour. The maximum factored count speed is 20,000 Hz. The maximum factored rate is 7 digits.

16 POINT LINEARIZATION variable K-factor option makes flow systems more accurate and often extends their usable range by allowing users to dial in different K-factors for different flow rates. It works with either pulse input or standard analog current loop or voltage input. It is recommended for flow meters whose K-factors change with different rates of flow. From 3 to 16 points of frequency (0 to 10,000 Hz) and K-factors (.0001 to 999,999) are dialed in at set up. The unit uses 8 digit floating math to interpolate between settings. Rate per second, per minute or per hour programmability eliminates the need to calculate separate K-factors for total and rate.

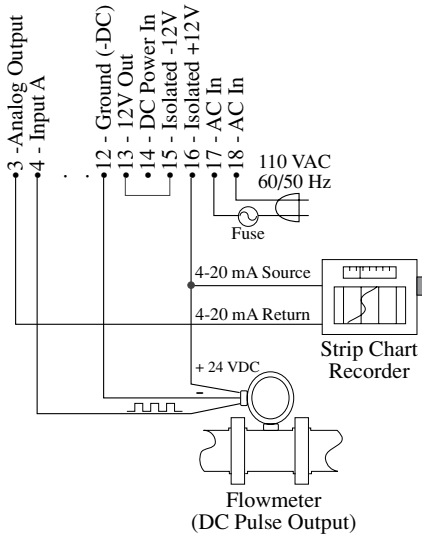
Outcard: RS232 or RS422 serial two way communication options are available. Several units can be linked together and addressed separately to transmit unit status or accept new set points in the standard ASCII format. Baud rates of 300, 600, 1200, 2400, 4800 or 9600 as well as choice of odd, even, space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

Termination:

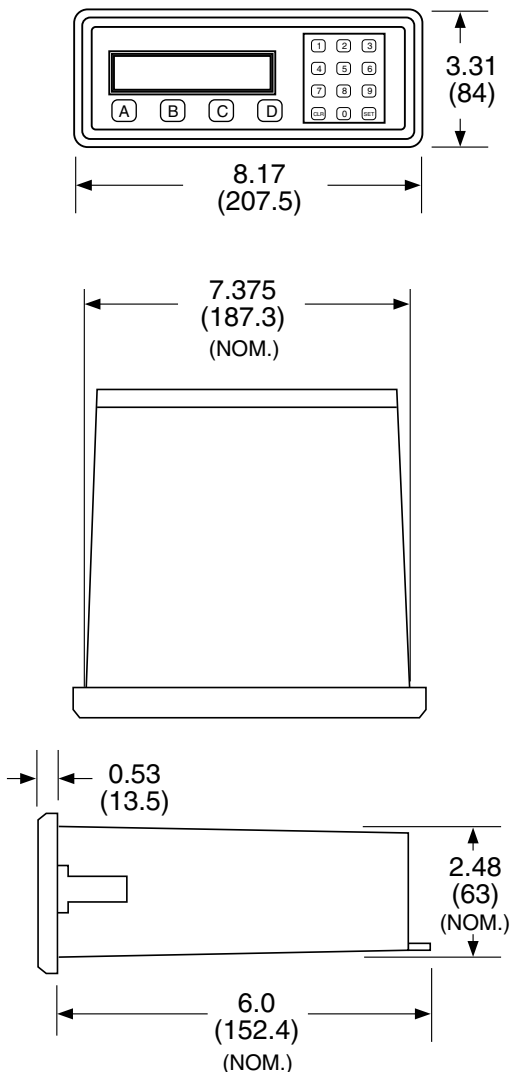
- 1 • NOT USED
- 2 • SCALED OUTPUT (OPEN COLLECTOR)
- 3 • ANALOG OUTPUT (SINK)
- 4 • INPUT (PULSE/ANALOG)
- 5 • RESET INPUT
- 6 • NOT USED
- 7 • NOT USED
- 8 • NOT USED
- 9 • NOT USED
- 10 • NOT USED
- 11 • GROUND (-DC)
- 12 • GROUND (-DC)
- 13 • 12 VOLTS OUT
- 14 • + DC POWER IN (12 to 27 VDC)
- 15 • ISOLATED -12 VOLTS OUT
- 16 • ISOLATED +12 VOLTS OUT
- 17 • AC INPUT
- 18 • AC INPUT
- 19 • PRESET B OPEN COLLECTOR
- 20 • PRESET A OPEN COLLECTOR



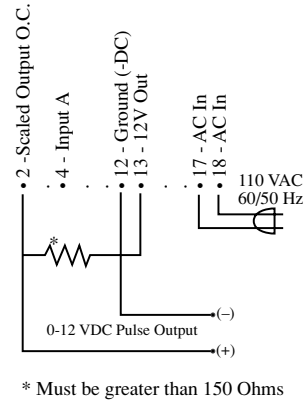
Pulse Input With Analog Output



Dimensions:



Pulse Output Wiring



Ordering Information

Example **KRT8 A 3A 2 A 13**

Series:

KEPtrol R/T

Operating Voltage:

A: 110 VAC $\pm 15\%$ or 12 to 27 VDC

B: 220 VAC $\pm 15\%$ or 12 to 27 VDC

Control Inputs:

* 3A: STD Pulse 3-30 VDC 20 kHz Max.

* 3B: As 3A, with 4.7 K Ω pull up resistors

5A: 4-20 mA

5B: 0-20 mA

5C: 1-5 VDC

5D: 0-5 VDC

5E: 0-10 VDC

6A: 4-20 mA Square Law

7A: 4-20mA in, 4-20mA out

7B: 0-20mA in, 4-20mA out

7C: 1-5VDC in, 4-20mA out

7D: 0-5VDC in, 4-20mA out

7E: 0-10VDC in, 4-20mA out

For Other Outputs:

Add X for 0-20mA out

Add Y for 0-5V out

Add Z for 0-10V out

Control Outputs:

1: Open Collector (optional)

2: SPDT Relay 10A (standard)

Input Speed:

* A: 0-40 CPS (Inputs 3A, 3B)

* C: 0-400 CPS (Inputs 3A, 3B)

* E: 0-20K CPS (Inputs 3A, 3B)

K: Inputs 5A-5E, 6A, 7A-7E

* Dip switch selectable,
all units can be field modified easily.

Options: (Multiple Options Available)

1: RS232 Serial Interface

2: RS422 Serial Interface

3: 4-20 mA Output (Input 3A or 3B only)

3X: 0-20 mA Output (Input 3A or 3B only)

3Y: 0-5VDC Output (Input 3A or 3B only)

3Z: 0-10VDC Output (Input 3A or 3B only)

4: 16 Point Linearization Opt.

ET: Extended Temperature:

-40° to 158°F (-40° to 70° C)

ET not available with analog inputs or outputs

UL/CSA: UL/CSA Approved Unit (pending) ..(consult factory)

Accessories:

NEMATROL- NEMA 4X/IP 65 Enclosures (see Accessories)

FLEXCOVER #36120

XTROL7/4- Explosion proof housing (see Accessories)

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

RTP

Two Separate Ratemeters, Totalizers With Two 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)



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

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: 100 to 260 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)
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)
DISPLAY RESOLUTION:	6 Digit Total, 6 Digit Rate
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

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

The RTP has the following Control Outputs:
RELAY / O.C.: 2 N.O. relays of 5 A and 250 V OR
2 Open Collector Outputs;
100 mA maximum.

ANALOG OUTPUT

Type: 4-20 mA output.

Accuracy: $\pm 50\mu\text{A}$ worst case.

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

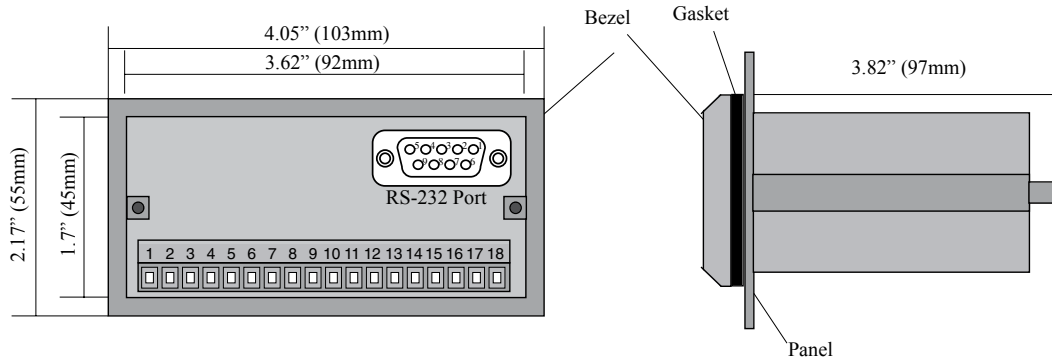
Reverse tracking O/P is also available.

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:

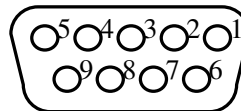
AC Power

- 1 • AC1 100 TO 260 VAC
- 2 • AC2 100 TO 260 VAC
- 3 • RELAY A (N.O.)
- 4 • COMMON
- 5 • RELAY A (N.C.)
- 6 • RELAY B (N.O.)
- 7 • COMMON
- 8 • RELAY B (N.C.)
- 9 • (+) 20VDC OUT (50mA)
- 10 • (-) 20VDC OUT (50mA)
- 11 • ANALOG O/P (+)
- 12 • ANALOG O/P (-)
- 13 • CTRL I/P E
- 14 • CTRL I/P D
- 15 • CTRL I/P C
- 16 • PULSE I/P B
- 17 • PULSE I/P A
- 18 • INPUT GND

DC Power

- 1 • + DC INPUT (24VDC $\pm 10\%$)
- 2 • - DC INPUT (24VDC $\pm 10\%$)
- 3 • RELAY A (N.O.)
- 4 • COMMON
- 5 • RELAY A (N.C.)
- 6 • RELAY B (N.O.)
- 7 • COMMON
- 8 • RELAY B (N.C.)
- 9 • (+) 20VDC OUT (50mA)
- 10 • (-) 20VDC OUT (50mA)
- 11 • ANALOG O/P (+)
- 12 • ANALOG O/P (-)
- 13 • CTRL I/P E
- 14 • CTRL I/P D
- 15 • CTRL I/P C
- 16 • PULSE I/P B
- 17 • PULSE I/P A
- 18 • INPUT GND

Communication Port Terminal Designations:



RS-232 Port: (DB9 Female)

- 6 - NC
- 7 - CMOS TXD
- 8 - TX
- 9 - RX

RS-485 Port: (DB9 Female)

- 1 - TX+
- 2 - TXD
- 3 - RXD
- 4 - RX+
- 5 - GND

Ordering Information

Example: RTP A 3 1

Series: RTP= Pulse Input Ratemeter/Totalizer

Operating Voltage:

A= 110 VAC $\pm 15\%$

B= 220 VAC $\pm 15\%$

*C= 24 VDC

Input:

3= Standard, 4-30 VDC simultaneous inputs

Options:

1= RS-232, 3 Control Inputs (not available with RS-485)

*2= RS-485, 2 Control Inputs (not available with RS-232)

A= 4-20 mA Out (Can be ordered with options 1 or 2)

* Special Order

Accessories

NEMA 4X wall mount enclosure available, see NEMA-1/8DIN

XHV 7/4 Explosion Proof Housing available, see XHV7/4

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

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

MS-716

Flow Totalizer, Ratemeter and Batch-er for Vehicle & Skid Mounting

Features

- NEW! - Vehicle Mount Enclosure; Rugged Aluminum Construction
- Class I, Div II Option Available
- Provisions for Sealing
- "EZ Setup" Guided Setup for First Time Users
- Rate/Total and Batching Functions
- Menu Selectable Hardware & Software Features
- Universal Viscosity Curve (UVC) and API Eq.
- Advanced Batching Features: Overrun Compensation, Autobatch Start, Print End of Batch, Slow Fill, 2 Stage Batching
- Isolated Outputs Standard
- RS-232 Port Standard, RS-485 Optional
Advanced Printing Capabilities
Windows™ Setup Software
- On Board Data Logging
- DDE Server & HMI Software Available

Description:

The MS-716 is a special version of the SUPERtrol-1 Flow Computer which is supplied in a vehicle mount enclosure. The MS-716 satisfies the instrument requirements for a variety of flowmeter types in liquid applications. Multiple flow equations and instrument functions are available in a single unit with many advanced features.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling is supported

The versatility of the MS-716 permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/output while configuring the instrument.



- Enhanced Modem Features for Remote Metering
- Quick Batching Sequence with Automatic Ticket Printing

The isolated analog output can be chosen to follow volume flow, corrected volume flow, mass flow, temperature, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for data logging, transaction printing, or for connection to a modem for remote meter reading.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs and printing system setup.

Specifications:

Flow Meters and Computations

Meter Types: All linear and square law meters supported including: Coriolis, vortex, turbine, magnetic, PD, target, orifice, venturi, v-cone and many others

Linearization: Square root, 16 point table or UVC table

Computations: Volume, Corrected Volume & Mass

Fluid Computations: Temperature, Density, Viscosity and API 2540 for petroleum.

Environmental

Indoor Use

Altitude up to 2000m

Operating Temperature: 0°C to +50°C
(-20°C to 55°C optional)

Storage Temperature: -40°C to +85 C

Maximum Relative Humidity : 80% for temperatures up to 31°C decreasing linearly to 50% RH at 40°C

Mains supply voltage fluctuations not to exceed ±10% of the nominal voltage

Transient overvoltage according to INSTALLATION CATEGORY II (see UL 3101-1 Annex J)

POLLUTION DEGREE 2 in accordance with IEC 664 (see 3.7.3)

Materials: UL, CSA, VDE approved

UL Class 1 Division 2 (optional)

Listing: UL/ULC Listed (File No. E192404), CE Compliant

Display

Type: 2 lines of 20 characters

Types: Backlit LCD

Character Size: 0.3" nominal

User programmable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad with 16 keys

Enclosure

Size: See Dimensions

Seal: NEMA4X

Materials: Aluminum

Real Time Clock

The MS-716 is equipped with a battery backed real time clock with display of time and date.

Format:

12 or 24 hour time display

Day, Month, Year date display

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.

110 VAC Power: 85 to 127 Vrms, 50/60 Hz

220 VAC Power: 170 to 276 Vrms, 50/60 Hz

DC Power:

12 VDC (10 to 14 VDC)

24 VDC (14 to 28 VDC)

Power Consumption:

AC: 11.0 VA (11W)

DC: 300 mA max.

Flow Inputs:

Analog Input:

Accuracy: 0.01% FS at 20° C

Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Basic Measurement Resolution:

16 bit

Update Rate: 4 updates/sec

Automatic Fault detection: Signal over/under-range, Current Loop Broken

Calibration: Software Calibration (no trimmers) and Auto-zero Continuously

Extended calibration:

Learns Zero and Full Scale of each range using special test mode.

Fault Protection:

Reverse Polarity: No ill effects

Over-Voltage Limit: 50 VDC Over voltage protection

Over-Current Protection: Internally current limited protected to 24VDC

Pulse Inputs:

Number of Flow Inputs: one with or without quadrature

Input Impedance: 10 KΩ nominal

Pullup Resistance: 10 KΩ to 5 VDC (menu selectable)

Pull Down Resistance: 10 KΩ to common

Trigger Level: (menu selectable)

High Level Input

Logic On: 3 to 30 VDC

Logic Off: 0 to 1 VDC

Low Level Input (mag pickup)

Sensitivity:

10 mV or 100 mV

Minimum Count Speed:

Menu selectable

Maximum Count Speed:

Menu Selectable: 40Hz, 3000Hz or 20 kHz

Overvoltage Protection: 50 VDC

Auxiliary / Compensation Input

The auxiliary/compensation input is menu selectable for temperature, density or not used. This input is used for the compensated input when performing compensated flow calculations and using volumetric flowmeters. It can also be used as a general purpose input for display and alarming.

Operation: Ratiometric
 Accuracy: 0.01% FS at 20° C
 Basic Measurement Resolution: 16 bit
 Update Rate: 1 update/sec minimum
 Automatic Fault detection:
 Signal Over-range/under-range
 Current Loop Broken
 RTD short
 RTD open
 Fault mode to user defined default settings
 Fault Protection:
 Reverse Polarity: No ill effects
 Over-Voltage Limit (Voltage Input): 50 VDC
 Available Input Ranges
 Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC
 Current: 4-20 mA, 0-20 mA
 Resistance: 100 Ohms DIN RTD

100 Ohm DIN RTD
 (DIN 43-760, BS 1904):
 Three Wire Lead Compensation
 Internal RTD linearization learns ice point resistance
 1 mA Excitation current with reverse polarity protection
 Temperature Resolution: 0.01 C

Control Inputs

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used.
 Control Input Specifications
 Input Scan Rate: 10 scans per second
 Logic 1: 4 - 30 VDC
 Logic 0: 0 - 0.8 VDC
 Input Impedance: 100 KΩ
 Control Activation:
 Positive Edge or Pos. Level based on product definition for switch usage.

Excitation Voltage

Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected)
NOTE: DC powered units have limited excitation voltage

Relay Outputs

The relay outputs are menu assignable to (Individually for each relay) Low Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm or General purpose warning (security), low temperature/high temperature.
 Number of relays: 2 (4 optional)
 Contact Style: Form C contacts
 Contact Ratings: 5 amp, 240 VAC or 30 VDC

Serial Communication

The serial port can be used for printing, datalogging, modem connection and communication with a computer.

RS-232:
 Device ID: 01-99
 Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200
 Parity: None, Odd, Even
 Handshaking: None, Software, Hardware
 Print Setup: Configurable print list and formatting.
 Print Out: Custom form length, print headers, print list.
 Print Initialization: Print on end of batch, key depression, interval, time of day or remote request.
 RS-485: (optional 2nd COM port)
 Device ID: 01-247
 Baud Rates: 1200, 2400, 4800, 9600, 19200
 Parity: None, Odd, Even
 Protocol: Modbus RTU (Half Duplex)

Data Logging

The data logger captures print list information to internal storage for approximately 1000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

Isolated Analog Output

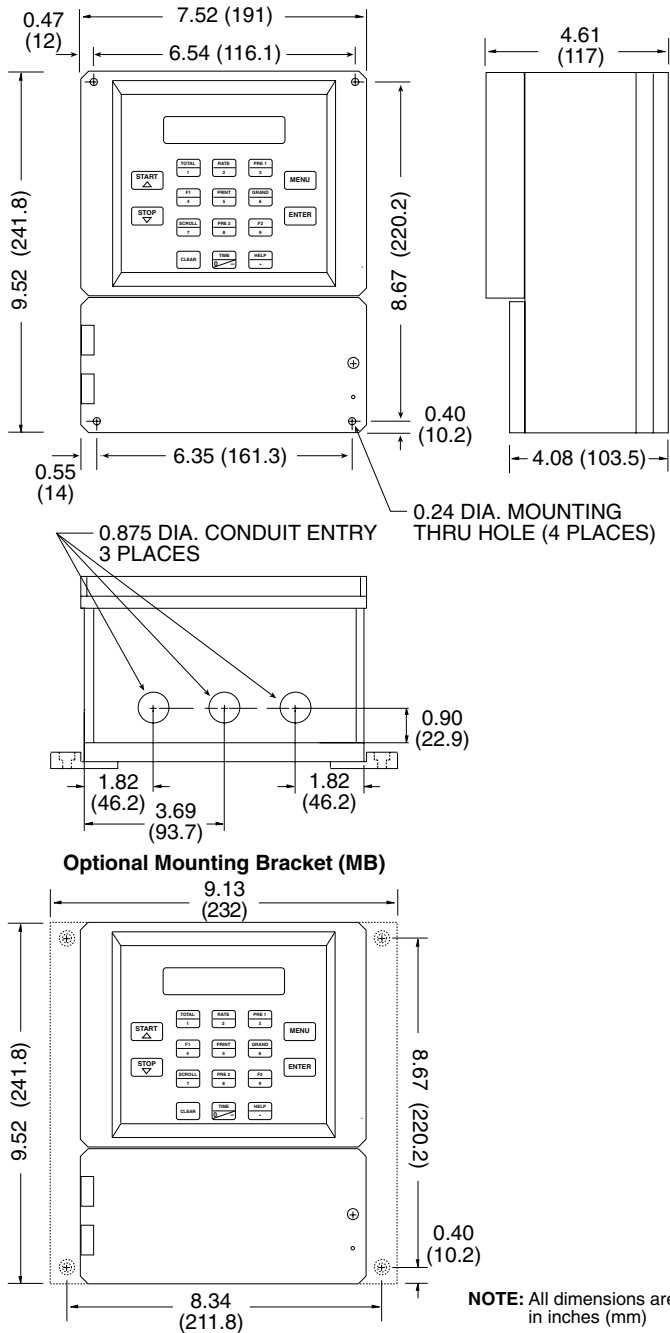
The analog output is menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, Volume Total, Corrected Volume Total or Mass Total.
 Type: Isolated Current Sourcing
 Available Ranges: 4-20 mA, 0-20 mA
 Resolution: 12 bit
 Accuracy: 0.05% FS at 20° C
 Update Rate: 1 update/sec minimum
 Temperature Drift: Less than 200 ppm/C
 Maximum Load: 1000 ohms (at nominal line voltage)
 Compliance Effect: Less than .05% Span
 60 Hz rejection: 40 dB minimum
 Calibration: Operator assisted Learn Mode
 Averaging: User entry of damping constant to cause a smooth control action

NOTE: DC powered units are not isolated

Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total or Mass Total
 Pulse Output Form: Photomos Relay
 Maximum On Current: 25 mA
 Maximum Off Voltage: 30 VDC
 Saturation Voltage: 1.0 VDC
 Maximum Off Current: 0.1 mA
 Pulse Duration: 10 mSec or 100 mSec (user selectable)
 Pulse output buffer: 256
 Fault Protection
 Reverse polarity: Shunt Diode

Vehicle Mount Dimensions



Terminal Designations

1	DC OUTPUT		
2	PULSE IN 1	Vin +	FLOW
3	PULSE IN 2	lin +	IN
4	COMMON		
5	RTD EXCIT +	Vin +	COMP
6	RTD SENS +		IN
7	RTD SENS -	lin +	
8	CNTR IN 1		
9	CNTR IN 2		SEE USER
10	CNTR IN 3		MANUAL
11	COMMON		
12	PULSE OUTPUT +		
13	PULSE OUTPUT -		
15	ANALOG OUTPUT +	4-20 mA	
16	ANALOG OUTPUT -		
17	NC	25	COM RLY3
18	COM RLY1	26	NO
19	NO	27	NC
20	NC	28	COM RLY4
21	COM RLY2	29	NO
22	NO	30	NC
23	AC LINE	DC +	POWER IN
24	AC LINE	DC -	

Ordering Information

Example **MS716 L 1 A 0 V ETMB**

Series: _____

MS716 = ST1 Special

Display Type: _____

L = LCD

Input Type: _____

1 = 110 VAC

2 = 220 VAC

3 = 12 VDC (10 to 14 VDC)

4 = 24 VDC (14 to 28 VDC)

Relays: _____

A = 2 SPDT Relays

B = 4 SPDT Relays

Network Card: _____

0 = None (STD)

2 = RS485/Modbus

Mounting: _____

V = Vehical Mount, Skid Mount, Field Mount

Options: _____

ET = Extended Tempertaure

-4°F to 131°F (-20°C to 55°C)

UL = UL Class 1 Division 2

MB = Aluminum Mounting Brackets (2) (Recommended)

IM = IM-2400 Internal Modem

M = Modem Power Option

TB = RS485 Terminal Block

for Panel Mount Enclosure

Accessories:

KEPS-KEP1-32

KEP RS232 for SUPERtrol 1, SUPERtrol 1LE,
SUPERtrol 2 and LEVELtrol 2 • 32 Bit OPC/DDE Server

KEPS-MBS32

Supports RS485 for ST1, ST1LE, ST2,
LT2, MRT, DRT & MB2 (Modbus RTU)

Modem Available, see MPP-2400 and MPP-2400N

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

Remote metering and data collection software available, see TROLlink

Batching Tutorial

What is a Flow Batch Controller? A special purpose instrument which is intended to be used in conjunction with a flow sensor and a control valve to dispense a desired amount of a fluid into a container, tank, or vehicle. In some cases the temperature may also be used to estimate the fluid density from stored fluid properties.

How does a Batcher Work? The basic batcher is illustrated in the figures below. The operator begins by entering the desired amount of fluid to be dispensed into a batch quantity setpoint on the instrument. The Start button is pushed. The valve opens and the vessel begins filling. The flow sensor sends the flow signal to the batcher. The batcher compares the total amount delivered and shuts the valve when the desired amount has been dispensed.

What is batch overrun and how do I prevent it? Batch overrun is the term given for the amount of fluid dispensed which is greater than the setpoint which was entered. Batch overrun results from the delay in the valve closing. Two techniques are used to minimize batch overrun. See Batch Overrun Compensation and Two Stage Batching.

Batch Overrun Compensation- This technique uses a feature in some batchers which “learn” the amount of batch overrun and then seek to turn the batch off “early” by the average amount of the batch overrun. This feature may be enabled or disabled in some models.

Two Stage Batching- This technique for reducing Batch Overrun uses two valves, one slow fill and one fast fill, to reduce the flow rate just before the batch ends to reduce the amount of overrun. The user can enter the prewarn value for the slow fill at the end of the batch.

Slow Fill- This is a technique used in conjunction two stage batching where a vessel is initially filled at a slow rate to prevent splashing before the fast fill begins. The user can enter the amount of fluid to be filled during the slow fill.

Count Mode- In general, a batcher may be configured to either count from 0 up to the batch quantity or to count down from the batch quantity to 0.

Maximum Batch Preset- This is a safety feature which places a limit on the maximum batch size the operator may enter. It is intended to eliminate large operator entry errors.

Batch Auto Restart- This is a capability which may be used in some applications where the same size container will be filled repeatedly. A programmable time is allowed for the removal of the previously filled container and the repositioning of the new empty container between batches.

Flow Time Out or Security- This is a safety feature which automatically stops a batch when a loss of flow signal is encountered for longer than a user programmed time while a batch is in progress. It is intended to prevent a spill in the event of a failed flow sensor.

Drain Time- This is a feature in some batchers which delays the print of batch record for a user programmable time to permit draining of a fluid into the receiving vessel.

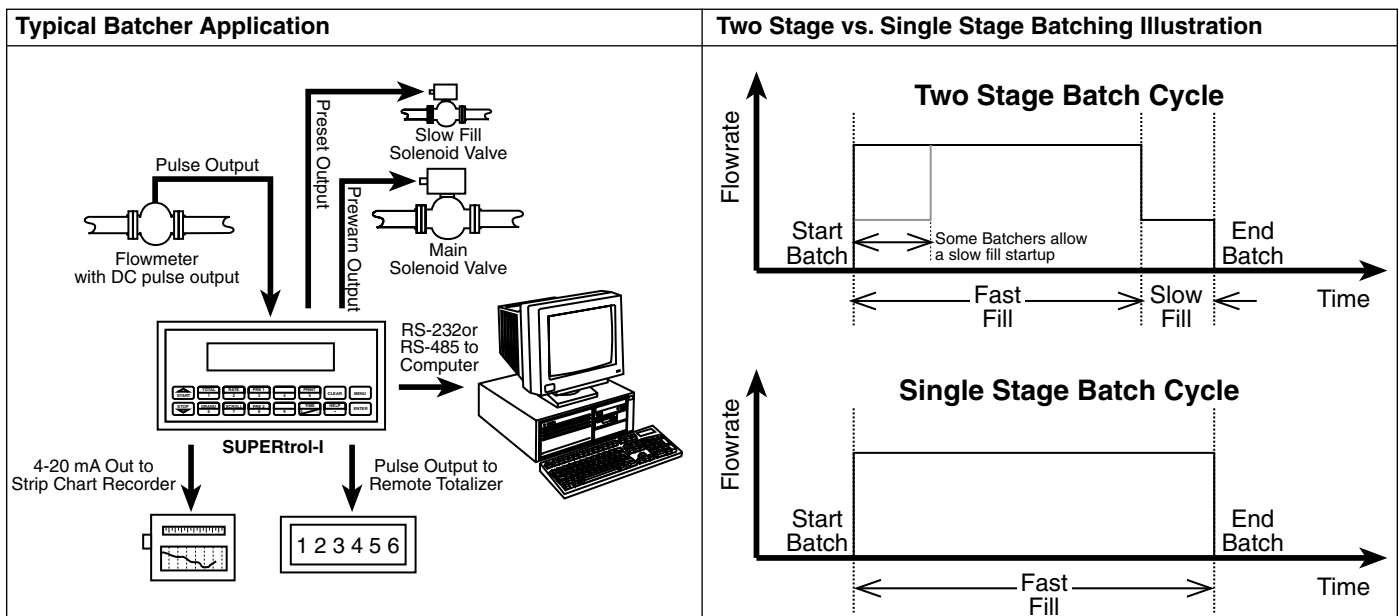
Printing Capability- Many batchers support the generation of a transaction printout. Usually a RS-232 port is provided which may be connected to a printer. A transaction print may be generated manually by pressing a PRINT key, or automatically. The format of the printout and the information which it contains are usually selectable by the user.

Print on End of Batch- This is a capability to automatically create a print out when a batch has been completed by sending out a report on a RS-232 port to a local printer.

Overrun Alarm Detection- This is a safety feature which generates an alarm if the batch quantity has exceeded the desired batch size by more than the allowed limit. It is intended as a safety measure to notify the user of a malfunctioning valve which has failed to close on command.

Remote Start/Stop/Clear Capability- Many batchers have provisions for wiring remote switches or contact closure such that a remote operator or system can control the starting and stopping of a batcher.

Flow Instruments
BATCHERS



MB2 (MINI-Batcher)

Low Cost, Pulse Input Batch Controller

Features

- 5 Digit Scaling Factor
- Display Rate, Batch Size and (Number of Batches or Grand Total)
- Second B Relay Programmable for Output at Prewarn or selected Batch/Grand Total
- Pulse Input - 10 kHz Max.
- Security Lockout
- RS422/RS232 Serial Communication Option
- Modbus RTU RS422/RS485/RS232
- NEMA 4X / IP65 Front Panel



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

Application:

This miniature batcher is ideal for all batching applications. The display will show Batch Amount, Rate and Batch/Grand Total at the push of a button. The Start and Stop buttons make batching simple.

Description:

The MINI-Batcher is a 6 digit totalizer and 4.5 digit ratemeter with two relay outputs. One output is dedicated to the batch amount (Preset A), the other can be activated for Prewarn or Batch/Grand Total. The unit can count up to the preset (reset to 0) or down from the preset (set to preset). Start, Stop and Reset functions can be activated from the front panel or remote inputs.

An analog output (assignable for Rate or Batch Amount) is available for data logging.

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

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

24 VAC \pm 15% or 12 to 15 VDC

Current: 250 mA DC max. or 6.5 VA (6.5W) 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.

Listing: CSA (File No. LR91109), CE Compliant, NRTL/C pending

Inputs:

3: High Impedance DC pulse input 4-30 VDC (high), Open or 0-1 VDC (low), 10 k Ω impedance, 10 kHz max. speed.

3M: Mag. Input, accepts 30mV input (50 V max.) signals 10 K Ω imp. 5 kHz max.

Stop / Reset:

Front Panel:

STOP/RST button stops batch if batch is running, Resets displayed value and control output if batch is stopped.

Remote:

4-30 VDC, positive edge: stops batch if batch is running, Resets batch amount if batch is stopped.

NOTE: Hold either front or remote reset active to inhibit any start inputs.

Scaling Factor (K-Factor): A user programmable K-Factor is used to convert the input pulses to engineering units. The 5 digit K-Factor divider, with decimal keyed into any position, allows easy direct entry of any K-Factor from 0.0001 to 99999.

Presets: Two control outputs are provided. A 5 digit value can be entered for both presets. The decimal point location is the same as the counter (No decimal in Batch Total counter).

PRESET A:

The preset A output is dedicated to the batch amount. When START is activated, Relay A will energize and remain on until the batch is complete or the batch is stopped.

PRESET B:

The preset B output can be programmed to activate as a Prewarn (for two stage batch control) or activate on Batch Total (number of batches) or Grand Total (selectable).

When set for PREWARN, Relay B will energize when START is activated and drop out at Prewarn number before preset.

When set for Batch Total (number of batches) or Grand Total, Relay B will activate when the batch total or grand total counts up to preset B amount. The output ON time can be set for a duration (0.01 to 99.99 sec.) or latched (0.00 setting). If a value other than 0.00 is set for the duration, the batch total (number of batches) or grand total will auto-reset at preset B.

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.

Analog Output:

An optional 4-20mA (0-20mA) output is available for the Mini-Batch series. The output can be programmed to track rate or batch amount. 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.

Lockout: Unauthorized front panel changes can be prevented by entering a user selected 5 digit code. The front panel can be completely locked out (except Start & Stop) or the preset can remain accessible.

Ratometer: Accuracy: 0.01% FS (± 1 display digit).

The rate display updates once per second. The rate meter can be programmed to sample from 2 to 24 seconds maximum, and auto-range up to 5 digits of significant information. The ratemeter displays in units per second, minute or hour.

Batch or Grand Totalizer: In addition to viewing the batch amount, a second counter can be viewed. This counter is programmable

to count either the number of batches (Batch Total) or the grand total count (Grand Total).

RS232/RS422 with KEP Protocol:

If the serial interface option is supplied, up to 99 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.

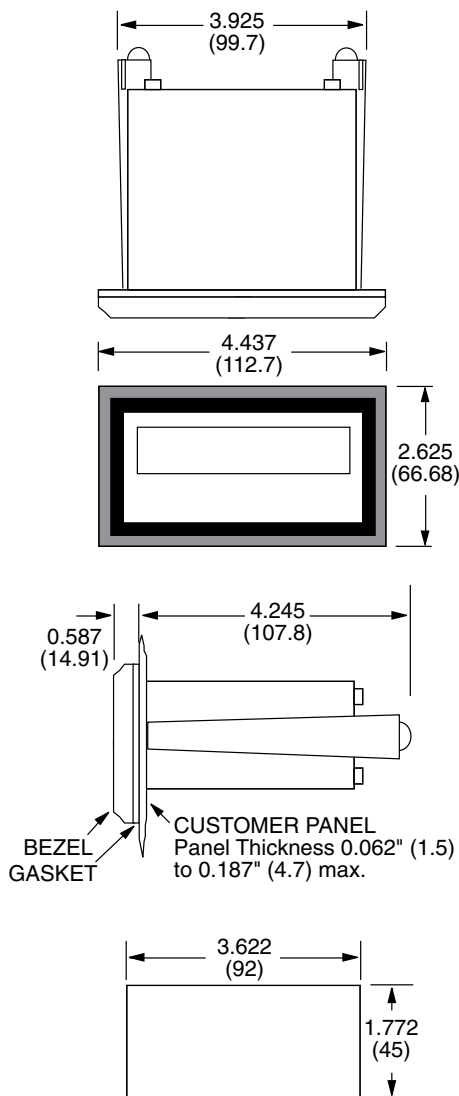
Device ID: 01-247

Baud Rates: 300, 600, 1200, 2400, 4800, 9600

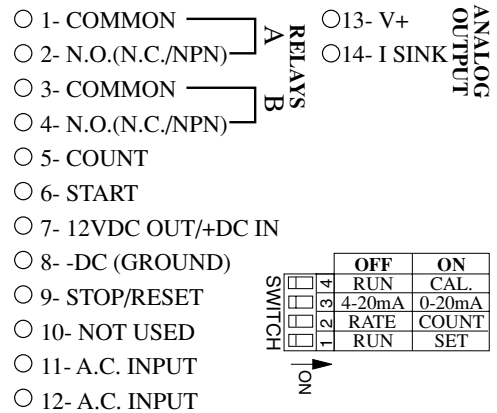
Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Dimensions:



Wiring:



Ordering Information

Example: MB2 A 3 1

Series: MB2= MiniBatcher

Operating Voltage: 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

Count Inputs: 3 = Standard, 4-30 VDC pulse inputs.

3M = Mag. Input, 30mV input

Options

1= RS232 Communications

2= RS422 Communications

3= Modbus RTU RS232

4= Modbus RTU RS422/RS485

A= Analog Output (4-20/0-20 mA)

NOTE: RS232/RS422/RS485 & Analog Output options can not be combined

Accessories

Separate keyboard panel - order #34569

NEMA4 wall mount enclosure available, see NEMAtril

Explosion proof enclosure available, see XHV

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

Modbus DDE/OPC Server available, see KEPserver

SUPERtrol-I

Multi-Function Flow Totalizer, Ratemeter and Batcher

Features

- "EZ Setup" Guided Setup for First Time Users
- Rate/Total and Batching Functions
- Menu Selectable Hardware & Software Features
- Environmental Compliance Monitoring and Report Generation
- Universal Viscosity Curve (UVC) and API Eq.
- Advanced Batching Features: Overrun Compensation, Autobatch Start, Print End of Batch, Slow Fill, 2 Stage Batching
- Isolated Outputs Standard
- RS-232 Port Standard, Modbus RTU RS-485 Optional
- Advanced Printing Capabilities
- Windows™ Setup Software
- DIN Enclosure with Two Piece Connectors
- On Board Data Logging
- DDE Server & HMI Software Available
- Enhanced Modem Features for Remote Metering

Description:

The SUPERtrol-I Flow Computer satisfies the instrument requirements for a variety of flowmeter types in liquid applications. Multiple flow equations and instrument functions are available in a single unit with many advanced features.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling is supported

The versatility of the SUPERtrol-I permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/output while configuring the instrument.

The isolated analog output can be chosen to follow volume flow, corrected volume flow, mass flow, temperature, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for data logging, transaction printing, or for connection to a modem for remote meter reading.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs and printing system setup.



Specifications:

Flow Meters and Computations

Meter Types: All linear and square law meters supported including: vortex, turbine, magnetic, PD, target, orifice, venturi, v-cone and many others
Linearization: Square root, 16 point table or UVC table
Computations: Volume, Corrected Volume & Mass
Fluid Computations: Temperature, Density, Viscosity and API 2540 for petroleum.

Environmental

Operating Temperature: 0°C to +50°C
Storage Temperature: -40°C to +85°C
Humidity: 0-95% Non-condensing
Materials: U.L. approved

Listing: UL/C-UL Listed (File No. E192404), CE Compliant

Display

Type: 2 lines of 20 characters
Types: Backlit LCD and VFD ordering options
Character Size: 0.3" nominal
User programmable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad with 16 keys

Enclosure

Size: See Dimensions
Depth behind panel: 6.5" including mating connector
Type: DIN
Materials: Plastic, UL94V-0, Flame retardant
Bezel: Textured per matt finish

Real Time Clock

The SUPERtrol-I is equipped with a battery backed real time clock with display of time and date.
Format: 12 or 24 hour time display
Day, Month, Year date display

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.

110 VAC Power: 85 to 127 Vrms, 50/60 Hz
220 VAC Power: 170 to 276 Vrms, 50/60 Hz
DC Power: 12 VDC (10 to 14 VDC)
24 VDC (14 to 28 VDC)

Power Consumption:
AC: 11.0 VA (11W)
DC: 300 mA max.

Flow Inputs:

Analog Input:

Accuracy: 0.01% FS at 20° C

Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Basic Measurement Resolution:

16 bit

Update Rate: 4 updates/sec

Automatic Fault detection: Signal over/under-range,

Current Loop Broken

Calibration: Software Calibration (no trimmers) and Auto-zero Continuously

Extended calibration:

Learns Zero and Full Scale of each range using special test mode.

Fault Protection:

Reverse Polarity: No ill effects

Over-Voltage Limit: 50 VDC Over voltage protection

Over-Current Protection: Internally current limited protected to 24VDC

Pulse Inputs:

Number of Flow Inputs: one with or without quadrature or pulse security checking

Input Impedance: 10 K Ω nominal

Pullup Resistance: 10 K Ω to 5 VDC (menu selectable)

Pull Down Resistance: 10 K Ω to common

Trigger Level: (menu selectable)

High Level Input

Logic On: 3 to 30 VDC

Logic Off: 0 to 1 VDC

Low Level Input (mag pickup)

Sensitivity:

10 mV or 100 mV

Minimum Count Speed:

Menu selectable

Maximum Count Speed:

Menu Selectable: 40Hz, 3000Hz or 20 kHz

Overvoltage Protection: 50 VDC

Auxiliary / Compensation Input

The auxiliary/compensation input is menu selectable for temperature, density or not used. This input is used for the compensated input when performing compensated flow calculations. It can also be used as a general purpose input for display and alarming.

Operation: Ratiometric

Accuracy: 0.01% FS at 20° C

Basic Measurement Resolution:

16 bit

Update Rate: 1 update/sec minimum

Automatic Fault detection:

Signal Over-range/under-range

Current Loop Broken

RTD short

RTD open

Fault mode to user defined default settings

Fault Protection:

Reverse Polarity: No ill effects

Over-Voltage Limit (Voltage Input): 50 VDC

Available Input Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD

100 Ohm DIN RTD

(DIN 43-760, BS 1904):

Three Wire Lead Compensation

Internal RTD linearization learns ice point resistance

1 mA Excitation current with reverse polarity protection

Temperature Resolution: 0.01 C

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used.

Number of Control Inputs: 3

Control Input Specifications

Input Scan Rate: 10 scans per second

Logic 1: 4 - 30 VDC

Logic 0: 0 - 0.8 VDC

Input Impedance: 100 K Ω

Control Activation:

Positive Edge or Pos. Level based on product definition for switch usage.

Excitation Voltage

Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected)

Relay Outputs

The relay outputs are menu assignable to (Individually for each relay) Low Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm or General purpose warning (security), low temperature/high temperature.

Number of relays: 2 (4 optional)

Contact Style: Form C contacts

Contact Ratings: 5 amp, 240 VAC or 30 VDC

Serial Communication

The serial port can be used for printing, datalogging, modem connection and communication with a computer.

RS-232:

Device ID: 01-99

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Handshaking: None, Software, Hardware

Print Setup: Configurable print list and formatting.

Print Out: Custom form length, print headers, print list items.

Print Initialization: Print on end of batch, key depression, interval, time of day, control input or serial request.

RS-485: (optional 2nd COM port)

Device ID: 01-247

Baud Rates: 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Data Logging

The data logger captures print list information to internal storage for approximately 1000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

Isolated Analog Output

The analog output is menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, Volume Total, Corrected Volume Total or Mass Total.

Type: Isolated Current Sourcing

Available Ranges: 4-20 mA, 0-20 mA

Resolution: 12 bit

Accuracy: 0.05% FS at 20° C

Update Rate: 1 update/sec minimum

Temperature Drift: Less than 200 ppm/C

Maximum Load: 1000 ohms (at nominal line voltage)

Compliance Effect: Less than .05% Span

60 Hz rejection: 40 dB minimum

Calibration: Operator assisted Learn Mode

Averaging: User entry of damping constant to cause a smooth control action

Control Inputs



BATCHtrol II

Batch Controller With Two Stage Valve Control

Features

- Start/Stop Buttons & Remote Inputs
- Separate 8 Digit K-Factors For Rate & Total
- Accepts Pulse or Analog Inputs
- Displays Rate, Total and Grand Total
- Security Lockout with Missing Pulse Detection
- Scaled Pulse Output
- Two Way RS232/422 Communications Option



- 2 Setpoints For Two Stage Valve Control
- NEMA 4X (IP65) Front Panel

Description:

Featuring 8 digits of bright, .55 inch, alphanumeric display, the BATCHtrol II can accept up to 20,000 pulses per second of digital count. The analog input versions accept inputs, such as 4 to 20 mA or 1 to 5V. The standard unit has two separate, 8 digit, floating decimal, "K" factors to convert the inputs to meaningful total and rate data. An optional 16 point K-factor can linearize flow from non-linear meter outputs. The user, with the push of a button, can toggle back and forth to view the total of the batch, the rate of flow or the grand total of flow.

The BATCHtrol II may be thought of as two separate counters and a ratemeter. The "batching" counter counts to prewarn and preset numbers entered by the user and enables separate control outputs. The "totalizing" counter gives a cumulative reading or grand total.

Finally, the ratemeter counts the number of pulses per second and, with its scaling feature, can provide gallons per minute or any other rate measurement without the totalizer losing counts. At any time, the user may view the total, the grand total or the rate while never interrupting the counting process.

Setup is done through the front panel and the menu driven software in the unit. Start-Stop control can be activated via the front panel buttons or remote inputs.

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 -12VDC 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.

Up to 15 addresses can be defined for the optional RS232 or RS422 communications port and units multi-dropped. The serial port can be used to set control points or access data.

Specifications:

DISPLAY:

8 Digit, .55" High, 15 Segment, Red Orange, LED.

INPUT POWER: (Internally Fused)

A: 110 VAC $\pm 15\%$ or 12 to 27 VDC

B: 220 VAC $\pm 15\%$ or 12 to 27 VDC

CURRENT:

Maximum 280 mA DC or 5.3 VA (5.3W) at rated AC voltage.

OUTPUT POWER: (On AC powered units only):

+12 VDC at 100mA. Separate Isolated 12 VDC at 100mA to allow +12 VDC or +24 VDC regulated $\pm 5\%$ worst case.

DC Outputs are supplied with resettable fuses.

TEMPERATURE:

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

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

ET: Extended Temperature -40° to 158°F (-40° to 70° C)

ET not available with analog inputs or outputs

HUMIDITY: 0-90% Noncondensing

Listing: CE Compliant

MEMORY:

EEPROM stores all program and total data for minimum of 10 years if power is lost.

PULSE INPUTS:

3A: Standard, High impedance pulse input.

Low: Open or 0 to 1 VDC

High: 3 to 30 VDC, 10K Ohm impedance 20 kHz max. input speed (min. on/off 25 μ sec.).

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

ANALOG INPUTS:

The current loop or voltage input is converted to a highly linear 0 to 10 kHz frequency. This frequency can then be scaled by the 8 digit K-Factors to total or display rate in separate engineering units.

Accuracy over full temperature range:

Zero error: +0.175% full scale max.

Overall error: +0.5% full scale max.

5A/7A: 4-20mA, 250 Ohm impedance

5B/7B: 0-20mA, 250 Ohm impedance

5C/7C: 1-5 VDC, 15K Ohm impedance

5D/7D: 0-5 VDC, 15K Ohm impedance

5E/7E: 0-10 VDC, 15K Ohm impedance

6A: 4-20 mA, Square Law, 250 Ohm impedance

RESET:

Front push button: "CLR" resets displayed number and control output.

REMOTE START & STOP/RESET INPUTS:

A 4 to 30VDC positive pulse will activate these inputs. Pin 10 is the START input and when activated, the unit will "start." Pin 5 is the STOP/RESET input. When activated, the unit will "stop" (if unit is started and the batch is not complete). When the unit is stopped or the batch is complete, activating this input will reset the total. If pin 5 is held high (4 to 30VDC), the display will flash "STOPPED" and any start inputs will be inhibited. Stop always over-rides Start input.

NOTE: The remote START input will not work with the type 7 input option (analog in & analog out) boards. All other features will work as described above.

These new features have not yet been added to the 16 point linearization BATCHtrol II version 12.0 .

FACTORED OUTPUT:

The BATCHtrol II gives one pulse out for each increment in total. The open collector sinks 30 VDC maximum to 1 volt maximum at 100mA maximum. Output speed is user selectable (see table below). An internal buffer holds up to 10,000 pulses for output at the selected frequency before "DATA LOST" flashes, indicating pulses are lost. If factored rate exceeds 7 digits "RFF..." flashes. These alarms indicated that speed has been exceeded.

Speed(Hz)	10	200	2000	20000
Min. on/off (mSec)	47.5	2.0	0.2	0.013

CONTROL OUTPUTS:

(Each of two outputs)

1. NPN Transistor Version: (Optional)

The open collector sinks max. 250mA from 30 VDC when active. (When relay is used, 10 VDC is 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).

2. SPDT Relay Version:

10A 120/240 VAC or 28 VDC (Standard).

ANALOG OUTPUT:

Digital input or analog input (except Square Law) versions can be ordered with an analog output of the rate or total reading. User keys in the low and high settings at set-up.

Current Outputs:

A sinking driver generates a corresponding linear current through the external devices, updating with each update of the rate. Accuracy is $\pm 5\%$ FS worst case. Compliance voltage must be 3 to 24 VDC, non inductive. (The BATCHtrol II can provide the DC source as long as the drop across all devices being driven does not exceed 21 V).

Voltage Outputs:

When the voltage out option is ordered, a controlled voltage output is located at terminal 3 and referenced to pin 12 (ground). Accuracy is $.1\% @ 20^\circ\text{C}$ (max. drift $.01\%/^\circ\text{C}$).

SECURITY:

The BATCHtrol II has a missing pulse detector. The user selects the amount of time (1 to 99 sec.) that the unit will "wait" for input pulses. If the unit doesn't receive pulses within the selected time, the unit displays "SECURITY" and both relays drop out. (00 Disables the security feature; Entering the lockout code returns the unit to the run mode)

PRESETS:

The user may enter two numbers to set up the batch totalizer, Preset and Prewarn. The Prewarn is a number set a certain amount before the preset number. For instance, you may want one hundred gallons in a particular batch. You may also want a valve to close and slow down flow 25 gallons before the end. Your preset is 100, your prewarn is 25. When the start is activated, the relays energize simultaneously to start flow. When the totalizer reaches 75, the prewarn relay drops out. When the totalizer reaches 100 the preset relay drops out. The preset values can be viewed or changed via the menu (when stopped).

K-FACTOR:

In the standard unit a fixed K-Factor is used to convert the input pulses or frequency generated internally by the analog input to engineering units. The 8 digit K-Factor dividers, with decimal keyed into any position, allow easy direct entry of any K-Factor greater than 0.0001 to 99999999. Separate K-Factors may be entered for the total and rate section. Thus, you may batch and total in gallons and display rate in liters per hour.

16 POINT LINEARIZATION:

This variable K-factor option makes flow systems more accurate and often extends their usable range by allowing users to dial in different K-factors for different flow rates. It works with either pulse input or standard analog current loop or voltage input. It is recommended for flow meters whose K-factors change with different rates of flow. From 3 to 16 points of frequency from 0 to 10,000 Hz. and K-factors greater than .0001 to 999,999 are dialed in at set up. The 16 point linearization option uses 8 digit

floating math to interpolate between settings. Rate per second, per minute or per hour programmability eliminates the need to calculate separate K-factors for total and rate.

TOTALIZER:

Each of the total and grand total counters have 8 digits. In the set-up mode choose "R0" (reset to zero) for adding operation or "SP" (set to preset) for subtracting operation. While viewing the total the display can be made to flash the grand total by pressing "ENT". Activating "CLR" while the grand total is flashing, resets the grand totalizer.

RATEMETER:

Accurate to 5 1/2 digits (± 1 display digit). 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 autorange up to 6 digits of significant information. The rate meter with a "K" factor of 1 displays the rate of pulses per second. Simply dial in the proper "K" factor to display in minutes, hours or other units of measurement. (See 16 Point Opt. Above) Press the "C" button while the unit is displaying the batch to display the rate; "R" is displayed on the left side of the display.

WEIGHT:

This feature is used to provide a weighted averaging of the rate data being received. Higher settings provide more averaging for a more stable display, derived from the equation:

$$\frac{(\text{Old Data} \times \text{"Weight"}) + \text{New Data}}{(\text{"Weight"} + 1)}$$

LOCKOUT:

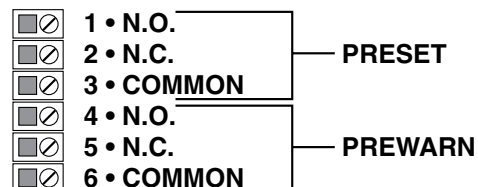
Unauthorized front panel changes can be prevented by entering a user selected four digit code.

OUTCARD:

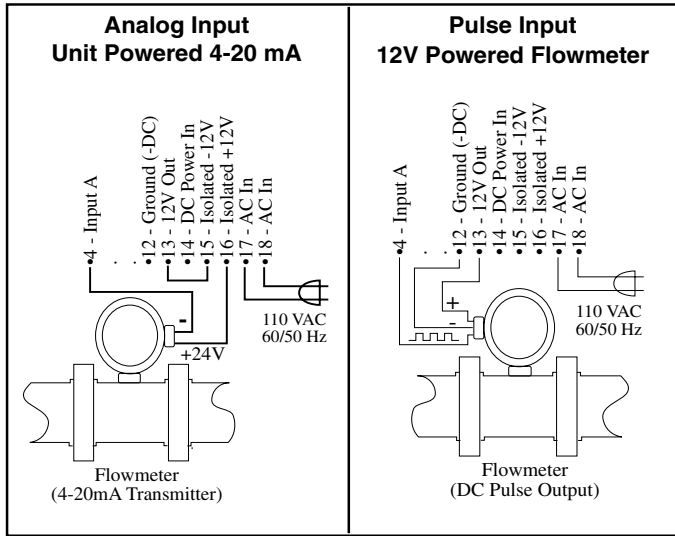
RS232 or RS422 serial two way communication options are available. Up to 15 units can be linked together and addressed separately to transmit unit status or accept new set points in the standard ASCII format. Baud rates of 300, 600, 1200, 2400 4800 or 9600 as well as choice of odd, even, space or mark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

Termination:

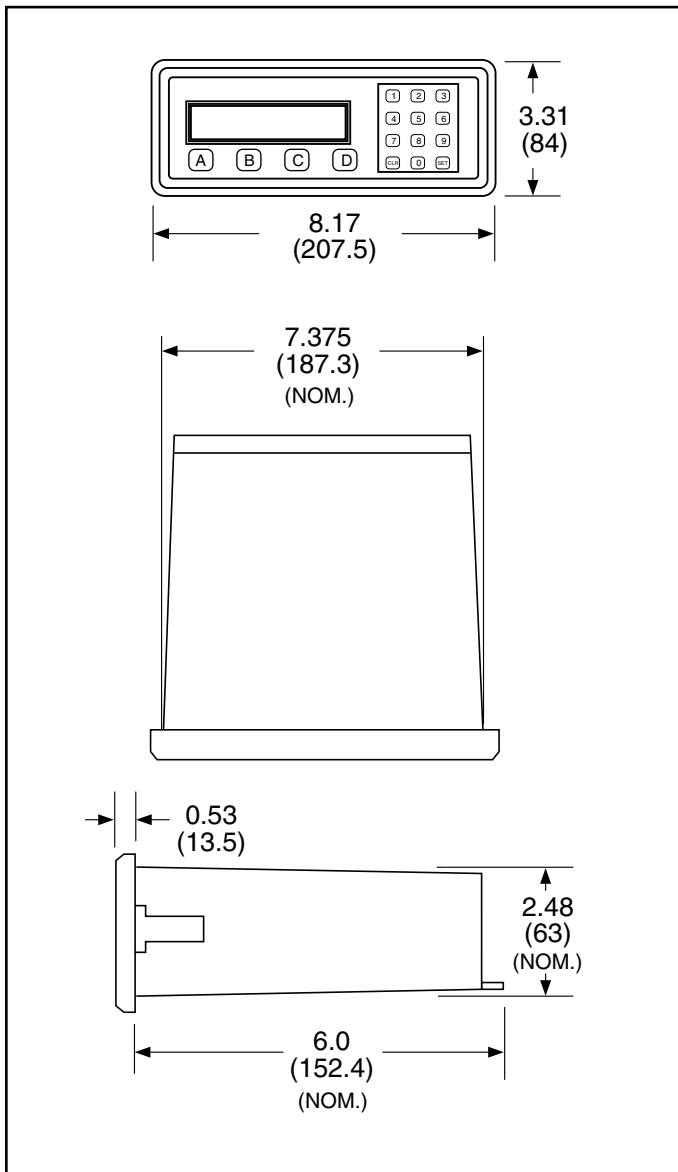
- 1 • NOT USED
- 2 • SCALED OUTPUT (OPEN COLLECTOR)
- 3 • ANALOG OUTPUT (SINK)
- 4 • INPUT (PULSE/ANALOG)
- 5 • STOP / RESET INPUT
- 6 • NOT USED
- 7 • NOT USED
- 8 • NOT USED
- 9 • NOT USED
- 10 • START INPUT
- 11 • GROUND (-DC)
- 12 • GROUND (-DC)
- 13 • 12 VOLTS OUT
- 14 • + DC POWER IN (12 to 27 VDC)
- 15 • ISOLATED -12 VOLTS OUT
- 16 • ISOLATED +12 VOLTS OUT
- 17 • AC INPUT
- 18 • AC INPUT
- 19 • PREWARN TRANSISTOR
- 20 • PRESET TRANSISTOR



Typical Hookup:



Dimensions:



Ordering Information

Example BT28 A 3A 2 A 1 3

Series: _____
Batchrol II

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

Control Inputs: _____

- * 3A: STD Pulse 3-30 VDC 20 kHz Max.
- * 3B: As 3A, with 4.7 KΩ pull up resistors
- 5A: 4-20 mA
- 5B: 0-20 mA
- 5C: 1-5 VDC
- 5D: 0-5 VDC
- 5E: 0-10 VDC
- 6A: 4-20 mA Square Law
- 7A: 4-20mA in, 4-20mA out
- 7B: 0-20mA in, 4-20mA out
- 7C: 1-5VDC in, 4-20mA out
- 7D: 0-5VDC in, 4-20mA out
- 7E: 0-10VDC in, 4-20mA out

For Other Outputs:
Add X for 0-20mA out
Add Y for 0-5V out
Add Z for 0-10V out

Control Outputs: _____

- 1: Open Collector
- 2: SPDT Relay 10A (standard)

Input Speed: _____

- * A: 0-40 CPS (Inputs 3A, 3B)
- * C: 0-400 CPS (Inputs 3A, 3B)
- * E: 0-20K CPS (Inputs 3A, 3B)
- K: Inputs 5A-5E, 6A, 7A-7E
- * Dip switch selectable, all units can be field modified easily.

Options: (Multiple Options Available) _____

- 1: RS232 Serial Interface
- 2: RS422 Serial Interface
- 3: 4-20 mA Output (Input 3A or 3B only)
- 3X: 0-20 mA Output (Input 3A or 3B only)
- 3Y: 0-5VDC Output (Input 3A or 3B only)
- 3Z: 0-10VDC Output (Input 3A or 3B only)
- 4: 16 Point Linearization Opt.
- CSA: CSA Approved Unit (pending) Consult Factory
- ET: Extended Temperature:
-40° to 158°F (-40° to 70° C)

ET not available with analog inputs or outputs

Accessories:

- FLEXCOVER #36120
- XTROL7/4- Explosion proof housing
- NEMA 4X wall mount enclosure available, see NEMATROL
- Serial printer available, see P1000, P295
- Ethernet Port Server available, see IEPS
- RS-422/485 to RS-232 Communication Adaptor available, see CA285

Flow Instruments
BATCHERS

Flow Computer Tutorial

What is a flow computer? A special purpose device which computes a corrected flow based on information derived from raw input signals and stored sensor and fluid properties information

What are the typical applications requiring a flow computer? Computation of Heat Flow, Mass Flow, Corrected Volume Flow typically require a flow computer. In addition, many flow sensors require linearization to improve accuracy. The flow computer is also used for data logging, communication, remote metering, alarming and control functions. In many cases a flow computer may replace some of the functionality of a small PLC in your application.

What are typical uses of flow computers? The figures and equations below illustrate a number of the common applications for flow computers.

Where do the equations come from which are solved by the flow computer? All flow measurement sensors have basic mathematical expressions which describe how they relate the measured input signal to a flow measurement. Often there are a number of such expressions for each flowmeter type which range from the simple to those which include additional second order effects. In addition, there are basic equations from thermodynamics and industry standard equations which are utilized in liquid, gas, steam, and heat.

How can you enhance the accuracy of flow meters? A flow computer often offers a variety of performance enhancement functions. These range from simple square root functions, to more elaborate linearization tables applicable to that flowmeter type. In addition, the flow computer can correct for changes in physical dimensions of the flowmeter with temperature and for the effects of changes in fluid properties of the material being measured in some cases.

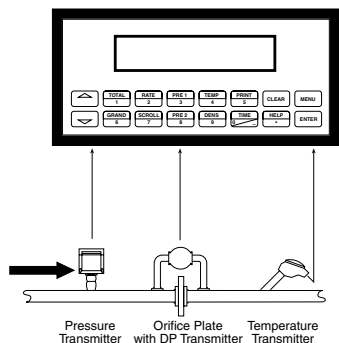
How are fluid properties determined? Fluid properties are stored within the flow computer. Properties are then computed as a function of measured fluid temperature and/or pressure. Density and viscosity are among the most commonly computed fluid properties.

What types of flowmeters typically use flow computers? The most common types used in conjunction with flow computers are turbine, vortex, positive displacement, orifice and similar types, magnetic flowmeters, and a variety of special flowmeter types. Flow computers are often used with other types when the application calls for local information display, data communications, control, alarm, and data logging functions.

What other factors should be considered? Flexibility in use of flow computation and use of inputs and outputs, signal input resolution and accuracy, isolation, 24VDC to power transmitters, networking, communications software and accessories, printing, data logging and remote metering support. Approvals may also be required. Instrument setup software is also of value. Application support from the manufacturer is also important.

Applications & Equations

Steam Mass & Steam Heat Illustration



Calculations

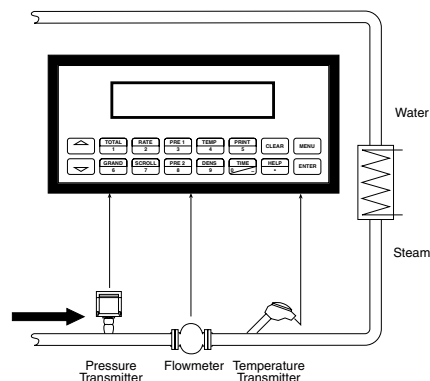
Mass Flow

Mass Flow = volume flow • density (T, p)

Heat Flow

Heat Flow = Volume flow • density (T, p) • Sp. Enthalpy of steam (T, p)

Steam Net Heat Illustration



Calculations

Net Heat Flow

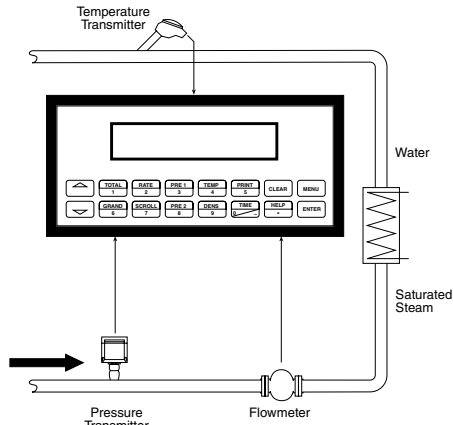
Net Heat Flow =
Volume flow • density (T, p) • [$E_D(T, p) - E_W(T_{S(p)})$]

E_D = Specific enthalpy of steam

E_W = Specific enthalpy of water

$T_{S(p)}$ = Calculated condensation temperature (= saturated steam temperature for supply pressure)

**Steam Delta Heat
Illustration**



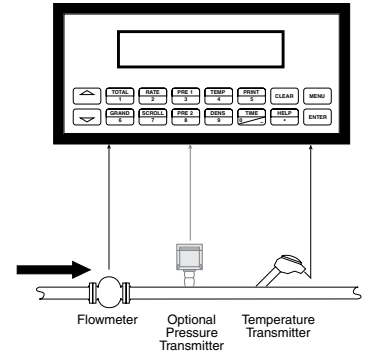
Calculations

Delta Heat Flow

Net Heat Flow =
Volume flow • density (ρ) • [E_D (p) – E_w (T)]

- E_D = Specific enthalpy of steam
- E_w = Specific enthalpy of water

**Liquid
Corrected Volume Flow
Mass Flow
Combustion Heat Flow
Illustration**



Calculations

Corrected Volume Flow

Corrected Volume Flow = vol. flow • (1 - α • (T_f-T_{ref}))²

Mass Flow

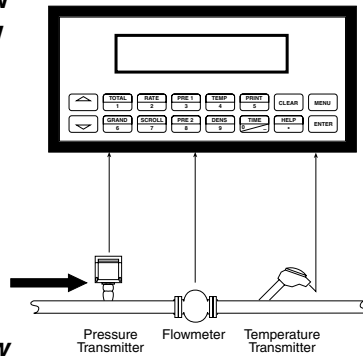
Mass Flow =
volume flow • (1-α • (T-T_{ref}))² • ref. density

Heat Flow

Heat Flow =
C • volume flow • (1-α • (T-T_{ref}))² • ref. density

- α = Thermal expansion coefficient • 10⁻⁶
- C = Specific combustion heat

**Gas
Corrected Volume Flow
Combustion Heat Flow
Mass Flow
Illustration**



Calculations

Corrected Volume Flow

Corrected Volume Flow =
Volume Flow • P/P_{ref} • T_{ref}/T • Z_{ref}/Z

Combustion Heat Flow

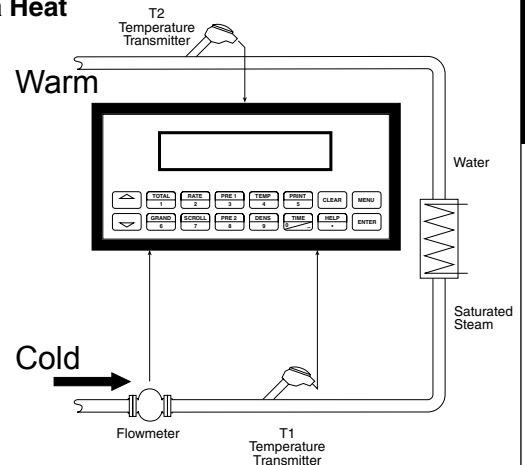
Combustion Energy =
C • ρ_{ref} • Q • P/P_{ref} • T_{ref}/T • Z_{ref}/Z

Mass Flow

Mass Flow =
Actual Volume Flow • ρ_{ref} • P/P_{ref} • T_{ref}/T • Z_{ref}/Z

- ρ_{ref} = Reference density
- T_{ref} = Reference temperature
- P_{ref} = Reference pressure
- Z_{ref} = Reference Z-factor
- C = Specific combustion heat
- Q = Volume flow

**Liquid Delta Heat
Illustration**



Calculations

Water

Heat = Volume Flow • ρ(T₁) • [h(T₂) – h(T₁)]

Other heat carrying liquids

Heat = C • volume flow • (1-α • (T₁-T_{ref}))² • ρ_{ref} • (T₂ - T₁)

- α = Thermal expansion coefficient • 10⁻⁶
- C = Mean specific heat
- ρ(T₁) = Density of water at temperature T₁
- h(T₁) = Specific enthalpy of water at temperature T₁
- h(T₂) = Specific enthalpy of water at temperature T₂
- ρ_{ref} = Reference density
- T_{ref} = Reference temperature

SUPERtrol II

Multi-Function Flow Computer

- “EZ Setup”- Guided Setup for First Time Users
- Liquid, Gas, Steam and Heat Flow Equations
- Utility Metering
- Menu Selectable Hardware & Software Features
- Internal Data Logging Option
- Isolated Pulse and Analog Outputs Standard
- RS-232 Port Standard, Modbus RTU RS-485 Optional
- Windows™ Setup Software
- NX19 Gas Equations, Stacked DP Transmitters
- DDE Server & HMI Software Available
- Remote Metering by Wireless or Modem and TROLlink Remote Metering Software Available



Keypad

Keypad Type: Membrane Keypad
Keypad Rating: Sealed to Nema 4
Number of keys: 16

Enclosure

Enclosure Options: Panel, Wall, Explosion Proof
Size: See Dimensions
Depth behind panel: 6.5" including mating connector
Type: DIN
Materials: Plastic, UL94V-0, Flame retardant
Bezel: Textured per matt finish

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor is provided for added transient suppression. MOV protection for surge transient is also supported

Universal AC Power: 85 to 276 Vrms, 50/60 Hz
DC Power Option: 24 VDC (16 to 48 VDC)

Power Consumption

AC Power: 6.5 V/A (6.5W)
DC Power: 300 mA max.

Flow Meter Types:

Linear: Vortex, Turbine, Positive Displacement, Magnetic, GilFlo 16 point, ILVA 16 Point and others
Square Law: Orifice, Venturi, Nozzle, V-Cone, Wedge, Averaging Pitot, Target and others
Multi-Point Linearization: May be used with all flowmeter types. Including: 16 point, UVC and dynamic compensation.

Flow Inputs:

Analog Input:

Accuracy: 0.02% FS at 20° C
Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC
Current: 4-20 mA, 0-20 mA,
4-20 mA stacked, 0-20 mA stacked

Basic Measurement Resolution: 16 bit

Update Rate: 4 updates/sec

Automatic Fault detection: Signal over/under-range,
Current Loop Broken

Calibration: Operator assisted learn mode

Extended calibration: Learns Zero and Full Scale of each range

Fault Protection:

Fast Transient: 500 V Protection (capacitive clamp)
Reverse Polarity: No ill effects
Over-Voltage Limit: 50 VDC Over voltage protection
Over-Current Protection: Internally current limited protected to 24VDC

Description:

The SUPERtrol II Flow Computer satisfies the instrument requirements for a variety of flowmeter types in liquid, gas, steam and heat applications. Multiple flow equations are available in a single instrument with many advanced features.

The alphanumeric display offers measured parameters in easy to understand format. Manual access to measurements and display scrolling is supported

The versatility of the Flow Computer permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be “soft” assigned to meet a variety of common application needs. The user “soft selects” the usage of each input/output while configuring the instrument. Consider the following illustrative examples.

The isolated analog output can be chosen to follow the volume flow, corrected volume flow, mass flow, temperature, pressure, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for external data logging, transaction printing, or for connection to a modem for remote meter reading.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs. The system setup can also be printed.

Specifications:

Environmental

Operating Temperature: 0 to +50 C
Storage Temperature: -40 to +85 C
Humidity : 0-95% Non-condensing
Materials: UL, CSA, VDE approved

Display

Type: 2 lines of 20 characters
Types: Backlit LCD and VFD ordering options
Character Size: 0.3" nominal
User selectable label descriptors and units of measure

Pulse Inputs:

Number of Flow Inputs: one
 Input Impedance: 10 k Ω nominal
 Trigger Level: (menu selectable)
 High Level Input
 Logic On: 2.5 to 30 VDC
 Logic Off: 0 to 2 VDC
 Low Level Input (mag pickup)
 Selectable sensitivity: 10 mV and 100 mV
 Minimum Count Speed: 0.25 Hz (to maintain rate display)
 Maximum Count Speed: Selectable: 0 to 50 kHz
 Overvoltage Protection: 50 VDC
 Update Speed: 1 update/sec.

Temperature, Pressure, Density Inputs

The compensation inputs usage are menu selectable for temperature, temperature 2, pressure, density or not used.

Calibration: Operator assisted learn mode
 Operation: Ratiometric
 Basic Measurement Resolution: 16 bit
 Update Rate: 2 updates/sec minimum
 Automatic Fault detection:
 Signal Over-range/under-range
 Current Loop Broken
 RTD short
 RTD open
 Reverse Polarity: No ill effects
 Over-Current Limit
 (current input) Internally limited to protect input to 24 VDC

Available Input Ranges
 Current: 4-20 mA, 0-20 mA
 Resistance: 100 Ohms DIN RTD
 Accuracy: 0.02% FS at 20° C

100 Ohm DIN RTD (DIN 43-760, BS 1904):
 Three Wire Lead Compensation
 Internal RTD linearization learns ice point resistance
 1 mA Excitation current with reverse polarity protection
 Temperature Resolution: 0.1°C
 Temperature Accuracy: 0.5°

Stored Information (ROM)

Steam Tables (saturated & superheated),
 Fluid Properties: Water, Air, Natural Gas, A Variety of User
 Entered Industrial Fluids or Generic

User Entered Stored Information (EEPROM / Nonvolatile RAM)

Transmitter Ranges, Signal Types
 Fluid Properties
 (reference density, expansion factor, specific heat,
 viscosity, isentropic exponent, combustion heating
 value, Z factor)
 Units Selections (English/Metric)
 Language Translations (optional)

Excitation Voltage

24 VDC @ 100 mA (fault protected with self resetting fuse)

Relay Outputs

The relay outputs usage is menu assignable to (Individually for each relay) Hi/Lo Rate Alarm, Hi/Lo Temperature Alarm, Hi/Lo Pressure Alarm, Pulse Output (pulse options), Wet Steam or General purpose warning (security).
 Number of relays: 2 (3 optional)
 Contact Style: Form C contacts (Form A with 3 relay option)
 Contact Ratings: 240 V, 5 amp

Analog Outputs

The analog outputs are menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Heat Rate, Temperature, Density, Pressure or Delta Temperature.

Number of Outputs: 2
 Type: Isolated Current Sourcing (shared common)
 Available Ranges: 0-20 mA, 4-20 mA (menu selectable)
 Resolution: 16 bit
 Accuracy: 0.05% FS at 20 Degrees C
 Update Rate: 5 updates/sec
 Temperature Drift: Less than 200 ppm/C
 Maximum Load: 1000 ohms
 Compliance Effect: Less than .05% Span
 60 Hz rejection: 40 dB minimum
 EMI: No effect at 3 V/M
 Calibration: Operator assisted Learn Mode
 Averaging: User entry of DSP Averaging constant to cause a smooth control action

Listing: CE Compliant, UL/C-UL Pending

Serial Communication

The serial port can be used for printing, datalogging, modem connection, two way paging and communication with a computer.

RS-232:
 Device ID: 01-99
 Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200
 Parity: None, Odd, Even
 Handshaking: None, Software, Hardware
 Print Setup: Configurable print list and formatting
 RS-485: (optional 2nd COM port)
 Device ID: 01-247
 Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200
 Parity: None, Odd, Even
 Protocol: Modbus RTU (Half Duplex)

Data Logging

The data logger captures print list information to internal storage for approximately 5000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total, Heat Total or Mass Total.
 Pulse Output Form (menu selectable): Open Collector NPN or 24 VDC voltage pulse
 Nominal On Voltage: 24 VDC
 Maximum Sink Current: 25 mA
 Maximum Source Current: 25 mA
 Maximum Off Voltage: 30 VDC
 Saturation Voltage: 0.4 VDC
 Pulse Duration: User selectable
 Pulse output buffer: 8 bit
 Fault Protection
 Reverse polarity:
 Shunt Diodes
 Over-current Protected
 Over-voltage Protected

Real Time Clock

The Flow Computer is equipped with a pseudo nonvolatile real time clock with display of time and date.
 Format:
 24 hour format for time
 Day, Month, Year for date

Fig. 1: Standard Dimensions

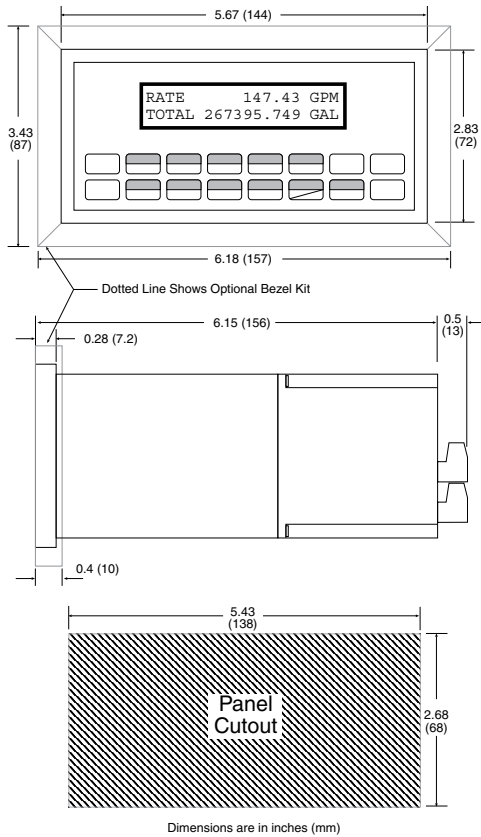
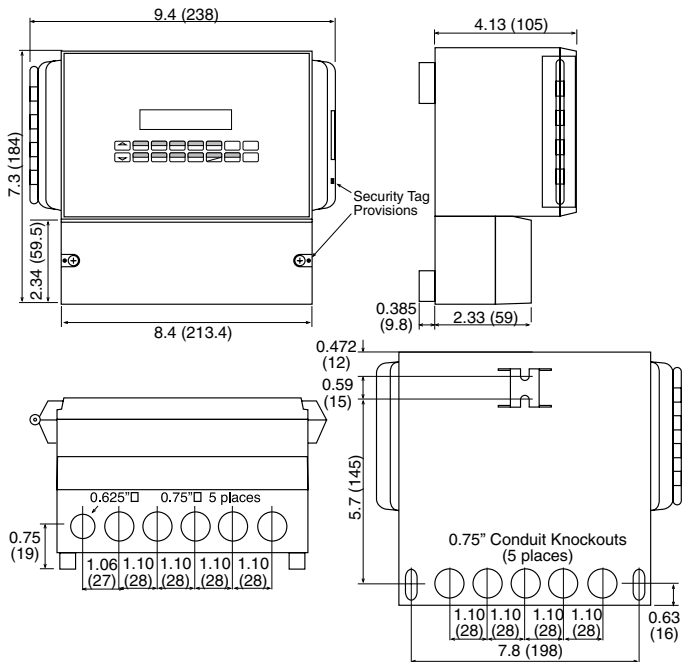


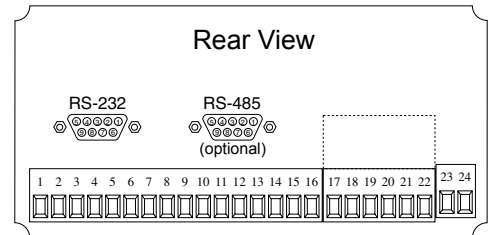
Fig. 2: Wall Mount ("W" mounting option) Dimensions



Terminal Designations

1	DC OUTPUT	2	FLOW	3	IN	4	COMMON	5	TEMPERATURE	6	IN	7	RTD EXCIT (+)	8	RTD SENS (+)	9	RTD SENS (-)	10	RTD SENS (+)	11	RTD SENS (-)	12	PULSE OUTPUT (+)	13	PULSE OUTPUT (-)	14	ANALOG OUTPUT 1 (+)	15	ANALOG OUTPUT 2 (+)	16	ANALOG OUTPUT COMMON (-)	17	NO	18	COM RLY1	19	NC	20	NC	21	COM RLY2	22	NO	23	AC LINE	24	AC LINE	DC (+)	POWER IN	DC (-)
---	-----------	---	------	---	----	---	--------	---	-------------	---	----	---	---------------	---	--------------	---	--------------	----	--------------	----	--------------	----	------------------	----	------------------	----	---------------------	----	---------------------	----	--------------------------	----	----	----	----------	----	----	----	----	----	----------	----	----	----	---------	----	---------	--------	----------	--------

Terminal Layout



Ordering Information

Example ST2 L 1 0 P M

Series: ST2 = Flow Computer

Display Type: L = LCD, V = VFD

Input Power: 1 = 85 to 276 VAC, 3 = 24 VDC (16 to 48 VDC)

Network Card: 0 = None, 1 = RS485/Modbus (optional 2nd COM port)

Mounting: P = Panel Mount (see Fig. 1), N = NEMA 4 Wall Mount (see NEMAtrIST4X), W = NEMA 12/13 Wall Mount w/ Clear Cover (see Fig. 2), E = Explosion Proof (No Button Access) (see XHVD 7/4), X = Explosion Proof (with Button Access) (see XTROL 7/4)

Options: 1 = Peak Demand, 2 = AGA NX-19 calculation for natural gas, 3 = Three Relays, 4 = Stacked DP option, 5 = Datalogger option (consult factory), 6 = Stack Emissions Controller option, 7 = Manifold Flowmeter Controller option, 9 = 3 Relay Super Chip (options 1, 2, 4, 6, 7), 10 = 2 Relay Super Chip (options 1, 2, 4, 6, 7), 13 = Superchip; 2 relay, Positive heat only, 14 = Superchip; 3 relay, Positive heat only, ET = Extended Temperature; -4°F to 131°F (-20°C to 55°C), IM = Internal Modem, M = Modem Power Option, TB = RS485 Terminal Block for Panel Mount Enclosure, TU = Translation Utility Disk

Accessories:
 KEPS-KEP1-32 = KEP RS232 DDE server for SUPERtrol.
 KEPS-MBS32 = Modbus RTU OPC/DDE server
 Modem Available, see MPP-2400 and MPP-2400N (requires M option)
 Two Way Pager Available, see MPP-TWP (requires M option)
 Serial printer available, see P1000, P295
 Ethernet Port Server available, see IEPS
 RS-422/485 to RS-232 Communication Adaptor available, see CA285
 Remote metering and data collection software available, see TROLlink

MS-748

Rugged, Field Mount Multi-Function Flow Computer

- “EZ Setup”- Guided Setup for First Time Users
- Liquid, Gas, Steam and Heat Flow Equations
- Utility Metering
- Menu Selectable Hardware & Software Features
- Internal Data Logging Option
- Isolated Pulse and Analog Outputs Standard
- RS-232 Port Standard, RS-485 Optional
Windows™ Setup Software
- NX19 Gas Equations, Stacked DP Transmitters
- DDE Server & HMI Software Available
- Remote Metering by Wireless or Modem and
TROLlink Remote Metering Software Available
- NEW! - Attractive, Rugged, Field Mount
Enclosure

Description:

The MS-748 Flow Computer satisfies the instrument requirements for a variety of flowmeter types in liquid, gas, steam and heat applications. Multiple flow equations are available in a single instrument with many advanced features. The unit is provided in a rugged enclosure.

The alphanumeric display offers measured parameters in easy to understand format. Manual access to measurements and display scrolling is supported

The versatility of the Flow Computer permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be “soft” assigned to meet a variety of common application needs. The user “soft selects” the usage of each input/output while configuring the instrument. Consider the following illustrative examples.

The isolated analog output can be chosen to follow the volume flow, corrected volume flow, mass flow, temperature, pressure, or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for external data logging, transaction printing, or for connection to a modem or two way pager transceiver for remote meter reading.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs. The system setup can also be printed.



Specifications:

Environmental

Operating Temperature: -20 to 55 C
Storage Temperature: -40 to +85 C
Humidity : 0-95% Non-condensing
Materials: UL, CSA, VDE approved

Display

Type: 2 lines of 20 characters
Types: Backlit LCD and VFD ordering options
Character Size: 0.3” nominal
User selectable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad
Keypad Rating: Sealed to Nema 4
Number of keys: 16

Enclosure

Size: See Dimensions
Materials: Aluminum, UL94V-0 Keypad
Enclosure Rating: NEMA 4X
Provisions for sealing unit

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor is provided for added transient suppression. MOV protection for surge transient is also supported

Universal AC Power: 85 to 276 Vrms, 50/60 Hz

DC Power Option: 24 VDC (16 to 48 VDC)

Power Consumption

AC Power: 6.5 V/A (6.5W)

DC Power: 300 mA max.

Flow Meter Types:

Linear: Vortex, Turbine, Positive Displacement, Magnetic, GilFlo and others

Square Law: Orifice, Venturi, Nozzle, V-Cone, Wedge, Averaging Pitot, Target and others

Multi-Point Linearization: May be used with all flowmeter types. Including: 16 point, UVC and dynamic compensation.

Flow Inputs:

Analog Input:

Accuracy: 0.01% FS at 20° C

Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA,
4-20 mA stacked, 0-20 mA stacked

Basic Measurement Resolution: 16 bit

Update Rate: 4 updates/sec

Automatic Fault detection: Signal over/under-range,
Current Loop Broken

Calibration: Operator assisted learn mode

Extended calibration: Learns Zero and Full Scale of each range

Fault Protection:

Fast Transient: 500 V Protection (capacitive clamp)

Reverse Polarity: No ill effects

Over-Voltage Limit: 50 VDC Over voltage protection

Over-Current Protection: Internally current limited
protected to 24VDC

Pulse Inputs:

Number of Flow Inputs: one

Input Impedance: 10 k Ω nominal

Trigger Level: (menu selectable)

High Level Input

Logic On: 2.5 to 30 VDC

Logic Off: 0 to 2 VDC

Low Level Input (mag pickup)

Selectable sensitivity: 10 mV and 100 mV

Minimum Count Speed: 0.25 Hz (to maintain rate display)

Maximum Count Speed: Selectable: 0 to 50 kHz

Overvoltage Protection: 50 VDC

Temperature, Pressure, Density Inputs

The compensation inputs usage are menu selectable for temperature, temperature 2, pressure, density or not used.

Calibration: Operator assisted learn mode

Operation: Ratiometric

Accuracy: 0.02% FS at 20° C

Basic Measurement Resolution: 16 bit

Update Rate: 2 updates/sec minimum

Automatic Fault detection:

Signal Over-range/under-range

Current Loop Broken

RTD short

RTD open

Reverse Polarity: No ill effects

Over-Current Limit

(current input) Internally limited to protect input to 24 VDC

Available Input Ranges

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD

100 Ohm DIN RTD (DIN 43-760, BS 1904):

Three Wire Lead Compensation

Internal RTD linearization learns ice point resistance

1 mA Excitation current with reverse polarity protection

Temperature Resolution: 0.1° C

Stored Information (ROM)

Steam Tables (saturated & superheated),

Fluid Properties: Water, Air, Natural Gas and Other Common Fluids or Generic

User Entered Stored Information (EEPROM / Nonvolatile RAM)

Transmitter Ranges, Signal Types

Fluid Properties

(reference density, expansion factor, specific heat, viscosity, isentropic exponent, combustion heating value, Z factor)

Units Selections (English/Metric)

Language Translations (optional)

Excitation Voltage

24 VDC @ 100 mA (fault protected with self resetting fuse)

Relay Outputs

The relay outputs usage is menu assignable to (Individually for each relay) Hi/Lo Rate Alarm, Hi/Lo Temperature Alarm, Hi/Lo Pressure Alarm, Pulse Output (pulse options), Wet Steam or General purpose warning (security).

Number of relays: 2 (3 optional)

Contact Style: Form C contacts

Contact Ratings: 240 V, 5 amp

Analog Outputs

The analog outputs are menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Heat Rate, Temperature, Density, or Pressure.

Number of Outputs: 2

Type: Isolated Current Sourcing (shared common)

Available Ranges: 0-20 mA, 4-20 mA (menu selectable)

Resolution: 16 bit

Accuracy: 0.05% FS at 20 Degrees C

Update Rate: 5 updates/sec

Temperature Drift: Less than 200 ppm/C

Maximum Load: 1000 ohms

Compliance Effect: Less than .05% Span

60 Hz rejection: 40 dB minimum

EMI: No effect at 3 V/M

Calibration: Operator assisted Learn Mode

Averaging: User entry of DSP Averaging constant to cause a smooth control action

Listing: CE Compliant, UL/CSA Pending

Serial Communication

The RS-232 serial port can be used for printing, datalogging, modem connection, two way paging and communication with a computer.

RS-232:

Device ID: 01-99

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Handshaking: None, Software, Hardware

Print Setup: Configurable print list and formatting

RS-485: (optional 2nd COM port)

Device ID: 01-247

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Data Logging

The data logger captures print list information to internal storage for approximately 5000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.

Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total, Heat Total or Mass Total.

Pulse Output Form (menu selectable): Open Collector

NPN or 24 VDC voltage pulse

Nominal On Voltage: 24 VDC

Maximum Sink Current: 25 mA

Maximum Source Current: 25 mA

Maximum Off Voltage: 30 VDC

Saturation Voltage: 0.4 VDC

Pulse Duration: User selectable

Pulse output buffer: 8 bit

Fault Protection

Reverse polarity:

Shunt Diodes

Over-current Protected

Over-voltage Protected

Real Time Clock

The Flow Computer is equipped with a pseudo nonvolatile real time clock with display of time and date.

Format:

24 hour format for time

Day, Month, Year for date

ES-747

Flow Computer for Liquid and Gas Applications

Features

- Supports Pulse Producing Flowmeters
- Rate/Total and Batching Functions
- Universal Viscosity Curve (UVC) and Strouhal/Roshko Advanced Linearization Methods
- Gas & Liquid Flow Equations (Volume, Mass, Corrected Volume)
- API 2540, AGA-7 Equations
- 10 Selectable Fluid Tables
- Advanced Batching Features: Overrun Compensation, Print End of Batch
- Menu Selectable Hardware & Software Features
- Data Logging
- Two Line LCD or VFD Display

Description:

The ES-747 Flow Computer satisfies the instrument requirements for pulse producing flowmeters in liquid and gas applications. Multiple flow equations and instrument functions are available in a single unit with many advanced features.

The alphanumeric display shows measured and calculated parameters in easy to understand format. Single key direct access to measurements and display scrolling is supported

The versatility of the ES-747 permits a wide measure of versatility within the instrument package. The various hardware inputs and outputs can be "soft" assigned to meet a variety of common application needs. The user "soft selects" the usage of each input/output while configuring the instrument.

The isolated analog output can be chosen to follow volume flow, corrected volume flow, mass flow, temperature, pressure or density by means of a menu selection. Most hardware features are assignable by this method.

The user can assign the standard RS-232 Serial Port for data recording, transaction printing, or for connection to a computer.

Front panel selection of fluid type is supported.

Linearization options include UVC, Strouhal/Roshko and 40 point linearization tables.

A Service or Test mode is provided to assist the user during start-up system check out by monitoring inputs and exercising outputs and printing system setup.



- Isolated Pulse and Analog Outputs Standard
- RS-232 Port Standard, RS-485 Optional
- Windows™ Setup Software
- DDE Server & HMI Software Available

Specifications:

Flow Meters and Computations

Meter Types: Supports pulse producing meters including: vortex, single rotor turbine, magnetic, PD flowmeter
Linearization: 40 point table, UVC table or Strouhal/Roshko
Computations: Volume, Corrected Volume & Mass
Fluid Computations: Density, Viscosity

Environmental

Operating Temperature: 0°C to +50°C
Storage Temperature: -40°C to +85 C
Humidity : 0-95% Non-condensing
Materials: U.L. approved

Approvals: CE Compliant, UL/CUL Listed

Display

Type: 2 lines of 20 characters, Blue VFD or Backlit LCD
Character Size: 0.3" nominal
User programmable label descriptors and units of measure

Keypad

Keypad Type: Membrane Keypad with 16 keys
Keypad Rating: Sealed to Nema 4

Enclosure

Size: See Dimensions
Depth behind panel: 6.5" including mating connector
Type: DIN
Materials: Plastic, UL94V-0, Flame retardant
Bezel: Textured per matt finish

Fluid Types

General Purpose, Water, Skydraul 500B, 50/50 Ethylene, Air, Propane, MIL-C-7024D, MIL-O-5606, MIL-23699, JETA-1, Diesel, Methanol

Real Time Clock

The ES-747 is equipped with a battery backed real time clock with display of time and date.

Format:

12 or 24 hour time display
Day, Month, Year date display

Excitation Voltage

Menu Selectable: 5, 12 or 24 VDC @ 100 mA (fault protected with self resetting fuse)

Relay Outputs

The relay outputs are menu assignable to (Individually for each relay) Low Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm, Temperature, Pressure, Density or General purpose warning (security).

Number of relays: 2 (4 optional)

Contact Style: Form C contacts

Contact Ratings: 5 amp, 240 VAC or 30 VDC

Capabilities: Alarm Delay, Setpoint, Hysteresis, Duration

Power Input

The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression.

110 VAC Power: 85 to 127 Vrms, 50/60 Hz

220 VAC Power: 170 to 276 Vrms, 50/60 Hz

DC Power:

12 VDC (10 to 14 VDC)

24 VDC (14 to 28 VDC)

Power Consumption:

AC: 11.0 VA (11W)

DC: 300 mA max.

Flow Inputs:

Pulse Inputs:

Number of Flow Inputs: one input available for single pickup or with dual pickups or quadrature

Input Impedance: 10 K Ω nominal

Pullup Resistance: 10 K Ω to 5 VDC (menu selectable)

Pull Down Resistance: 10 K Ω to common

Trigger Level: (menu selectable)

High Level Input

Logic On: 3 to 30 VDC

Logic Off: 0 to 1 VDC

Low Level Input (mag pickup)

Sensitivity:

10 mV or 100 mV

Minimum Count Speed:

Menu selectable: 1-99 seconds

Maximum Count Speed:

Menu Selectable: 40Hz, 3000Hz or 20 kHz

Overvoltage Protection: 50 VDC

Control Inputs

Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used.

Control Input Specifications

Number of Control Inputs: 3

Input Scan Rate: 10 scans per second

Logic 1: 4 - 30 VDC

Logic 0: 0 - 0.8 VDC

Input Impedance: 100 K Ω

Control Activation:

Positive Edge or Pos. Level based on product definition for switch usage.

Auxiliary / Compensation Inputs

The auxiliary/compensation inputs are menu selectable for temperature, pressure, density or not used. These inputs are used for the compensated inputs when performing compensated flow calculations. They can also be used as a general purpose input for display and alarming.

Number of inputs: 2

Operation: Ratiometric

Accuracy: 0.02% FS at 20° C

Basic Measurement Resolution: 16 bit

Update Rate: 1 update/sec minimum

Automatic Fault detection:

Signal Over-range/under-range

Current Loop Broken

RTD short

RTD open

Fault mode to user defined default settings

Fault Protection:

Reverse Polarity: No ill effects

Over-Voltage Limit (Voltage Input): 50 VDC

Available Input Ranges

Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC

Current: 4-20 mA, 0-20 mA

Resistance: 100 Ohms DIN RTD

Proprietary Thermistor

100 Ohm DIN RTD (liquid equations only)

(DIN 43-760, BS 1904):

Three Wire Lead Compensation

Internal RTD linearization learns ice point resistance

1 mA Excitation current with reverse polarity protection

Temperature Resolution: 0.1°C

Isolated Analog Output

The analog output is menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Pressure, Density, Volume Total, Corrected Volume Total or Mass Total.

Type: Isolated Current Sourcing

Available Ranges: 4-20 mA, 0-20 mA

Resolution: 12 bit

Accuracy: 0.05% FS at 20° C

Update Rate: 1 update/sec minimum

Temperature Drift: Less than 200 ppm/C

Maximum Load: 1000 ohms (at nominal line voltage)

Compliance Effect: Less than .05% Span

60 Hz rejection: 40 dB minimum

Calibration: Operator assisted Learn Mode

Averaging: User entry of damping constant to cause a smooth control action

Isolated Pulse output

The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total or Mass Total

Pulse Output Form: Photo MOS Relay

Maximum On Current: 100 mA

Maximum Off Voltage: 30 VDC

Saturation Voltage: 1.0 VDC

Maximum Off Current: 0.1 mA

Pulse Duration: 10 mSec or 100 mSec (user selectable)

Pulse output buffer: 256

Fault Protection

Reverse polarity: Shunt Diode

Serial Communication

The serial port can be used for printing, data recording, and/or communication with a computer.

RS-232:

Device ID: 01-99

Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Handshaking: None, Software, Hardware

Print Setup: Configurable print list and formatting

RS-485: (optional 2nd COM port)

Device ID: 01-247

Baud Rates: 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Setup Diskette Capabilities

Capabilities include: View Live Results Configure unit, Upload and Download to unit, Load and Save to file, Print Setup,

Data Logging Capabilities

Capabilities:

Permits unit to automatically gather data during use.

Data Log List:

User selectable: includes process variables, totalizers, set points, time and date

Data Log Event Trigger:

selectable: includes interval, time of day, front key, external contact, end of batch

Data Log Format:

selectable: Printer format, Database CSV format

Data Transmission:

Selectable: Output may be transmitted immediately or held in data log for later polling

Remote Request Capabilities include:

Send data log, clear data log

External Modem Support Capabilities:

Compatibility: Hayes Compatible

Polling Capabilities:

Answers incoming calls, responds to requests for information of action

Call Out Capabilities:

Can initiate call on user selectable event condition, or upon error

Error Handling:

Supports multiple retry, automatic disconnect upon loss of line or remote inactivity

Fig. 1: Standard Dimensions

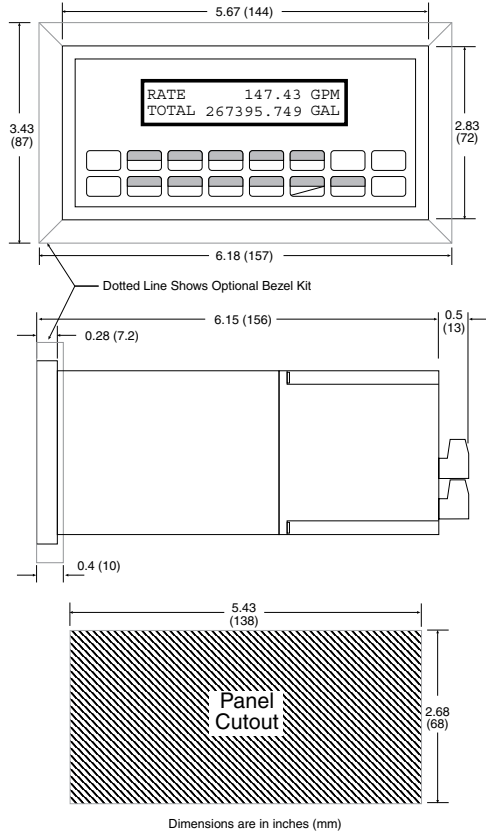
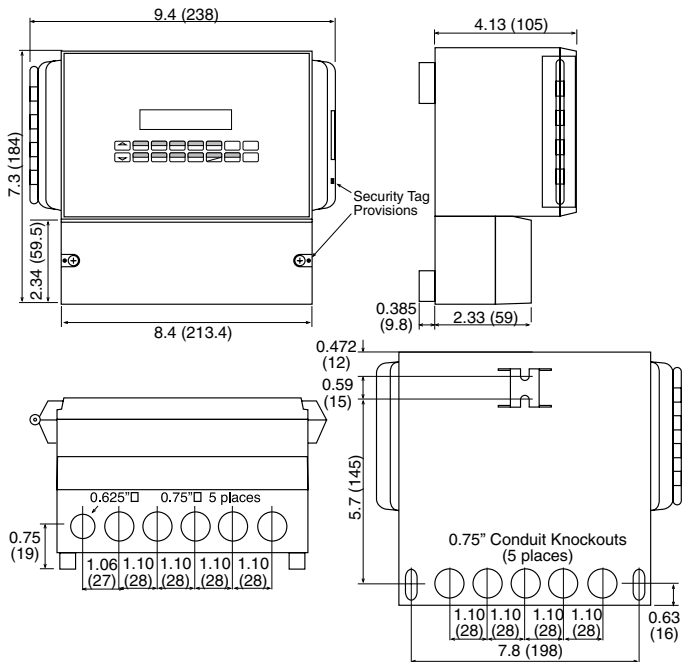


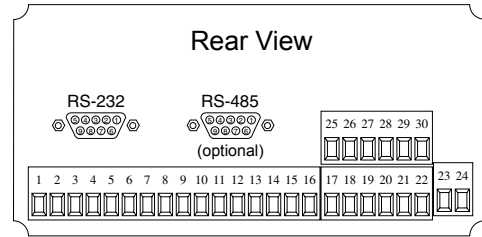
Fig. 2: Wall Mount ("W" mounting option) Dimensions



Terminal Designations

1	DC OUTPUT	1	FLOW IN
2	PULSE IN 1	2	IN
3	PULSE IN 2	3	
4	COMMON	4	Pressure
5	RTD EXCIT +	5	Thermistor
6	RTD SENS +	6	lin +
7	RTD SENS -	7	lin +
8	CNTR IN 1	8	Pressure
9	CNTR IN 2	9	SEE USER MANUAL
10	CNTR IN 3	10	
11	COMMON	11	
12	PULSE OUTPUT +	12	
13	PULSE OUTPUT -	13	
14	ANALOG OUTPUT +	14	4-20 mA
15	ANALOG OUTPUT -	15	
16		16	
17	NC	17	COM RLY3
18	COM RLY1	18	25 NO
19	NO	19	26 NO
20	NC	20	27 NO
21	COM RLY2	21	28 NO
22	NO	22	29 NO
23	AC LINE	23	30 NO
24	DC -	24	DC +

Terminal Layout



Ordering Information

Example ES747 L 1 A 0 P

Series: ES747= ES-747

Display Type: L= LCD, V= VFD

Input Type: 1= 110 VAC, 2= 220 VAC, 3= 12 VDC (10 to 14 VDC), 4= 24 VDC (14 to 28 VDC)

Relays: A= 2 SPDT Relays, B= 4 SPDT Relays

Network Card: 0= None (STD), 2= RS485/Modbus (optional 2nd COM port)

Mounting: P= Panel Mount, N= NEMA 4 Wall Mount, W= NEMA 12/13 Wall Mount w/ Clear Cover, E= Explosion Proof (No Button Access), X= Explosion Proof (with Button Access)

Options: TB= RS485 Terminal Block for Panel Mount Enclosure, ET= Extended Temperature (-4°F to 131°F (-20°C to 55°C)), IM = Internal Modem, M = Modem Power Option

Accessories: KEPS-KEP1-32

KEPS-KEP1-32: KEP RS232 for SUPERtrol 1, SUPERtrol 1LE, SUPERtrol 2 and LEVELtrol 2 • 32 Bit OPC/DDE Server
 KEPS-MBS32: Supports RS485 for ST1, ST1LE, ST2, LT2, MRT, DRT & MB2 (Modbus RTU)

Modem Available, see MPP-2400 and MPP-2400N (requires M option)
 Serial printer available, see P1000, P295
 Ethernet Port Server available, see IEPS
 RS-422/485 to RS-232 Communication Adaptor available, see CA285
 Remote metering and data collection software available, see TROLlink

Communications Solutions Tutorial

In recent years there has been a virtual explosion of new technologies and methods which greatly simplify the exchange of information between systems. This virtual explosion in new technologies complement many of the traditional direct wiring approaches of interconnecting instruments around a plant, complex, city, or region.

KEP seeks to assist our customers in "getting connected" by using the serial communication ports provided on many of our models such that they may be used for communications with computers, for modems, for printing, for datalogging, and in wire-line and wireless communications.

KEP offers a variety of compatible hardware and software system building blocks which many users find helpful in interconnecting their instruments to their computer over their preferred communication channel.

How can I get a printed report? Many instruments may be supplied with a standard or optional RS-232 serial port which may be connected to a printer with a RS-232 serial interface. Printers are purchased separately as an accessory.

What information can I get on my printed report? The printing capabilities of instruments vary widely. Instruments with more advanced printing capabilities permit the user to decide on the form length, include a custom print header, time and date, sequential print number, and all the desired information. Some models include a more limited print list. Basic models support only the printing of a single number.

How can I initiate the report to print? Depending on the model being used there may be one or more ways to initiate a print. These include: Remote Print Switch, Local Print Key, End of Batch, Interval, and Time of Day.

How can I get information into my PC? There are several issues involved with getting information into a PC from an instrument. The first is the decision for the communication channel to be used. The second is the data gathering software (server). The final is the selection of the software that will display or store the information for the operator (client software).

What is a Server or DDE Server? A server is a communication utility program that you purchase which enables you to easily communicate with an instrument or PLC. Most programs offer a wizard which guides you through naming and selecting the communication channel with its com port and setting, the instruments which will be on that cable and the various measurements (or tags) being made by each instrument. Other programs will latter reference instrument name and tag.

How can I get information into my spread sheet? One of the simplest ways involves using a "DDE or OPC Server" which has been configured to constantly gather information from your instrument to make it available for other programs to access. (See using a dde server.) The information is accessed in the desired cell of your spread sheet by entering the following: "=KEPDDE|UNIT_NAME|DATA_ITEM_NAME". One of the nice aspects of this approach is there is no need to write a program in many applications. A DDE server and the above command is all you need.

I want to write my own program. How do I go about it? You will need to consider using an off the shelf server or writing your own custom program in the language of your choice. Each instrument with serial communications has a special user manual which describes the format of a request for information and a list of the information. These will act as an aid while you are writing and debugging your program.

What is an HMI Software? HMI software is a software toolbox that enables a user to create custom screens for displaying information and controlling his plant. Capabilities include: controls and displays on touch screen, graphics symbols or object libraries, real time trending, data logging, and alarming. The software toolbox also includes a powerful programming or scripting language.

What do I need to get information into my Human Machine Interface Software? DDE and OPC Servers are routinely used. Alternately, custom scripting may be used in some cases.

What are the some of the common communications possibilities on the market? The choice of communications solutions available on the market is quite large. These include direct connect, wireless, fiber optic, LAN's and those which utilize the phone system. There are many others. Each technique offers advantages based on the needs of the system.

What is a hardware interface? The sender and receiver of information must match. This includes at the electrical signal level and at the low level communication settings. Industry standards exist for defining the hardware interface for signaling of information. These include RS-232, RS-422 and RS-485. There are a range of related communication settings which include baud rate, parity, start and stop bits which further clarify the interface.

What is RS-232 and how far can I send it? RS-232 is an industry standard for electrical signal levels. It is commonly used with many serial devices where the information will be send over distances not to exceed 50-200'. RS-232 ports are provided on all personal computers with a connector style known as mini-D or D-Sub.

What is RS-485 and how far can I send these signals? RS-485 is an industry standard for electrical signal levels. It is commonly used with many serial devices where the information will be send over distances not to exceed 4000'. Information is carried of 3 wires including a ground reference. RS-485 to RS-232 adapters are required to provide connections to the RS-232 ports on all personal computers.

What is a protocol? A protocol is an agreed upon method for exchanging information. It is used to decide on the method of formatting information that will be carried along a communication cable. An example would be the MODBUS-RTU protocol used on many instruments. However, there are a vast number on the market place.

What is remote metering? This may be described as any approach that is used to access information from a remote instrument to a centralized PC by connecting to and then polling an instrument for information. Telephone (modem) and wireless systems are commonly used.

What is Wireless Communications? Wireless if a term that includes a variety of technologies which do not require the sender and receiver of the system be directly connected by a wire cable. Instead a wireless transceiver is used. In common usage it may be divided into subclassifications. Common ones include wireless telephone, wireless one and two way personal messaging or paging, and radio telemetry.

What is the cost of a wireless solution? The costs of initial equipment, and installation cost vary. There is usually a monthly service charge associated with each transceiver that is based on the amount of air time, or amount of information to be transferred. There are often reduced charges for off peak hour usage.

KEPServer

SUPERtrol Series 32 Bit Device Driver for KEPware's KEPServer

Description

KEPware's 32 bit **KEP SUPERtrol** device driver works in conjunction with KEPware's **DDE Server** (KEPServer) to exchange data between DDE clients and Kessler-Ellis Products SUPERtrol devices. Block reads are optimized automatically. Block polling rates are defined by scanning blocks at the rate of the fastest tag scan rate in the block.

Part Number :

KEPS-KEP1-32: KEP RS232 for SUPERtrol 1, SUPERtrol 1LE, SUPERtrol 2 and LEVELtrol 2 • 32 Bit DDE Server, Now with Modem Support

KEPS-MBS32: SUPERtrol & LEVELtrol Series with RS-485 & MODBUS RTU Support

Supported Devices

- Multidrop Supported
- SUPERtrol ILE , SUPERtrol I, SUPERtrol II, LEVELtrol II, MS716, MS748, ES747

Supported Data

KEPware's 32 bit KEP SUPERtrol device driver supports: Process Variables, Totalizers, Error Status, and Action Routines may be read or activated.

Process Variables: Heat, Mass, Corrected Volume, Volume, Temperature, Pressure, Density and similar items as well as Raw Input & Output signals.

Totalizers: Resettable & non-resettable total of: Heat, Mass, Corrected Volume and Volume

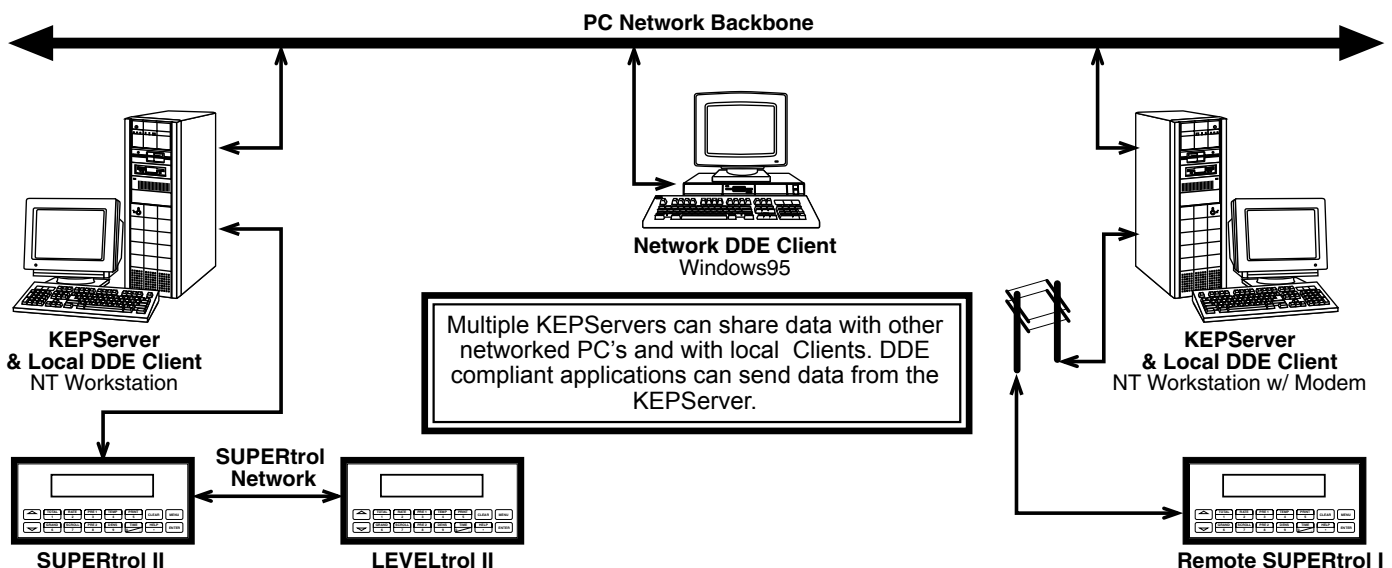
Action Routines: Initiate Print, Clear Totalizer, Clear Alarms, Start Batch, Stop Batch and many others

Data Types: Boolean - bit, Word - unsigned 16 bit, Short - signed 16 bit , Long - signed 32 bit
DWord - unsigned 32 bit, Float - floating point 32 bit, Double - floating point 64 bit,
String - null terminated ASCII

Driver System Requirements

- Windows 95 and Windows NT 3.51 or better with 16MB RAM minimum.

Network Configuration Options



TROLlink

Remote Metering and Data Collection Software

Features

- Retrieve data from KEP flow computers using direct wire, internet or modem connection.
- Collects data from the following Kessler-Ellis Products flow computer instruments: SUPERTROL I, SUPERtrol II, ES-747, LEVELTROL II, MASSTROL, DPFC
- Runs on: Windows 95® and higher; Windows NT® 4.0 and higher
- Works with most Hayes compatible modems for remote data collection.
- Handles a mix of instruments, they don't have to be the same type.
- Select the data items to acquire by simple check boxes for each instrument.
- Manual and automatic data collection modes.
- Can automatically collect data from 1 to 100's of instruments.
- Automatic data collection by Time and Date.
- Automatic Telephone busy retries.
- Collected data can go to screen, text file, Excel spread sheets and is available to DDE aware applications.
- Each instrument can have data directed to separate or common named files.
- Can write log files showing data collection session details and connection failures due to busy or no answers.
- Collects data from items that are displayable on instrument displays.
- Collects data from SUPERtrol and LEVELtrol II dataloggers.
- Automatic Peak Demand reset capability possible when using meter reading routes
- Each instrument can be assigned a route number to write special messages during data collection to data file.



Description

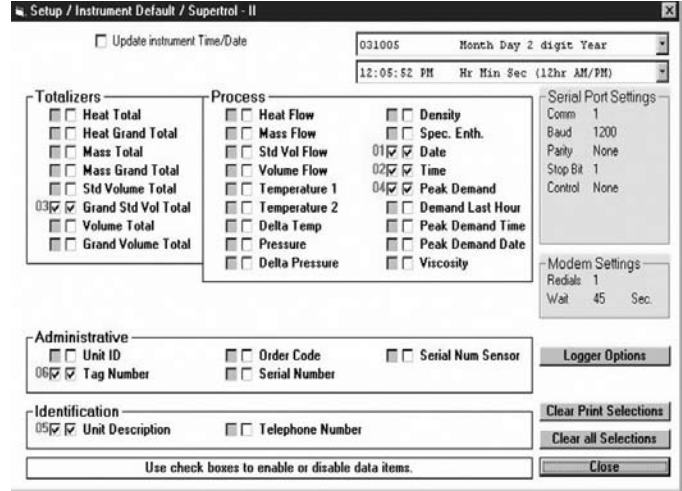
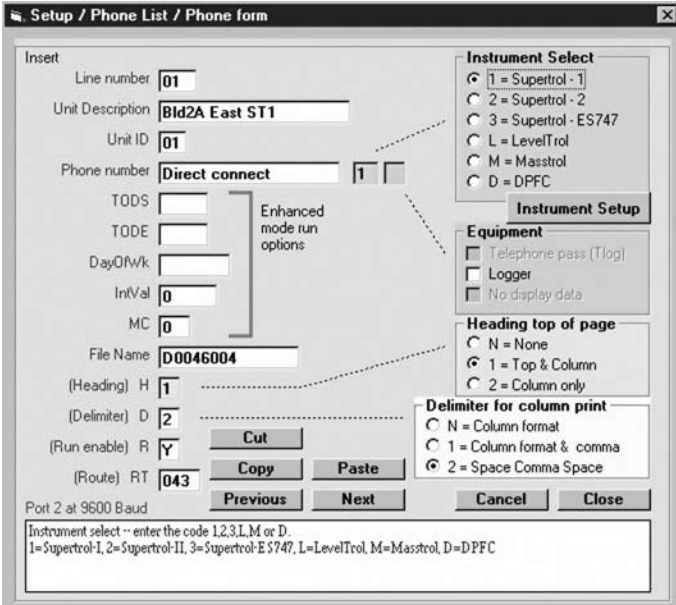
TROLlink is remote metering software for collecting data, via direct wire or modem, from KEP's SUPERTrol, LEVELtrol II, MASStrol, and DPFC flow computer families.

This practical data collection system lets the operator retrieve data from one or hundreds of instruments, of varying types, in manual or automatic mode. Adding a modem and PC provides an easy-to-use and cost-effective remote monitoring system for utility, continuous process, and batching operations.

TROLlink's simple user interface prompts the operator to select the data items to be acquired, specify automatic data collection by time and date, direct data to screen, text, or EXCEL files, and define a route number for each instrument, if required.

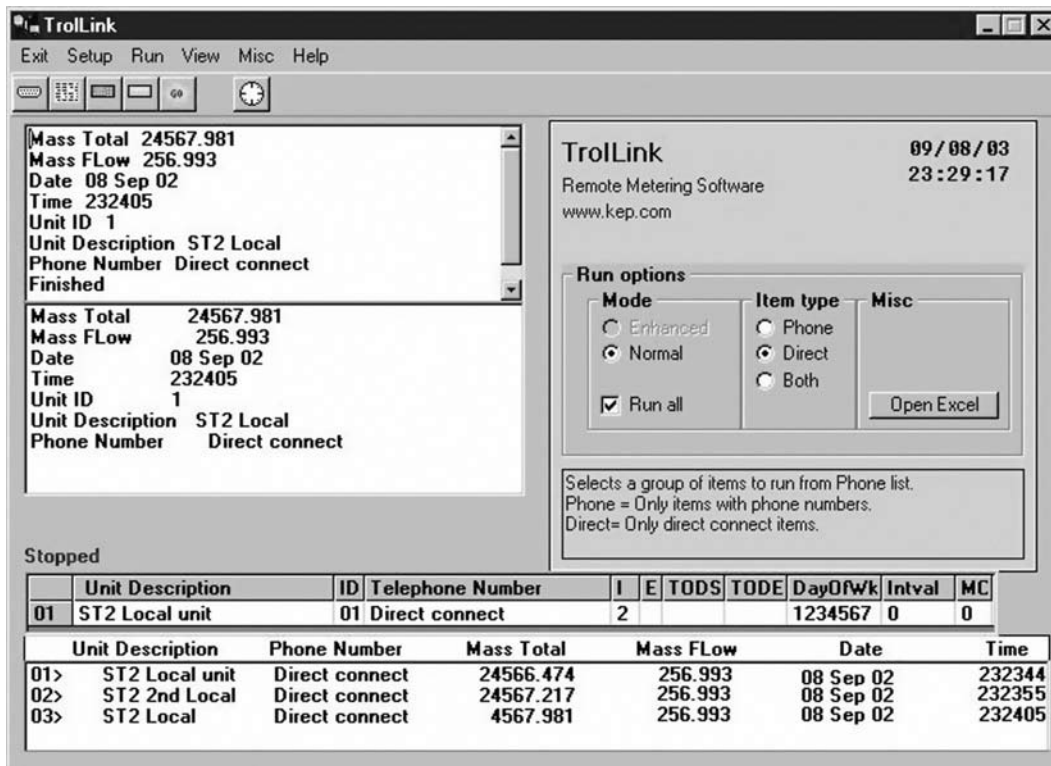
TROLlink runs on Windows 95 and higher, and Windows NT 4.0 and higher, and works with most Hayes compatible modems.

EASY TO SETUP!



Setup is simple using check boxes and “fill in the blank” formats.

EASY TO USE!



Within moments after setup you will be up and running and collecting your vital data. The data may be viewed on screen or saved as text or Excel™ Spreadsheet files

IEPS 1000

Intelligent Ethernet Single Port Server

Features

- LAN-Attached Serial Port Expansion
- Optional Ethernet Hub
- Remote Monitoring
- IP Routing for Multi-Site Networks
- Software for Virtual Com Port Included
- Permits Gateway Connection from Instrument's RS-232 to PC's Ethernet LAN

Description:

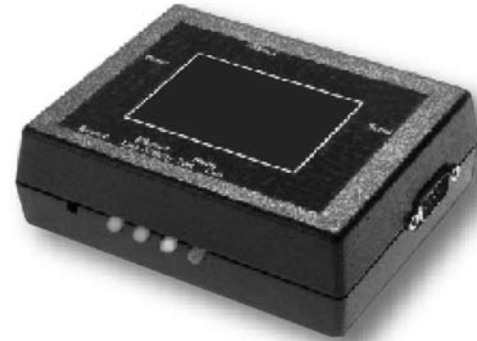
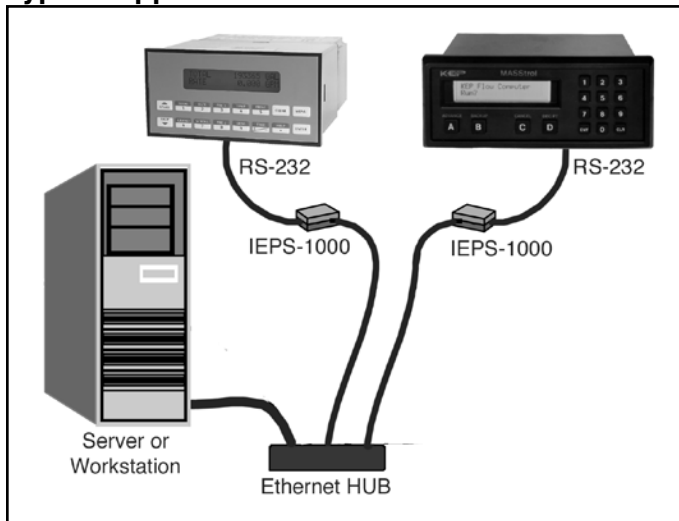
The IEPS1000 gives users the ability to connect KEP products with Ethernet networks. The SUPERtrol II (ST2) unit can be connected to the RS-232 port on the IEPS1000. The port server allows customers to use their existing plant 10 base T ethernet rather than running separate cables to the ST2's. This will permit users to have Infilink-HMI software, Server software or Flow Computer setup application running on a PC with an ethernet port. Their software at the PC end creates a virtual RS-232 COM Port for these programs.

Port Server Software Included to:

- Assign IP Address
- Set Communication Parameters
- Create Virtual Com Port

The IEPS1000 Series of Networked Peripheral Servers provide LAN-attached serial port expansion and remote monitoring. The IEPS1000 is targeted to users who need to manage, control, and share access with one to two peripheral devices over the LAN or Internet using standard protocols. The IEPS1000 uses industry standard TCP/IP, and telnet protocols to ensure open-systems connectivity and flexibility for your demanding applications. The IEPS1000 is bundled with NativeCOM port redirection software, web browser interface, and remote diagnostics. NativeCOM simplifies installation and support, and makes any LAN-attached serial port (whether local or remote) appear as local to your Windows application.

Typical Application



SPECIFICATIONS

Serial Interface: DB9 Connector; supports all TTY signals (RxD, TxD, RTS, CTS, DCD, DTR, DSR, RI)

Power Requirements: External 110/220V; Worldwide; Over current protection

Dimensions: w 3.25" x l 4.37" x h 1.5"

Temperature: Operating temp 0° to 60° C

Humidity range: 5% to 95% non condensing

LAN Interface: RJ45 (10 Base-T), 10Mbit, Ethernet 802.3; TCP protocol

Host Communications: 10 Base-T, 10Mbit, Ethernet 802.3

Protocols Supported: Raw TCP, NativeCOM port redirector, Telnet, Rtelnet, LPD

Security: Password protected configuration

Management and Diagnostics: Web-based interface, Remote/local diagnostics (to pin level)

Compatible Instruments: SUPERtrol 1LE, 1, 2, LEVELtrol II, INT69, MINItrol and others.

Compatible Software: SUPERtrol Family Setup Diskette, KEPServer, TROLlink, Infilink-HMI

Ordering Information

IEPS1101 1-port, RS-232 Interface

IEPS 3000

Intelligent Ethernet Port Server

Features

- LAN-Attached Serial Port Expansion
- Optional Ethernet Hub
- Remote Monitoring
- IP Routing for Multi-Site Networks
- Software for Virtual Com Port Included
- Permits Gateway Connection from Instrument's RS-232 to PC's Ethernet LAN

Description:

The IEPS3000 gives users the ability to connect KEP products with Ethernet networks. Up to six SUPERtrol II (ST2) units can be connected to each of the RS-232 ports on the IEPS3000. The port server allows customers to use their existing plant 10 base T ethernet rather than running separate cables to the ST2's. This will permit users to have TROLlink, Infilink-HMI software, Server software or Flow Computer setup application running on a PC with an ethernet port. Their software at the PC end creates a virtual RS-232 COM Port for these programs.

Since the IEPS3000 works using an IP address and uses TCP/IP Protocol, it also has Internet address capabilities.

Port Server Software Included to:

- Assign IP Address
- Set Communication Parameters
- Create Virtual Com Port

The IEPS3000 is characterized by high reliability, superior software functionality, expanded hardware interfaces and simplified remote installation. The IEPS3000 is designed for users who need to manage, control, program and share access with one to four devices over the LAN or Internet using standard protocols.

Ordering Information

IEPS3182	2-port
IEPS3282	2 port with optional HUB port
IEPS3184	4-port
IEPS3284	4 port with optional HUB port



IEPS3000 Hardware Specifications

- Motorola MC68EN360 QUICC 25 MHz or 33 MHz microprocessor with internal RISC processor.
- 1M byte in-circuit boot flash and program memory.
- 4 M byte nonparity DRAM.
- 10 Mbps Ethernet connection over 10BASET physical lines.
- 1 10BASET Ethernet HUB ports
- Two or Four asynchronous serial ports with modem control and surge suppression. Asynchronous port data rates of 50 bps to 115.2 Kbps over EIA-232 electrical interface. Uses DB-9 physical interface. Supports RS-232, RS-422, and RS-485.
- External 110 or 240 VAC power supply.
- Initialization self-test.
- Hardware exerciser.
- Status LEDs for each port.

Environmental Specifications

Operating temperature range: 0 to 50°C
Storage temperature range: -10 to 70°C
Humidity range: 10% to 90% noncondensing

Product Dimensions

The IEPS3000 model measures: 8 inches x 4.75 inches x 1.25 inches (203 mm x 121 mm x 32 mm)

Ethernet cabling specifications

- This section describes guidelines for using 10BASET twisted-pair cabling:
- Recommended cable is 22 to 26 AWG category 3 or category 5 unshielded solid copper twisted pair (standard telephone wire), at least Level 2 (two twists per foot).
 - Maximum distance of a segment—from concentrator to node—is 100 meters (328 feet).
 - Maximum of two devices to a cable segment.
 - Ethernet network interface cards (NICs) are available with built-in 10BASET transceivers and a 15-pin AUI port.
 - Devices with standard AUI ports may be attached by using a twisted-pair transceiver (MAU).

Compatible Instruments:

SUPERtrol 1LE, 1, 2, LEVELtrol II, INT69, MINItrol and others.

Compatible Software:

SUPERtrol Family Setup Diskette, KEPServer, TROLlink, Infilink-HMI

CA-285

RS-422/485 to RS-232 Interface Converter

Features

- User Selectable RS-422 or RS-485
- RS-485 User Selectable 2 or 4-Wire Operation
- Intelligent Control of RS-485 Transmitter and Receiver
- Td and Rd LED
- DTE/DCE Compatible
- Data Rates up to 64k BPS
- Connects to Standard PC Compatible 25 Pin RS-232 Port

DESCRIPTION:

The CA-285 is a unique interface converter that can be configured by the user to convert either RS-422 or RS-485 to RS-232. When operating in RS-485 mode, the CA-285 has an "intelligent" mode which provides control of the RS-485 line.

When configured to operate as an RS-232 to RS-422 interface converter, the CA-285 converts full duplex data, Td and Rd, between RS-232 and RS-422.

As an RS-232 to RS-485 converter, the unit can be configured for either 2 or 4-wire operation. In either mode, the CA-285 allows control of the transmitter so that multi-dropped operation can be accommodated. The CA-285 can be configured to control its data flow in one of two ways. The first is via the use of RTS, pin 4, of the RS-232 port. In this case, the RS-485 transmitter will turn ON when RTS is turned on. When RTS is OFF, the CA-285 is in the receive mode. In the 4-wire mode, the receiver is always on. The second method of controlling the RS-485 transmitter is to turn it on when Td data is applied to the RS-232 port. (recommended with KEPServer)

The receiver also operates differently depending on whether the mode is 2 or 4-wire. In the 2-wire mode, when no data is received by the RS-232 receiver, the RS-485 receiver is switched ON. When data is detected for transmission, the receiver is switched OFF. In the 4-wire mode, the RS-485 receiver is constantly ON while the transmitter is switched as required.

The CA-285 is equipped with a five position dip switch that is used to select the following:

RS-422 mode: 4-wire
RS-485 mode: 2-wire
RS-485 mode: 4-wire
RS-485 mode: controlled by RTS
RS-485 mode: controlled by data
220 ohm terminator: in or out

The CA-285 is also equipped with a DTE/DCE switch to allow reversing pins 2 and 3 on the RS-232 interface. Td and Rd LED indicators help verify operation.



SPECIFICATIONS:

Interface:	RS-232, conforms to CCITT V.24; pins 2 and 3 (transmit/receive data) switch selectable, pin 4 (RTS) tied to pin 5 (CTS), pins 6 (DSR), 8 (DCD) and pin 20 (DTR) are connected together; RS-422 or RS-485, selectable
Connectors:	RS-232, DB-25 male, RS-422/485, 5-position terminal block
Indicators:	2 LEDs, Td and Rd
Switches:	DTE/DCE switch selectable for reversing Td and Rd; 5-position dip switch set RS-422/485 operation and termination
Data Rate:	0 to 64k bps
MTBF:	596,000 hours
Power:	115 VAC at 60 Hz (Wall plug power adapter with 6' cable provided)
Size:	0.875"H x 2"W x 3.5" D
Operating Temp.:	32 to 122°F (0 to 50°C)
Humidity:	5 to 95% RH (non-condensing)

Ordering Information

EXAMPLE CA285
Series _____

CA-285 RS-422/485 to RS-232 Communication Adaptor

ADAM-4572

Modbus RTU to Modbus TCP Converter

Features

- Supports 10/100 Mbps communication speeds
- Allows up to 8 clients to access field data simultaneously
- Supports popular HMI software with Modbus®/TCP driver or OPC server
- Up to 3 Independent serial ports capacity if configured to RS-485 serial mode
- Provides auto-searching device ID Windows utility
- Surge protection for RS-485 and power line
- Automatic RS-485 data flow control
- Easy mounting on DIN-rail and wall, and can also be stacked
- Supports Modbus/ASCII, Modbus/RTU Protocol to control devices



DESCRIPTION:

ADAM-4572 serves as an interface between Modbus serial devices and computer hosts running Modbus/TCP on an Ethernet network. Fully compliant with Modbus/TCP, it is ideal for those who looking for an easy way to connect their existing devices or controllers running Modbus serial protocols (Modbus/ASCII or Modbus/RTU) to Ethernet networks. It works like a bridge between Modbus serial devices and controllers over TCP/IP Ethernet networks. Benefits are also abundant for customers who want to expand their Ethernet-based Modbus (Modbus/TCP) applications.

Networks have become increasingly vital for industrial automation applications, but many control devices today do not have a network port and can only communicate with a dedicated local PC or control panel. Advantech's revolutionary network-enabling technology is now allowing control devices with serial ports to connect to the Ethernet and share networks quickly and cost-effectively. The ADAM-4572 Modbus to Ethernet Data Gateway allows users to integrate new and existing Modbus/RTU and Modbus/ASCII serial devices to newer TCP/IP network-based devices. Manufacturers, system integrators, and end users can now use the ADAM-4572 to create networked applications to remotely manage and access data from control devices no matter where they are.

SPECIFICATIONS:

Ethernet Communications

Compatibility	IEEE 802.3, IEEE 802.3u
Speed	10/100 Mbps
Connectors	1 x RJ-45

Serial Communications

Type	RS-232/422/485
Connectors	Screw terminal
Ports	1
Data Bits	7, 8
Stop Bits	1, 2
Baud Rate	300 bps ~ 115.2 kbps
Data Signals	RS-232: TxD, RxD, GND RS-422: TxD+, TxD-, RxD+, RxD-, GND RS-485: Data+, Data-, GND

Protection

Surge Protection	15 kVESD
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Software

Drivers Supported Windows® 98/NT/2000/XP
Utility Software Auto-detecting configuration utility (up to 128 devices) Device setting: name, description, serial port
Operation Mode Modbus/TCP, Modbus/RTU, Modbus/ASCII
Configuration Configuration utility

Mechanics

Dimensions (H x W x D) 70 x 130 x 30 mm
Enclosure ABS+PC with solid mounting hardware
Mounting DIN-rail, stack, wall

General

Certifications CE, FCC class A
LED Indicators Network: Tx/Rx, Link, Speed (10/100 Mbps)
Serial: Tx/Rx
System: Power, Status

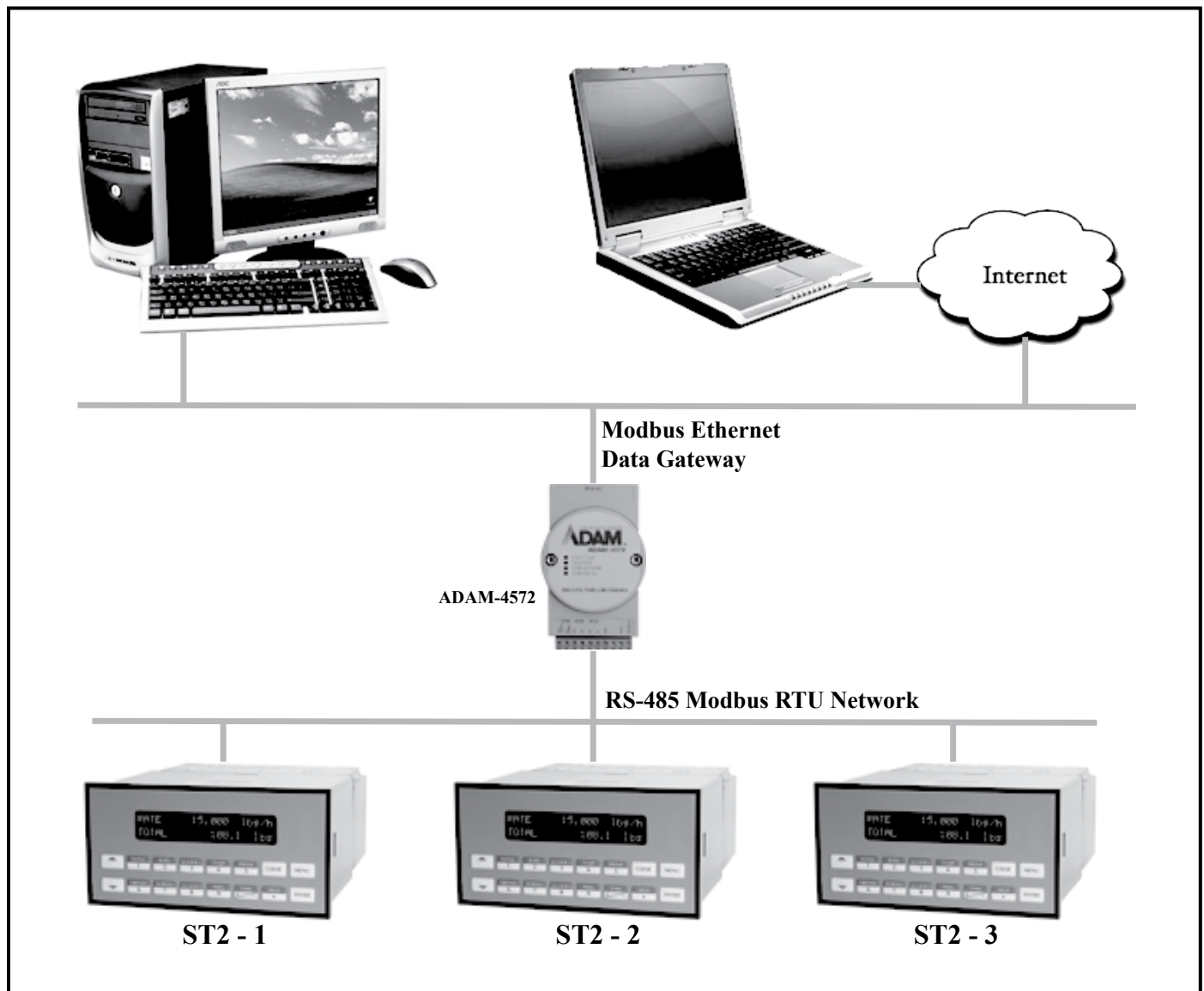
Power

Power Input Unregulated 10 ~ 30 VDC
Power Consumption 3 W
Environment
Operating Temp. 0 ~ 60° C (32 ~ 140°F)
Storing Temp. -20 ~ 80° C (-4 ~ 176°F)
Operating Humidity 20 ~ 95% (non-condensing)
Storing Humidity 0 ~ 95% (non-condensing)

Ordering Information

ADAM-4572 1-Port Modbus to Ethernet Data Gateway

TYPICAL APPLICATION:

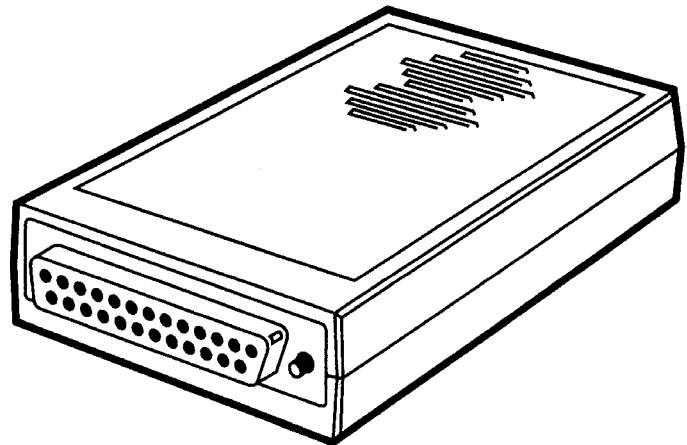


MPP-2400

Low Power Modem 2400 Baud Rate

Features

- Operates on All Telephone Lines
- External DC Power Required
- 2400 BPS Operation
- Automatic Fallback
- Compatible with All Communications Software Including: TROLink Remote Metering Software
- Compatible with SUPERtrol 1LE, 1 & 2, LEVEL-trol II Families
- Automatic Answer
- Tone & Pulse Dialing
- Compact Size



Description:

The MPP-2400 Modem is ultra-compact and easy to install. The Modem operates at speeds up to 2400 bps. If you are connected to a slower speed modem on the other end of the line, the MPP-2400 automatically "falls back" to match the speed of the slower modem so your data transmission is not interrupted.

The MPP-2400 also features automatic answer, so it can operate unattended.

It will operate over rotary or push-button lines since it works in tone or pulse dialing modes.

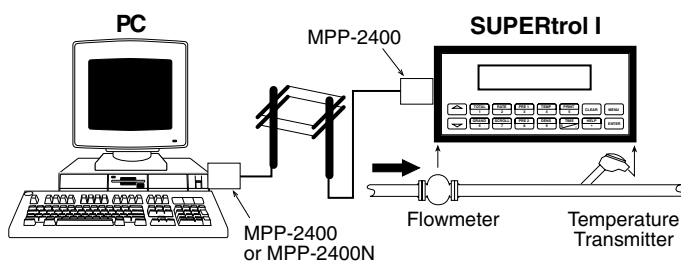
The Modem is very small and simple to install. It offers a standard DB25 female connector for your RS-232 port connection and an RJ-11 jack for your telephone cabling.

The MPP-2400 complies fully with the Hayes Standard AT Command Set and the ITU V.22 bis and V.22 standards, as well as Bell 103 and Bell 212A protocols. The MPP2400 can be powered by ST1LE, ST1, ST2 and LT2 units equipped with modem power option (option "M")

Alternately, an external DC power supply is available upon request. Call factory for details.

SPECIFICATIONS:

Operation:	Full- or Half-Duplex
Standards:	ITU V.22, V.22 bis, Bell 103/212A
Interface:	RS-232/V.24
Baud Rate:	2400, 1200, 300 bps
Command Set:	AT compatible
Dialing:	Tone and Pulse
Transmit Level:	-12 dBm
Receive Sensitivity:	-70 dBm
Dropout Level:	-43 dBm
Operating Temp.:	32 to 104 °F (0 to 40 °C)
Storage Temp.:	-40 to 212 °F (-40 to 100 °C)
Humidity:	10 to 95% (non-condensing)
Connectors:	(1) DB25 female, (1) RJ-11 female
Power:	6.5 to 15 VDC (75mA) Pin 20 (+); Pin 7 (-)
Size:	0.9"H x 2.3"W x 3.4" D
Weight:	0.18 lb. (0.08 kg)



Ordering Information

EXAMPLE MPP2400
Series _____
MPP-2400 Low Power Modem

Accessories

Interconnecting Cables and Power Pack Available on Request

MS-722 MPP-2400N

Wall Mount External Modem

Features

- Operates on All Telephone Lines
- RS-232 Powered from SUPERtrol-II
- 2400 BPS Operation
- Automatic Fallback
- Compatible with All Communications Software Including: TROLink Remote Metering Software
- Compatible with SUPERtrol 1LE, 1 & 2, LEVEL-trol II Families
- Automatic Answer
- Tone & Pulse Dialing
- Wall Mount Enclosure with Locking and Sealing Provisions
- FCC Approved



Description:

The MS722MPP-2400N Modem is compact and easy to install. It needs no batteries or AC power because it's designed to run on the DC power provided from the SUPERtrol (with modem power option "M") interface to which it attaches.

The Modem operates at speeds up to 2400 bps. If you are connected to a slower speed modem on the other end of the line, the MPP-2400 automatically "falls back" to match the speed of the slower modem so your data transmission is not interrupted.

The MS722MPP-2400 also features automatic answer, so it can operate unattended.

It will operate over rotary or push-button lines since it works in tone or pulse dialing modes.

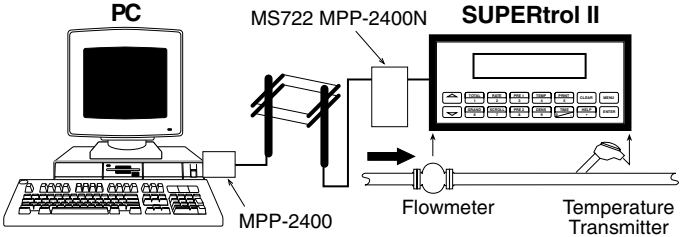
The Modem is very small and simple to install. It offers an RJ-45 connector for your RS-232 port connection and an RJ-11 jack for your telephone cabling. An extra RJ-11 jack is provided to permit the connection of a portable telephone.

The MS722MPP-2400 complies fully with the Hayes Standard AT Command Set and the ITU V.22 bis and V.22 standards, as well as Bell 103 and Bell 212A protocols.

SPECIFICATIONS:

Operation:	Full- or Half-Duplex
Standards:	ITU V.22, V.22 bis, Bell 103/212A
Interface:	RS-232/V.24
Baud Rate:	2400, 1200, 300 bps
Command Set:	AT compatible
Dialing:	Tone and Pulse
Transmit Level:	-12 dBm
Receive Sensitivity:	-70 dBm
Dropout Level:	-43 dBm
Operating Temp.:	32 to 104 °F (0 to 40 °C)
Storage Temp.:	-40 to 212 °F (-40 to 100 °C)
Humidity:	10 to 95% (non-condensing)
Connectors:	(1) RJ-45, (2) RJ-11 female
Power:	7-12VDC (RS-232 pins 8 & 9, 75mA)
Size:	8.97" H x 7.86" W x 5.38" D
Weight:	1 lb.

Flow Instruments
COMMUNICATION SOLUTIONS



Ordering Information

EXAMPLE MS722MPP2400N
Series _____
 MS722MPP-2400N Wall Mount, External Modem

MPP-2400N

Wall Mount External Modem

Features

- Operates on All Telephone Lines
- RS-232 Powered from KEP Instruments
- 2400 BPS Operation
- Automatic Fallback
- Compatible with All Communications Software Including: TROLink Remote Metering Software
- Compatible with SUPERtrol 1LE, 1 & 2, LEVEL-trol II Families
- Automatic Answer
- Tone & Pulse Dialing
- Compact Wall Mount Enclosure
- FCC Approved



Description:

The MPP-2400N Modem is ultra-compact and easy to install. It needs no batteries or AC power because it's designed to run on the DC power provided from the SUPERtrol interface to which it attaches.

The Modem operates at speeds up to 2400 bps. If you are connected to a slower speed modem on the other end of the line, the MPP-2400N automatically "falls back" to match the speed of the slower modem so your data transmission is not interrupted.

The MPP-2400N also features automatic answer, so it can operate unattended.

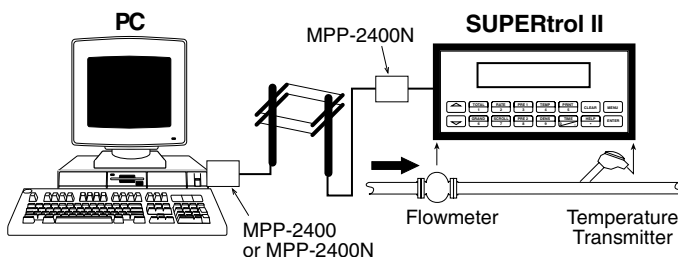
It will operate over rotary or push-button lines since it works in tone or pulse dialing modes.

The Modem is very small and simple to install. It offers a standard DB-9 male connector for your RS-232 port connection and an RJ-11 jack for your telephone cabling.

The MPP-2400N complies fully with the Hayes Standard AT Command Set and the ITU V.22 bis and V.22 standards, as well as Bell 103 and Bell 212A protocols.

SPECIFICATIONS:

Operation:	Full- or Half-Duplex
Standards:	ITU V.22, V.22 bis, Bell 103/212A
Interface:	RS-232/V.24
Baud Rate:	2400, 1200, 300 bps
Command Set:	AT compatible
Dialing:	Tone and Pulse
Transmit Level:	-12 dBm
Receive Sensitivity:	-70 dBm
Dropout Level:	-43 dBm
Operating Temp.:	32 to 104 °F (0 to 40 °C)
Storage Temp.:	-40 to 212 °F (-40 to 100 °C)
Humidity:	10 to 95% (non-condensing)
Connectors:	(1) DB-9 male, (1) RJ-11 female
Power:	7-12VDC (RS-232 pins 8 & 9, 75mA)
Size:	3.0"H x 5.1"W x 2.4" D
Weight:	0.5 lb.



Ordering Information

EXAMPLE MPP2400N

Series

MPP-2400N Wall Mount, Port Powered Modem

Accessories

Interconnecting Cables and Power Pack Available on Request

Factory Automation Solutions Tutorial

The selection of factory automation hardware and software is a topic still quite new to many users of conventional flow instrumentation. They are presented with a increased range of possible solutions to their plant wide automation needs.

Broadly speaking there are three basic approaches to solve instrumentation and control needs. These are networks of instrumentation, or PLC based designs, or PC based designs. Each has its own merits based on the size of the plant and the need for local control.

Industrial PC's are finding their way into more and more monitoring and control applications each year. In most cases the PC is used as an operator station or data gathering station which collects information from a number of instruments or PLC's.

Many users are trying to grow their own system by looking at their need for information and tackling small portions of their plant one step at a time and slowly adding these to their existing PC network within their plant.

How will information be displayed on my PC? Generally speaking there are two broad mechanisms which are involved in the display of factory information on a PC. One program is gathering and sharing data with the display, or "client" program. The data gathering program is called a "Server/Driver". "Client" programs include "HMI" or Human Machine Interface programs and common PC Spread Sheet and/or Database report programs. Many are available on the market.

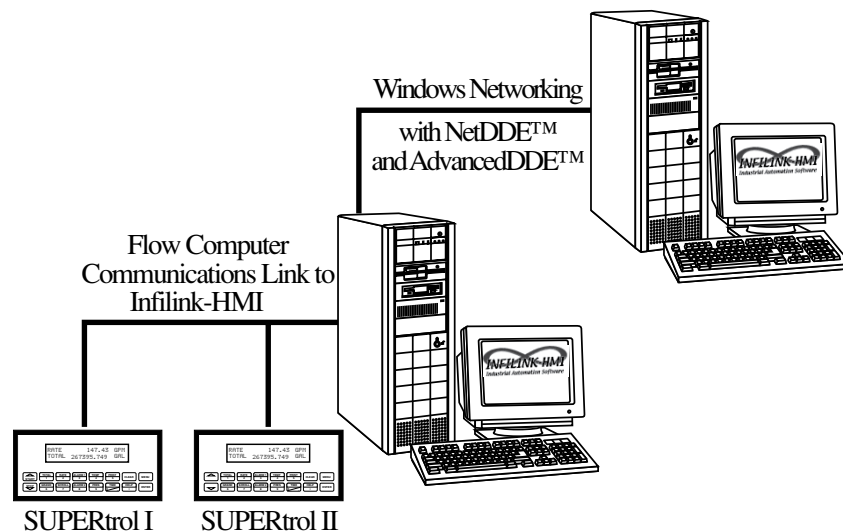
How do I select an Industrial PC? In most cases the hardware selection is done after you have decided on the software, on what you want this to do, and how it will be connected to the rest of the plant. Many experts agree that you should purchase a PC which is compatible with your software and with the best capabilities you can afford. Industrial PC offerings change frequently.

What are some of the selection criteria for Industrial PC's? Most customers begin by reviewing the processor, memory and hardware requirements for the software they plan on using since this lists the minimum requirements for any PC they might use. Next the desired display type/size, operator input, environmental ratings, and materials of construction are reviewed. The number and type of required field and/or instrument communication channel and the desired network connection is also considered. Supplier quotations are then solicited.

What are the common field or instrument communication channels? There has been a lack of standardization in instruments and PLC's. There are many on the market and in most plants. As a result it is not uncommon to find that several communication ports are required on your PC. Industrial PC's are usually provided with 2 or 4 RS-232 serial com ports and an optional LAN connector. Instruments and PLC's are arranged into groups that share a communication channel hardware and protocol type. Each com port is then associated with a "Server" software that knows how to gather information over that channel and how to share that information with the "client" software which is running on that or remote PC's. In some cases a "signal adapter or converter" is required to convert the COM Ports RS-232 into the signal type required by that channel. An example might be a RS-485 communication channel with several instruments which uses the MODBUS-RTU protocol would connect to COM PORT1 using a RS-232 to RS-485 adapter.

What are the common office LAN connections used in business? It is important to note that an industrial PC is after all a PC. Your system administrator will add a network card and software in the same manner as other PC's in your office. Many Industrial PC's come with an Ethernet connection as standard or as a option.

Typical Application:



INFILINK-HMI

Industrial Automation Software

Features

- Free Design Mode: Only pay to unlock run-mode copies
- OPC Client Functionality
- E-mail and Web Enabled: Send e-mail and View tag data over the Internet

- Historical Trending, Alarming, Data Logging included in base price
- Email and Web Enabling included in base price
- No yearly "maintenance" or "support" fees

New Features for Infilink 5.0.0:

- Project explorer. Contains Wizards, Animations, Project, Drag and Drop Tags
- Multi line text object.
- List box and Combo box objects.
- "Flush alarm log" menu item in run mode added. Equivalent script command "SysCmd.FlushAlarmLogger" added.
- Animation Expression can now be set for Linear gauge and Angular gauge objects instead of just tag names.
- Max OPC update rate changed from 60000 ms to one day.

- Run mode data entry onscreen keypads made resizable. Resizing these onscreen keypads will resize internal buttons proportionately. The size of the keypad is remembered when "Ok" button is pressed. Onscreen keypads affected by this modification: 1. Boolean entry keypad. 2. String entry keypad (English and French). 3. Numeric data entry keypad.
- Lock screen resolution check box added in "Project properties" dialog. Automatic scaling of graphic objects (on detecting screen resolution change) can be disabled by checking this box.
- XYPlot object added.

Description:

Infilink-HMI is a full featured solution at an affordable price. It is ideal for the small PLC user with its easy setup and run time price half that of competitive products. Machine builders and users want the benefits of a Windows based package, but are held back by the premium prices demanded by many vendors. Infilink-HMI changes all of that with the truly affordable HMI, Infilink-HMI.

Free Development System Buy Only the Runtimes You Need

Infilink-HMI now offers our complete development system for free. When you download the latest version of Infilink-HMI (5.0.0 or higher) from our web site you have a complete development system. There's no limitation on the tag count. The provided runtime has a one hour expiration time. When used in combination with a demo version of our 32 bit OPC servers, you have a complete HMI system that can be used by every developer in your organization without spending a dime.

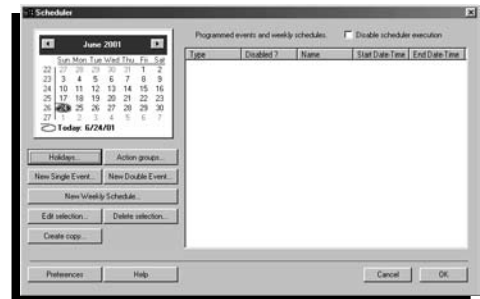
Email Capable

Infilink-HMI can send email messages based on alarm conditions. This can be a regular email message, or it could be sent to a technician's alphanumeric pager.



Scheduler

Infilink-HMI now includes a built in scheduler. Events can take place or tag data can be changed based on time, date, day of week, or holiday. New events can be entered by the operator in Run mode through the calendar interface.



Infilink-HMI Communicates Using KEPServerEX

- One free driver included with Infilink-HMI purchase.
- OPC and DDE supported.
- Over 100 drivers available.
- Support for various fieldbus networks including Ethernet TCP/IP and DeviceNet.

Web Enabled

Use the internet and our In-fiviewer utility to view tag data. This is an especially powerful troubleshooting feature when combined with email going to an alphanumeric pager. Infilink can notify technical personnel of a problem via email, and give them the ability to obtain additional application information over the internet.

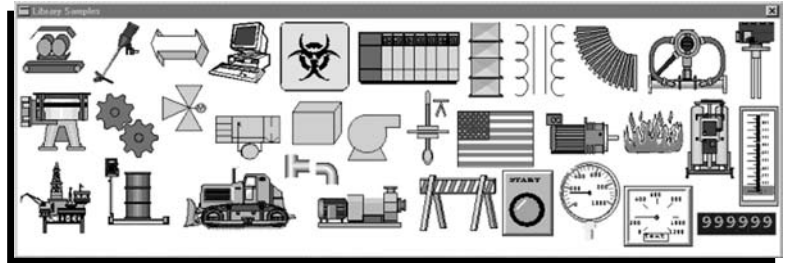


Graphic Objects and Editing Features

Infilink-HMI provides a powerful set of graphic primitives and editing features allowing you to easily depict your application's displays. All of these functions are available from our toolbox. Store your objects in libraries for reuse later or use the 2000+ library objects available with Infilink-HMI to speed your development.

Professional Library Objects

Infilink-HMI includes over 2000 professionally drawn library objects licensed from Reichard Software, famous for their Symbol Factory product. Additionally, our libraries also contain hundreds of pre-animated objects such as buttons, meters, displays, and sliders to name a few. These pre-animated objects can quickly be added to your application using the new Reassign Tags function. Drag and Drop objects out of the library into your application.



Arrange your toolbars on the top, bottom, middle, or sides of the screen with Floating Palettes.

Key Editing and Drawing Functions Include:

- Lines
- Polylines
- Polygons
- Rectangles
- Rounded Rectangles
- Ellipses & Circles
- Arcs, Pies, Chords
- Text
- Bitmaps
- Buttons
- Windows Metafile Import
- Alarm Displays
- Alarm Logger
- Trend Displays
- Object Grouping
- Editing of Group Objects
- Align ~ Left, Right, Top, Bottom
- Align Middle ~ Horizontal, Vertical
- Space Equal ~ Horizontal, Middle
- Rotate ~ Clockwise, Counter Clockwise
- Make Equal ~ Width, Height
- Bring to Front
- Send to Back
- Z Depth Level 1-10
- Reshape
- Rotate Shapes
- Flip Horizontal or Vertical

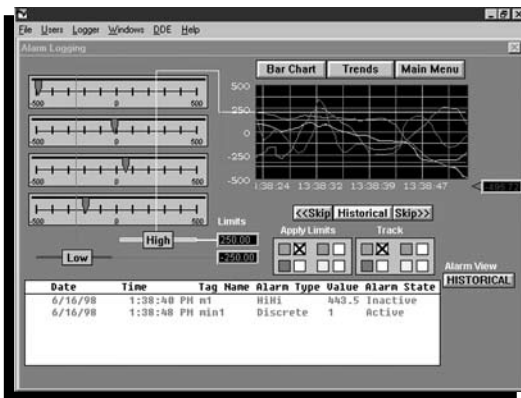
Key Animation

Functions Include:

- Visibility ~ Show/Hide
- Change Color
- Blink ~ Fast, Medium, Slow
- Take Action ~ Activate Script
- Rotate Shapes
- Move ~ Horizontal, Vertical
- Stretch ~ Horizontal, Vertical
- Enter Data ~ Boolean, Numeric, String
- Slider ~ Horizontal, Vertical
- Show Value ~ Boolean, Numeric, String

Trend Functions

Infilink-HMI provides built-in Real Time and Historical Trend objects which allow you to quickly add time based views of your process data.



Sample Trending Application

Key Trend Functions Include:

- Multiple Plotting Modes
- Script Control
- Fast Display Speed
- 10 Pens / Trend
- Library Objects for Trend Control

Scripting Language

Infilink-HMI was designed to fit all of your needs with our built in functions. However, we have provided a powerful scripting language allowing you to tailor Infilink-HMI's operation to meet any application requirement.

Key Script Functions Include:

- Project Script ~ (Before, While, After) Open
- Window Scripts ~ (Before, While, After) Open
- Tag Scripts ~ On Data Change
- Conditionals ~ IF, THEN, ELSE
- Logical Operators ~ AND, OR, NOT
- Comments
- File Functions ~ Read, Write, Text, CSV
- Object Property Access
- Conditional Operators
- Full Set of Math and String Functions
- Automatic Error Checking
- Play Wave Files

Data Logging

Any Tag in Infilink's tag database can be configured to log itself to disk. Crucial events can be stored and shared with any application via industry standard database formats.

Key Data Logging Functions Include:

- User Specified Logging Path
- User Controlled Log Enabling
- Log File Change Based On Time
- Improved logging performance
- User Selectable DBASE (DBF) or MS Access (MDB) file formats.



You Asked! We Listened! NEW FEATURE...

"Ragged Tank Cut-Out" has been a typical request which could not be done until now!



Alarm Management and Display

Infilink-HMI provides a complete alarm management and display system available from any window in your application. Operators can view and acknowledge alarm conditions quickly using the alarm object. The Alarm History Viewer allows logged alarm events to be searched and filtered.



Key Alarm Functions Include:

- Limit Alarms ~ LowLow to HighHigh
- Discrete Alarms
- Selectable Priority Levels
- Custom Alarm Messages
- Selectable Filtering on History Viewer
- Automatic Printing of Alarms
- Logging of event with User ID
- Print Selected Alarm History Data

Telephone Alarm Notification



The Infilink telephony feature is a real-time Telephone Alarm Notification system. Infilink can call pagers, cell phones, landline phones and wireless devices to warn operators of alarm conditions. Warnings can be spoken over the phone lines using the SpeakOut "text-to-speech" scripting. Touch tone recognition

allows the operator to send commands to the system using the telephone keypad. This feature is only available with the unlimited tags version.

MS Access (MDB) File Logging

Use your favorite editor or report generation tools such as Excel, Crystal Reports or MS Access, to organize or analyze your data.

OPC Client

OPC (Object Linking and Embedding for Process Control) is now the standard format for industrial communication drivers. We have added OPC Client functionality to Infilink-HMI. Now you can use any of the OPC communication servers on the market with our product. We recommend using the KEPSWare Extreme OPC servers, but you can use the OPC server product of your choice. Infilink also supports AdvancedDDE and NetDDE.

There's An Easier Way to Make Infilink-HMI Speak!

New Text-to-Speech (TTS) functionality lets Windows XP users read a string tag over speakers, into a PA system, or through a telephone mode. Infilink's SpeakOut command scripting prompts you to insert text and repetitions. This feature is only available with the unlimited tags version.



Other Features:

Software Based Protection

Infilink-HMI uses a software based keying system which works on any Windows operating system.

Multi-Platform Operation

Infilink-HMI runs with Windows 98SE, Windows 2000 and Windows NT.

System Requirements

Operating System:

Windows XP (preferred), 2000, NT 4.0, 98SE.

Disk Space:

50MB Free Disk Space

Screen Resolution:

640x480 (minimum), 800x600 or higher (preferred).

Ordering Information

Runtime Packages with the following Real I/O Tag counts are available:

128 I/O Tag Runtime **Part # KEPRUN-128**

Includes any 1 KEPServerEX OPC Server PLC Driver at no additional charge.

256 I/O Tag Runtime **Part # KEPRUN-256**

Includes any one KEPServerEX OPC Server PLC Driver at no additional charge.

512 I/O Tag Runtime **Part # KEPRUN-512**

Includes any one KEPServerEX OPC Server PLC Driver at no additional charge.

Unlimited I/O Tag Runtime **Part # KEPRUN-0000**

Includes any one KEPServerEX OPC Server PLC Driver at no additional charge.

Note: Internal or Memory tags are not counted as part of your licensed tag count.

Download a fully functional version of Infilink-HMI from our website at:

www.kep.com

KEP ServerEX

High Performance OPC Server Software

Description

KEP ServerEX is the latest generation of KEPware's OPC server technology. Building upon the original KEPServer, KEP ServerEX has incorporated many of the features requested by KEPware's customers. In addition to customer driven enhancements, many technological changes have occurred. These features and enhancements have all been made with the goal of providing an OPC server that demonstrates unparalleled compatibility and performance. A few of the enhancements are transparent to the user, but there are a number of new features that are readily apparent and directly available to the user. The following sections will describe the primary features of KEP ServerEX.

Application Connectivity

KEP ServerEX supports the following client server technologies:
 OPC Data Access Version 1.0a & 2.0
 DDE Format CF_Text, XL_Table & AdvancedDDE

Device Connectivity

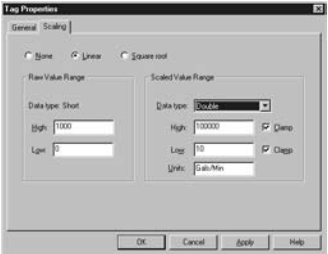
KEP ServerEX allows you to use a number of communications drivers concurrently.

Runs as NT Service

KEP ServerEX supports running as a service under Windows NT/2000. Service operation is completely user configurable from the Tools|Options menu and can be changed at any time allowing you to move from normal stand alone program operation to NT service mode.

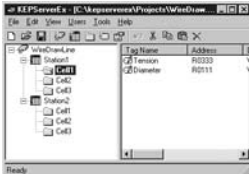
Data Scaling

KEP ServerEX now supports direct scaling of device data. Scaling allows raw device data to be converted to engineering units for OPC client applications. KEP ServerEX provides a number of unique scaling features that make it easy to implement scaling in your application.



On-Line Full Time

The full time on-line mode of operation allows a KEP ServerEX project to be modified while the server continues to supply data to client applications. Almost every parameter can be changed while the server is operating.



User Management

KEP ServerEX includes a built-in User Manager that allows complete control over what types of functionality each individual user can access.

Tag Management

KEP ServerEX's new user defined tag management features allow you to create a tag database structure that fits the nature of your application.

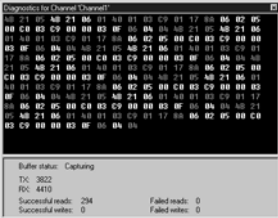
Automatic Tag Database Generation



The Automatic Tag Database Generation feature brings OPC technology one step closer to Plug and Play operation. Drivers that support this feature can either read tag information directly from a device or generate tags from stored tag data.

Diagnostics

KEP ServerEX's new diagnostic features provide real-time data on the performance of your communication driver. All read and write operations can be viewed in the diagnostic display window of KEP ServerEX or can be tracked directly in your OPC client application by using its built-in diagnostic tags.

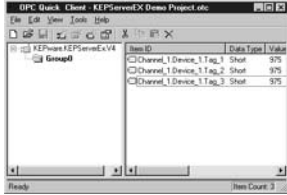


Modem Support

KEP ServerEX supports the use of modems on all serial communication drivers. Modem control is provided by a set of new modem tags.

OPC Quick Client

KEP ServerEX includes an extensive OPC Quick Client application to aid in the development your OPC applications.



Visual Basic Examples

The simple and complex VB examples included with KEP ServerEX are well commented and provide additional pointers for using OPC servers in your VB applications.

System Requirements:

	Minimum	Recommended
Operating System:	Windows 98	Windows NT 4.0 SP5 or better
Processor:	Pentium 200Mhz	Pentium 400Mhz
Ram:	32 MB	64 MB
Disk Space:	10 MB	10 MB

NOTE: While KEP ServerEX will run on Windows 95 and Windows 98 we strongly recommend the use of either Windows NT 4.0 SP5 or Windows 2000 for use in industrial applications.

Flow Instruments
FACTORY AUTOMATION

FLOWtrol Batch Controller

Features

- Start/Stop Buttons and Remote Inputs
- Programmable K-Factor
- Batch Total and Grand Total
- Two DPDT Relay Outputs for Two Stage Shut Off
- Pulse Input to 20 kHz Count Frequency

Description:

The FLOWtrol is a batch controller intended for use with pulse producing flowmeters. The FLOWtrol offers control outputs consisting of DPDT Relays rather than SPDT Relays. The Flowtrol may be applied in existing applications seeking to expand their batching operations with compatible units.

The FLOWtrol was the fore runner to the BATCHtrol II. However, it lacks the rate display, analog input and Easy Preset capabilities now available in the BATCHtrol II. The BATCHtrol II is recommended for all new applications.

Specifications:

Display: 8 digit, .55" high, 15 segment bright LED.

Input Power:

- A) 115 VAC ±15% or 12 to 27 VDC
- B) 230 VAC ±15% or 12 to 27 VDC

Current: 280 mA DC max. or 5.3 VA (5.3W) at rated AC voltage.

Output Power: (on AC powered units only)

+12 VDC @ 100 mA and separate isolated 12 VDC @ 100 mA to allow ±12 VDC or + 24 VDC, regulated ±5% worst case.

Input: (count/start/stop/reset)

- High: 3 to 30 VDC
- Low: open or <1 VDC
- Impedance: 10 kΩ
- Frequency: 20 kHz max.

Inputs: Positive edge triggered, 3 μsec/61 μsec/5 msec selectable debounce filtering.

Control Output: (preset and prewarn)

DPDT relay, 5 amp, 115 or 230 VAC

Temperature: 32° to 132°F (0° to 55°C)

Humidity: 0 to 90% (non-condensing)

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

Dimensions: See BATCHtrol II

Ordering Information

Example	FLO8	A	1
FLOWtrol			
Operating Voltage:			
A: 110 VAC ±15% or 12 to 27 VDC			
B: 220 VAC ±15% or 12 to 27 VDC			
Options:			
1: RS232 Serial Interface			
2: RS422 Serial Interface			

Accessories:

FLEXCOVER #36120

XTROL7/4- Explosion proof housing, see XTROL 7/4

NEMA 4X wall mount enclosure available, see NEMATROL

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

KEPtrol F/C Measures Net Flow of Boiler Fuel

Features

- Displays Net Rate & Net Total (A – B) or (A + B)
- Pulse Input to 10 kHz Count Frequency
- Separate K-Factors for A and B inputs
- Set Point Alarms
- NEMA 4X/IP65 Front Panel

Description:

The KEPtrol F/C is a special version of the KEPtrol R/T designed to measure the net flow of boiler fuel. Separate K-Factors can be entered for A and B inputs. Two SPDT relay alarm outputs are standard. A scaled pulse output is standard for interfacing with remote devices. An analog output is available to interface with strip chart recorders.

Specifications:

Display: 8 digit, .55" high, 15 segment bright LED.

Input Power: (Internally Fused)

- A) 115 VAC ±15% or 12 to 27 VDC
- B) 230 VAC ±15% or 12 to 27 VDC

Current: 280 mA DC max. or 5.3 VA (5.3W) at rated AC voltage.

Output Power: (on AC powered units only)

+12 VDC @ 100 mA and separate isolated 12 VDC @ 100 mA to allow ±12 VDC or + 24 VDC, regulated ±5% worst case.

The DC Outputs are supplied with self resetting fuses.

Pulse Inputs:

Thresholds: High: 3 to 30 VDC; Low: open or <1 VDC

Impedance: 10 kΩ

Frequency: 10 kHz max. (min. on/off 100 μsec.)

Control Output:

Open Collector: Sinks 250 mA max @ 30 VDC

SPDT Relay: 10 amp, 115/240 VAC or 28 VDC

Temperature: 32° to 132°F (0° to 55°C)

ET: Extended Temperature -40° to 158°F (-40° to 70° C)

Accuracy: 100% over specified temperature range

Humidity: 0 to 90% (non-condensing)

Memory: EEPROM stores all data for min. of 10 years if power is lost.

Dimensions: See KEPtrol R/T

Listing: CE Compliant, UL/CSA Pending

Ordering Information

Example	KFC8	A	3A	2	E	1 3
KEPtrol F/C						
Operating Voltage:						
A: 110 VAC ±15% or 12 to 27 VDC						
B: 220 VAC ±15% or 12 to 27 VDC						
Control Inputs:						
*3A: STD Pulse 3-30 VDC 20 kHz Max.						
*3B: As 3A, with 4.7 KΩ pull up resistors						
Control Outputs:						
1: Open Collector						
2: SPDT Relay 10A						
Input Speed:						
*A: 0-40 CPS (Inputs 3A, 3B)						
*C: 0-400 CPS (Inputs 3A, 3B)						
*E: 0-10K CPS (Inputs 3A, 3B)						
*Dip switch selectable, all units can be field modified easily.						
Options: (Multiple Options Available)						
1: RS232 Serial Interface						
2: RS422 Serial Interface						
3: 4-20 mA Output (Input 3A or 3B only)						
3X: 0-20 mA Output (Input 3A or 3B only)						
3Y: 0-5VDC Output (Input 3A or 3B only)						
3Z: 0-10VDC Output (Input 3A or 3B only)						
ET: Extended Temperature -40° to 158°F (-40° to 70° C)						
ET not available with analog outputs						
CSA: CSA Approved Unit (pending)..... (consult factory)						

Accessories:

FLEXCOVER #36120

XTROL7/4- Explosion proof housing, see XTROL 7/4

NEMA 4X wall mount enclosure available, see NEMATROL

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

MASSbatch

TEMP./DENSITY COMPENSATED BATCH CONTROLLER

Features

- Display Mass or Corrected Volume, Rate, Grand Total, Temperature or Density
- Accepts 4-30V Inputs or Pulses Directly From Magnetic Pickup Meters (no pre-amp required)
- Takes a Direct 100Ω Platinum RTD or Analog Signal For Compensation Input
- RS232/422 Communications (optional)
- Scalable 4-20mA Output of Rate/Total



Description:

Featuring 8 digits of bright, .55", alphanumeric display, the MASSbatch can accept up to 10,000 pulses per second and a direct 100Ω platinum RTD or analog input. The MASSbatch has two separate, 8 digit, floating decimal, "K" factors to convert the inputs to meaningful total and rate data. The user, with the push of a button, can toggle back and forth to view the total of the batch, the rate of flow, temperature or density and the grand total. Two control outputs are provided for two-stage valve control.

A scaled pulse output is also provided by an open collector driver. Since the output frequency is user selectable at 10, 200, 2K or 20K Hz, the unit can transmit the count data to remote electromechanical or electronic counters as well as computers, programmable controllers or other monitor equipment.

An optional analog output allows the user to select low and high settings to control strip recorders or other peripherals.

Specifications:

DISPLAY: 8 Digit, .55" High, 15 Segment, Red Orange, LED.

INPUT POWER: (Internally Fused)

A: 110 VAC ±15% or 15 to 27 VDC

B: 220 VAC ±15% or 15 to 27 VDC

CURRENT: Maximum 350 mA DC or 8.8 VA (8.8W) at rated AC voltage.

OUTPUT POWER: (On AC powered units only):

+12 VDC at 100mA. Separate Isolated 12 VDC at 100mA to allow +12 VDC or +24 VDC regulated +5% worst case.

The 24VDC Output is supplied with a self resetting fuse.

MEMORY: EEPROM stores all program and total data for minimum of 10 years if power is lost.

PULSE INPUT:

3A: (Standard) 4-30VDC 30 k Ohm impedance to GND, 10 kHz max. input speed (min. on/off 50µsec.).

3C: (Magnetic Pickup) 30mV to 30V P/P min., 2 Hz to 5 kHz Input Speed.

ENVIRONMENTAL:

Temperature:

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

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

ET: Extended Temperature -40° to 158°F (-40° to 70° C)

Humidity: 0-90% Noncondensing

Dimensions: See BATCHrol II

Listing: CE Compliant, UL/CSA Pending

FACTORED OUTPUT: The MASSbatch gives one pulse out for each factored count. The open collector sinks 30 VDC maximum to 1 volt maximum at 100mA maximum. Output speed is user selectable (see table below). An internal buffer holds up to 10,000 pulses for output at the selected frequency before "DATA LOST" flashes, indicating pulses are lost. If factored rate exceeds 7 digits "RFF..." flashes. These alarms indicated that speed has been exceeded.

Ordering Information

Example: MB8 A 3A 2 H R 3

Series: _____

MASSbatch

Operating Voltage: _____

A: 110 VAC ±15% or 15 to 27 VDC

B: 220 VAC ±15% or 15 to 27 VDC

Count Inputs: _____

3A: (STD) Pulse 4-30 VDC 10 kHz Max. (jumper selectable)

3C: (Mag. Pickup) 30mV 2 Hz to 10 kHz (jumper selectable)

Control Outputs: _____

1: Open Collector

2: SPDT Relay 10A

Input Speed: _____

L: (Low Speed) 0-40 Hz

H: (High Speed) 0-10 kHz

Options: (Multiple Options Available) _____

R: RTD and 4-20mA input (jumper selectable)Standard

1: RS232 Serial Interface

2: RS422 Serial Interface

3: 4-20 mA Output (jumper selectable)

3Y: 0-5VDC Output (jumper selectable)

3Z: 0-10VDC Output (jumper selectable)

4: 16 Point Linearization

ET: Extended Temperature:

-40° to 158°F (-40° to 70° C)

CSA: CSA Approved Unit (pending).....(consult factory)

Accessories:

FLEXCOVER #36120

XTROL7/4- Explosion proof housing, see XTROL 7/4

NEMA 4X wall mount enclosure available, see NEMATROL

Serial printer available, see P1000, P295

Ethernet Port Server available, see IEPS

RS-422/485 to RS-232 Communication Adaptor available, see CA285

XTROL 7/4

Explosion Proof Housing for 'trol Products

Features:

- Compatible with all Standard Size "trol" and "SUPERtrol" Family of Products
- Meets NEMA 3, 4, 7, 9 Specs.
- For use in Class 1, Division 1, Groups C & D
- For use in Class 2 & 3, Division 1, Groups E, F & G
- FM, CSA Listed Enclosure
- Specials Available for Custom Conduit Entries

Specifications:

This housing is designed and manufactured in compliance with FM Standards 3600 & 3615 and CSA Standard C22.2 No. 30-M1986 for use in Class I, Division I, Groups C & D and Class II an III, Division I, Groups E, F & G hazardous locations. The enclosure is **certified by:**

ADALET

FM (file# JI 0V2A6.AE)

CSA (file # LR36172).

It is made from cast aluminum and sealed to meet NEMA 7 and 4 specifications. This is accomplished by Buna-N o-ring gaskets retained in machined grooves in the covers and buttons.

The front button actuators have the same easy-to-use keypad layout that has become the trademark of the KEP "trol" and "SUPERtrol" series. 6 blind threaded holes are provided for mounting with 2 each 1/2" NPT openings for wiring.

To install a unit, the 16 front 3/16" allen screws must be removed and the "trol" mounted in the sub panel provided.

If the assembly option is ordered, only the 8 back cap screws need to be removed to complete the wiring to an optional pluggable connector.

Empty weight is 26 lbs.

Enclosure Certifications

Class I, Groups C & D

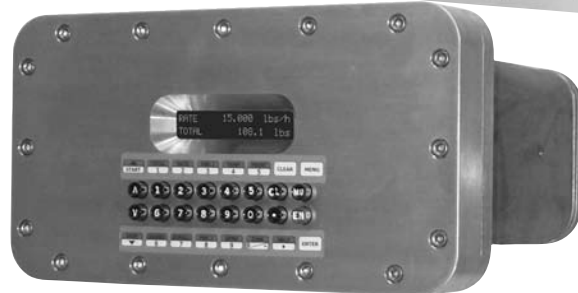
Class II, Groups E, F, & G

Class III

NEMA 4, 7CD, 9EFG

FM Standard 3615

CSA Standard C22.2 No. 30



XTROL 7/4*

Example: XTROL7/4 BT2 A

Series: XTROL7/4 (housing only)

Mounting Hardware: (Includes labels and two piece connector)

BT2 = BATCHtrol II

MB = MASSbatch

FLO = FLOWtrol

KFC = KEPtrol F/C

KP8 = KEPtrol

KRT = KEPtrol R/T

MFC = Mass Flow Computer

DPFC = DPFC

ST1** = SUPERtrol-I

ST1LE** = SUPERtrol-I LE

ST2** = SUPERtrol-II

LT2** = LEVELtrol-II

X = No Mounting Hardware

CONTROLLERS SOLD SEPARATELY

Assembly By KEP:

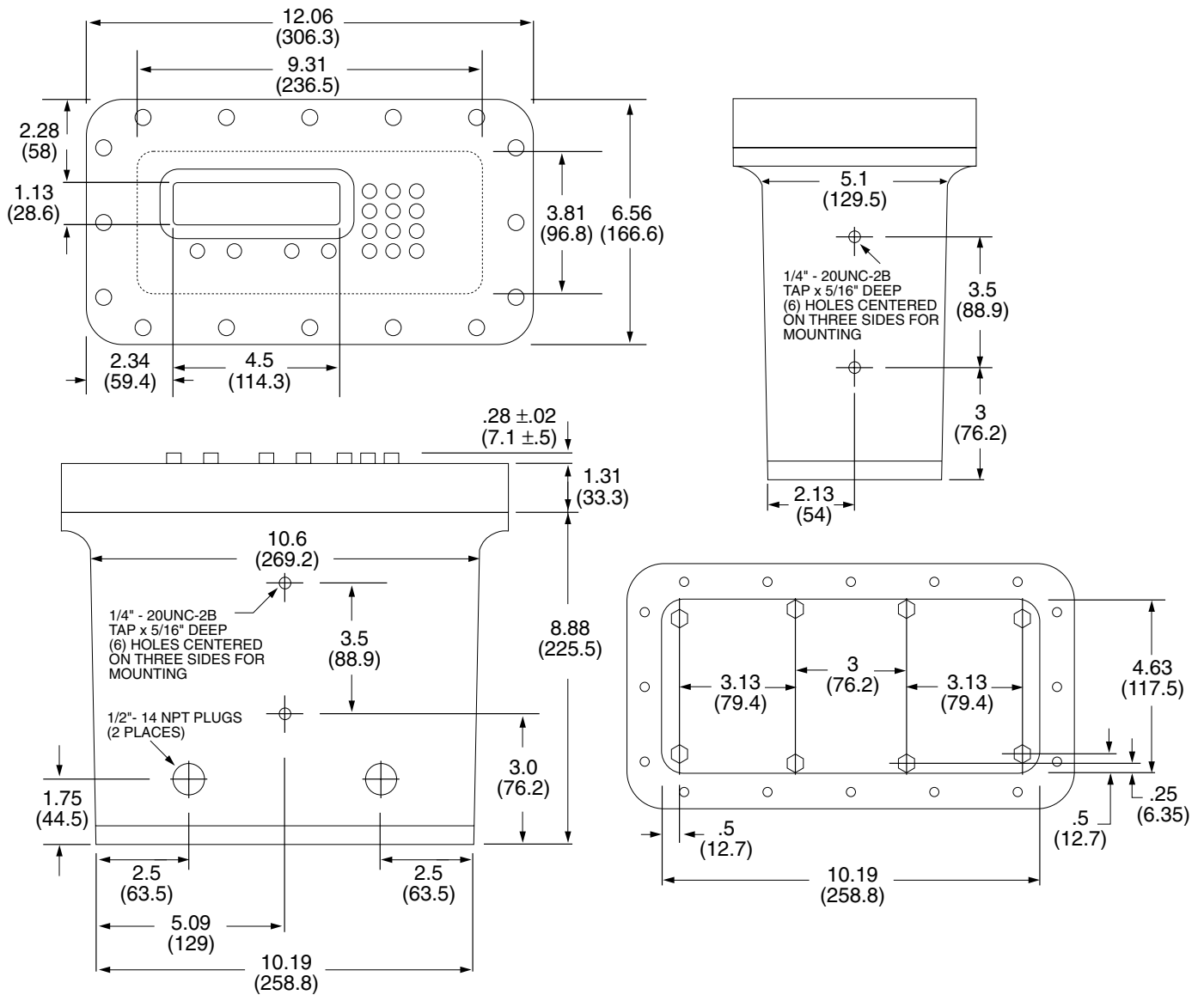
A = Assembled by KEP

X = No Assembly

Note: When placing the order, the unit part number directly following the XTROL part number on the Purchase Order is the one that will be assembled into the XTROL housing.

** See also XHV series enclosure.

XTROL 7/4 Dimensions:



Assembly:

If HOUSING ONLY is purchased, all front allen screws and front must be removed. Remove four allen screws so that the 'trol product can be mounted in the internal bracket (gasket not used; top of bracket is the thinner side). Wiring should be done before installing 'trol in the housing unless the MOUNTING HARDWARE with two piece connector is purchased. If the unit is assembled by KEP, only remove the back plate. The pluggable connector can be wired at back.

XHV Series

X-Proof Housing for Viewing Displays in Hazardous Areas

Features:

- Available for 1/8 DIN and DIN 144 x 72 mm Cases
- Meets NEMA 7 & 4 Specs.
- For use in Class 1, Division 1, Groups C & D
- For use in Class 2 & 3, Division 1, Groups E, F & G
- UL, cUL Approved
- Magnetic Reset Switch Available

Specifications:

This housing is designed and manufactured in compliance with UL Standard No. 1203 and was investigated to CSA Standard C22.2 No. 30-M1986 by UL for use in Class 1, Division 1, Groups C & D and Class II & III, Division I, Groups E, F & G hazardous locations.

Certified by:

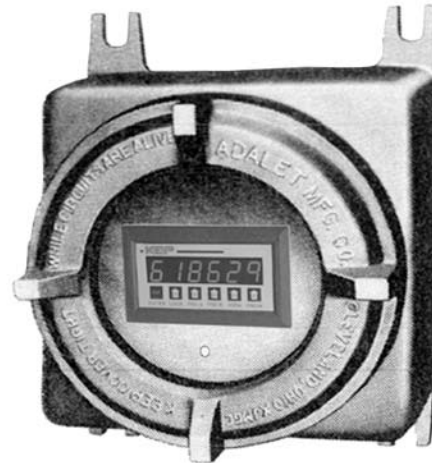
ADALET
UL (file# E81696)

The housing is made from cast aluminum and sealed to meet NEMA 7 and 4 specifications.

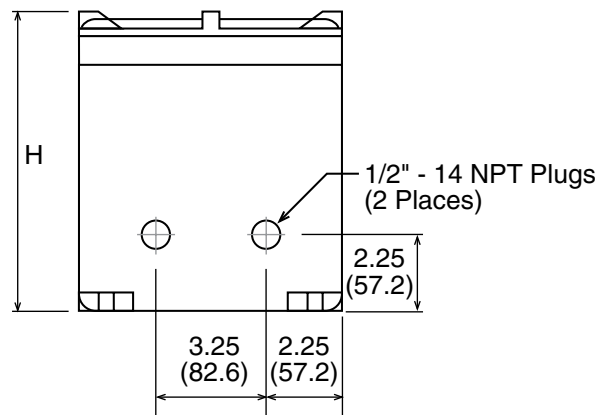
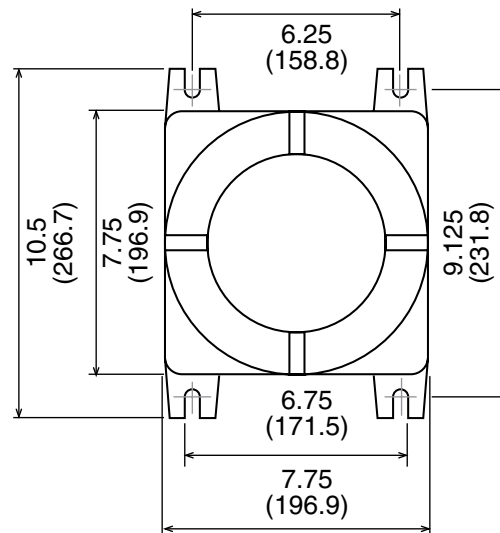
To install a unit, the cover must be removed and the KEP unit mounted in the sub panel provided.

Empty weight:

XHV = 19 lbs.
XHVD = 22 lbs.



Dimensions:



H
XHV = 8.5 (215.9)
XHVD = 11.5 (292.1)

Ordering Information

Example: **XHV 7/4 A A S1**

Series: _____

XHV 7/4 (8.5" high for INT69, MRT, Reporter, etc.)

XHVD 7/4 (11.5" high for SUPERtrol 1 and 2, LEVELtrol II)

Mounting Sub Panel: _____

A = Panel for (1) 1/8 DIN unit (INT69, MRT, etc.)

B = Panel for (2) 1/8 DIN units (INT69, MRT, etc.)

C = Panel for (1) DIN 144 x 72mm unit (ST1, ST2, LT2, Reporter)

Assembly By KEP: _____

A = Assembled by KEP

X = No Assembly

Options: _____

S1 = 1 Magnetic Reset Switch and Magnet

S2 = 2 Magnetic Reset Switches and Magnet

Accessories:

XHVA-1 = Magnetic Switch

XHVA-2 = Actuating Magnet

Note: When placing the order, the unit part number directly following the XHV part number on the Purchase Order is the one that will be assembled into the XHV housing.

NEMAtrol

NEMA 4X/IP65 Enclosures For 'trol & 1/8 DIN Cases

Features

- Compatible with all Standard Size "trol", SUPERtrol & 1/8 DIN Products
- Meets NEMA 4X/IP65 Specs.
- Quick-Release Latches
- Light Weight

Application:

Ideal for use in most petrochemical plants, sewage plants, food processing areas, packing plants, electroplating plants, etc.

Construction:

- Molded fiberglass reinforced polyester material has excellent chemical resistance and outstanding physical properties.
- Fiberglass material is easily punched, drilled, filed or sawed.
- Oil-resistant gasket attached with oil-resistant adhesive.
- The enclosures have corrosion-resistant fiberglass hinges and spring-loaded fiberglass latches attached with monel screws.



Ordering Information

Part Number

NEMAtrol4X (NEMA 4X enclosure for all standard 'trol units 7.365" x 2.495" cutout)

NEMAtrol 4x0 (no cutout)

NEMAtrol 4x1 (1 cutout)

NEMAtrol 4x2 (2 cutouts)

NEMAST4X

(NEMA 4X enclosure for SUPERtrol & LEVELtrol II series)

NEMAST 4x1 (1- 5.43" x 2.68" cutout for SUPERtrol series)

NEMAST 4x2 (2- 5.43" x 2.68" cutout for SUPERtrol series)

NEMA-1/8DIN

(NEMA 4X enclosure for all 1/8 DIN size units)

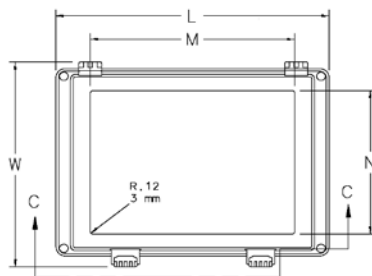
NEMA-1/8DIN 4x0 (no cutout)

NEMA-1/8DIN 4x1 (1 cutout)

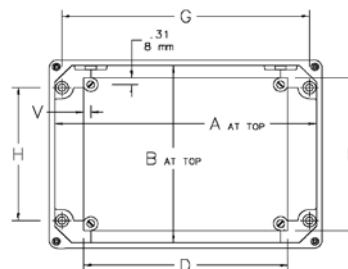
NEMA-1/8DIN 4x2 (2 cutouts)

Physical Properties	Enclosure Value	ASTM Method
Flexural Strength	17,000 PSI	D-790
Heat Distortion	400° F	D-648
Water Absorption (24hrs.)	.5%	D-570
Tensile Strength	6,500 PSI	D-651
Specific Gravity	1.8	D-792
Flammability	94-5V	UI 94
Dielectric Strength	400 V.P.M	D-149
Arc Resistance	180 Sec.	D-495

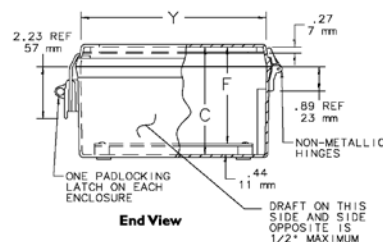
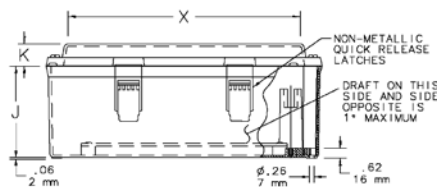
Dimensions:



Top View with Cover



Top View with Cover Removed



- NOTES: 1. Panel screws have # 10-32 threads.
2. Hinged cover opens 200° maximum.

Part Number	A x B x C	D x E	G x H	L x W	F	J	K	V	X	Y
NEMA-1/8DIN	7.50 x 6.00 x 5.28 (191 x 152 x 134)	4.88 x 4.88 (124 x 124)	6.75 x 4.00 (171 x 102)	8.00 x 7.39 (203 x 188)	4.75 (121)	4.38 (111)	1.00 (25)	0.31 (8)	6.22 (158)	5.59 (142)
NEMAtrol4X	11.50 x 8.00 x 6.78	8.75 x 6.88	10.75 x 6.00	12.00 x 9.39	6.25	5.13	1.75	0.25	9.97	7.34
NEMAST4X	(292 x 203 x 172)	(222 x 175)	(273 x 152)	(305 x 239)	(159)	(130)	(44)	(6)	(253)	(186)

LCN4X

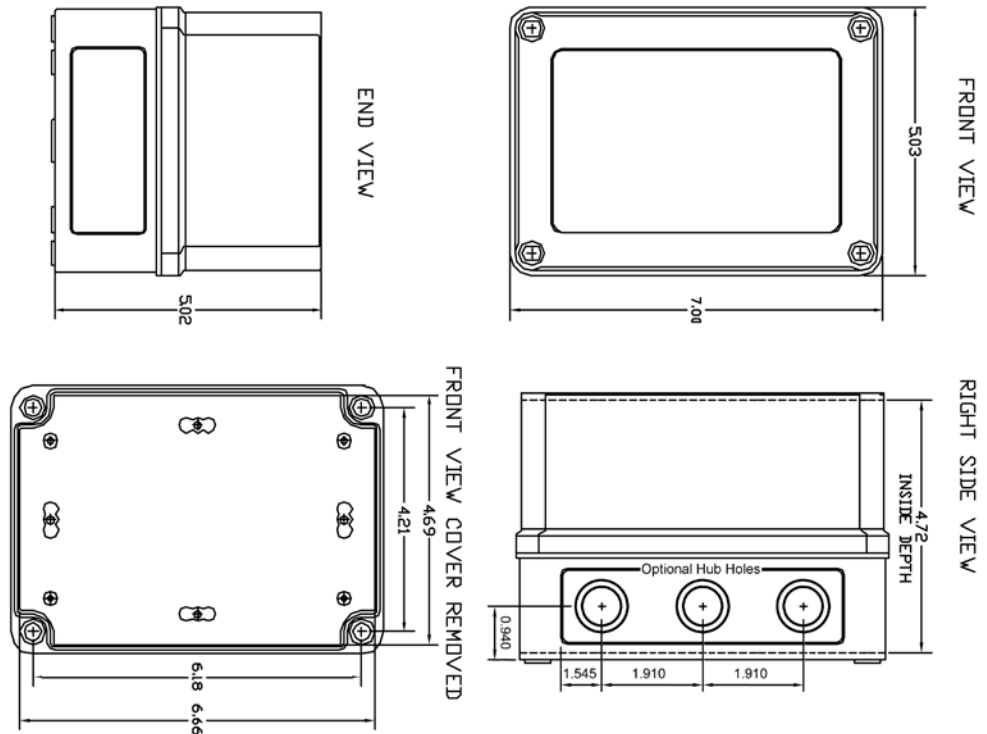
Low Cost NEMA 4X Housing for 1/8 and 1/16 DIN Size Units

FEATURES:

- Made of impact and corrosive resistant VELOX™, RAL 7035
- Molded internal bosses for back panel, component mounting and DIN-rails
- NEMA4X / IP66 Rating
- UL 508 and CSA Type 4, 4X, 3, 3R, 12, 13 Rating
- Temperature resistance: Base and opaque cover to +248°F (120°C) per UL 746B. Polycarbonate cover -40°F (40°C) to +248° (120°C)
- Non-Metallic cover screws
- Continuously poured polyurethane gasket
- Cover and bases meet with tongue and groove design for tight seal



Dimensions:



Ordering Information:

Part Number:

- LCN4X 1/8 DIN - for all 1/8th DIN products
- LCN4X 1/16 DIN - for all 1/16th DIN products

Options:

- H2 - 0.875" Hole for Hub fitting
- HF2 - 0.5" Female NPT Hub fitting
- 2H2 - Two 0.875" Holes for Hub fittings
- 2HF2 - Two 0.5" Female NPT Hub fittings
- H3 - Three 0.84" Holes for Hub fittings

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

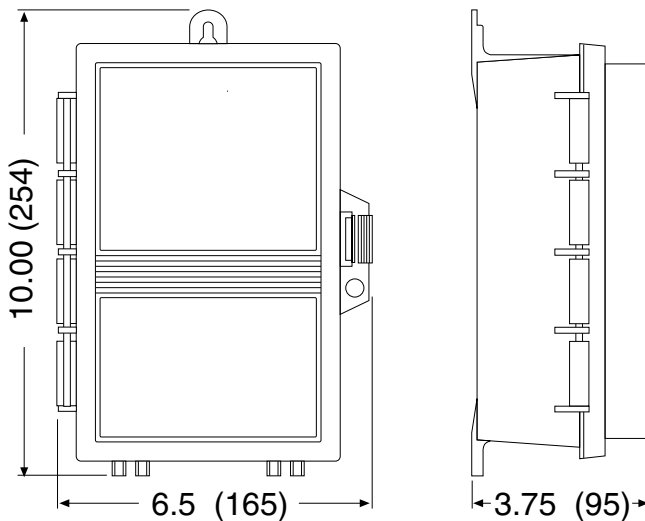
The E200 is a Plastic NEMA 3R raintight enclosure with hinged door and latch. It offers provisions for mounting up to four of ANY KEP 1/32 DIN sized units. The E200 also offers five combination 1/2"-3/4" knockouts: In bottom, sides and back for easy wiring and conduit connections. Exterior Size: 6.5" 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

Part Number	Description
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

P1000

Desktop / Handheld Serial Printer

Features

- Compact Serial Printer (Dot Matrix) for Field Use
- Uses Standard 2.25" Plain Paper Roll
- 24 or 40 Column Printing
- Standard Epson™ Ribbon
- Internal 2KB Buffer
- RS232 With Selectable Baud Rate
- Will Operate for 2 Hours on Internal Batteries for Hand Held Applications

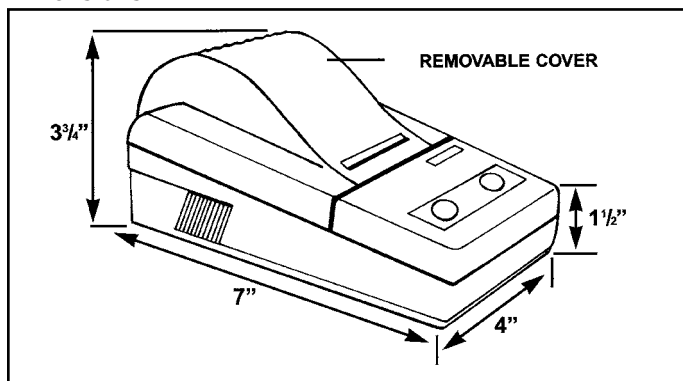
Applications:

- Logging data from KEP instruments
- Remote messages printing
- Plain paper for long lasting record keeping

Description:

The P1000 printer is a top quality, impact dot matrix micro printer. It is small, light weight, and low in cost, but extremely powerful in performance. This model is portable and designed for applications where regular desktop printers are unnecessary and space is limited. The P1000 is ideal for many uses such as logging data from KEP instruments, direct recording measurements from digital hand tools or electronic scales, remote message printing and more. It is an excellent service aid permitting print outs of setup information and helps with troubleshooting problems in the field.

Dimensions:



Ordering Information

EXAMPLE	P1000	1
Series	P1000 Printer	
Operating Voltage		1
	1 = 110V AC adaptor	
	2 = 230V AC adaptor	
	3 = 12V DC power cord	

Accessories

- P1AR = Ink Ribbon
- P1AA230 = 230V Adapter (spare)
- P1AA110 = 110V Adapter (spare)
- P1AC25M9MC = 6', Printer cable for ST1 & ST2
- P1AC25M9FC = 6', Printer cable for MRT & INT69
- P1AC25M25MS = 6', Printer cable for all 'trolls
- Other cables available on request



Specifications:

Character Types:	448 defined characters include: 96 standard ASCII characters Math symbols Printing symbols Block graphic characters 32 user defined characters
Print Method:	Impact Dot Matrix
Character:	Standard characters 5x7 dot matrix <i>compositions:</i> Block graphic char. 6x8 dot matrix User definable char. 6x8 dot matrix
Dimension:	7" x 4" x 3.25"
Baud Rate:	Selectable baud rate & parity setting by key combinations (1200,2400,4800,9600)
Print Speed:	40 lines per minute
Control Commands:	35 codes, IBM/EPSON
Input Buffer:	2k bytes (expandable to 4k)
Interface:	RS-232C, 25 pin D-SUB, RS connector
Power:	7.5 volt DC input, max. current 750mA with Internal Battery Pack 110V AC/DC to 7.5V DC adapter supplied.
Paper:	Plain adding machine type paper roll, internal mounting up to 130'x2.25" size roll
Ink Ribbon:	Porelon ERC 09 or equivalent
Options:	220V AC/DC adapter (spare) 12VDC adapter

P295

Miniature Slip Printer

Features

- Worlds Smallest Slip Printer
- Only 1.6 Kg
- Epson's ESC/POS Command Set
- Easy-To-Use Touch Panel
- Four Print Directions
- Auto Eject
- Compatible with KEP instruments



Description:

Just 1.6kg and ultra compact, the P295 is the worlds smallest slip printer. Select from among 4 print sizes and four printing directions. Or, use page mode to tell the printer where to print the page. The P295 is also equipped with a host of user-friendly features, such as an easy-to-operate touch panel and an automatic paper eject function.

The P295 offers printing capabilities of normal, double and quadruple size print in either horizontal or vertical formats. The P295 will print multi-part copies, original and two copies and supports dual cash drawer capability. The P295 is uses a serial interface and meets all world-wide regulatory requirements including UL, CSA and CE mark. The P295 utilizes the PA295 Universal Power Supply Adaptor which is an auto-switching supply. The P295 is Windows and OPOS compliant.

How To Order:

EXAMPLE P295

Series

P295 Slip Printer

Accessories

- PA295 = Universal AC Power Supply Adaptor
- PA295DC = Power Supply Adaptor for DC Operation
- P2CA25M9ML6 = 6' Serial Cable for SUPERtrol I, SUPERtrol ILE, LEVELtrol II, SUPERtrol II

Specifications

Print Method	7-pin, serial impact dot matrix
Print Font	
Font	5 x 7/7 x 7
Column capacity	35 / 42 columns
Character size (mm)	1.6 (W) x 2.9 (H) / 1.3 (W) x 2.9 (H)
Character set	95 Alphanumeric 32 International 128 x 3 Graphic
Characters Per Inch	13.5 CPI / 16.2 CPI
Interface	RS-232C
Data Buffer	512 bytes
Print Speed	2.1 LPS
Paper	
Dimensions (mm)	80(W) x 69(L) x 182(W) x 257(L)
Thickness (mm)	0.09 to 0.35
Copy Capability	One original and two copies
Inked Ribbon	ERC-27 (Purple)
Power	24 VDC± 10%
Current Consumption	Approx. 600 mA
Overall	180(W) x 19.5(D) x 101.5(H) mm
Dimensions	
Weight	1.6 kg (Approx)
EMI Standard	VCC # 1, FCC class A, CE marking
Safety Standards	UL / C-UL / TUV

115 Series

Cased Power Supply

Features:

- Screw Terminal Connections
- 250 mA of Regulated Power at 5 and 12 VDC
- 115/230 Volt 50/60 Hz Input
- Easily Mounted
- 5, 12 and 24 VDC Models

Power Supplies: 115-5, 115-12, 115-24

Applications:

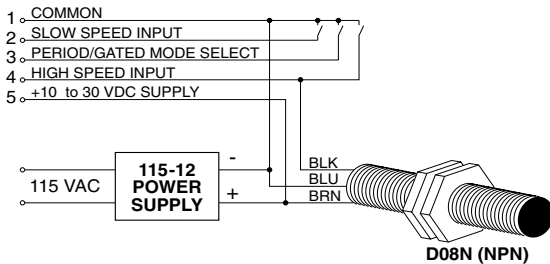
A compact supply to power various DC operated peripherals and inputs/output modules on PLC's, or transmitters in process control.

Description:

This module converts 115 VAC to DC. The 115-5 and 115-12 provide 250 mA of regulated DC for all of your 5VDC and 12VDC applications. Model 115-24 is available for all regulated 24VDC at 100mA applications.

Listing: CE Compliant

Sample Hookup to KAL-D R/T



Ordering Information

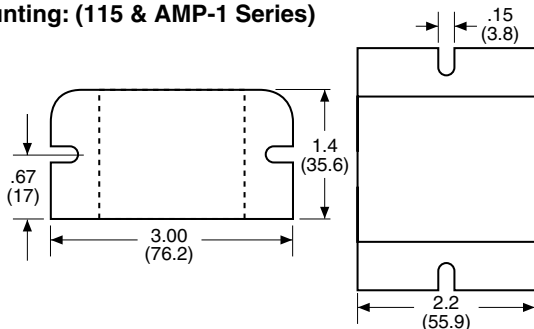
Part Number

- 115-5** 115VAC to 5VDC for all 5 Volt applications
- 115-12** 115VAC to 12VDC for all 12 Volt applications
- 115-24** 115VAC to 24VDC for all 24 volt applications
- 230-24** 230VAC to 24VDC for all 24 volt applications

Options:

E-Explosion Proof Housing (add E to end of part number)

Mounting: (115 & AMP-1 Series)



AMP-1

Preamp & Signal Conditioner for Magnetic Pickups

Features:

- Ultra Low Speed to 15 kHz Operation.
- 20 mV to 50 V Sensitivity.
- 100 mA Current Sinking Output.
- 11 to 26 VDC Power Supply Range.
- Easy Mount Metal Housing.
- Screw Terminal Hookup.

Description:

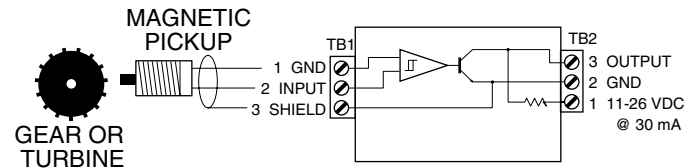
The KEP AMP 1 amplifies the low level signals from a magnetic pickup or flow transmitter by a factor of more than a hundred times to drive any ratemeter, counter or controller. The unit uses only 30 mA and operates from 11 to 26 VDC. It has a 2.7K pullup resistor attached to the open collector output and sinks a minimum of 100 mA to less than 1 V from a maximum of 26 VDC. It is mounted in a rugged 2" x 3" metal housing with screw terminals for easy installation. Operating temperature is 32 to 140° F (0 to 60° C).

Note: The low voltage line from the magnetic pickup to the AMP-1 should be less than 10 ft. in length, shielded and isolated from relays, solenoids or other sources of electrical noise (let the output line make the long run). If the input is too sensitive, lower the 1.1K input impedance by adding a 220 to 1K ohm resistor across TB1, pins 1 and 2, to increase noise immunity.

A special version, the AMP1-10k, is available with 10 kΩ impedance for use with turbine and paddle wheel flowmeters.

Listing: CE Compliant

Sample Hookup :



Ordering Information

Model

- AMP 1:** Standard unit
- AMP-1-10k:** AMP-1 with 10 kΩ input impedance

Options:

E-Explosion Proof Housing (add E to end of part number)

KAL-D06

Miniature, Low Cost, LCD, 8 Digit Electronic Counter

Features

- 8 Digits Standard
- Meets NEMA 4X and IP65 Ratings
- Long Life (10 Year) Lithium Battery
- 10 kHz Count Speed
- Screw Terminal Block
- Slow Speed Input for Contact Closures
- High Speed Input for Sinking Inputs from a Max. of 18VDC Without Module
- Quadrature and High Voltage (10 to 240 V AC; 2 to 110V DC) Inputs Optional
- UL Listed

Description:

The KAL-D06 counters 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, 0.354" (9mm) high, LCD display.

It 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.

Specifications:

Battery: Non-replaceable Lithium battery, expected life of 10 years at 20°C

Display: 8 digit black LCD, Digit size 0.354" (9mm) high, leading zero blanking,

Backlight: backlight requires external 5V supply ($\pm 0.5V$ @ 20mA). 12V, 24V and 30V can be used with the use of an external resistor, see backlight wiring diagram for details and resistor values.

Reset: Panel or remote (can be disabled if desired)

Count Range: 0-99999999, rollover to 0

Temperature Range:

Operating: 14 to 140°F (-10 to 60°C)
Storage: -4 to 140°F (-20 to 60°C)

Battery Life: 10 years at 20°C (calculated)

Relative Humidity: 80% max. up to 31°C, decreasing to 50% max. at 40°C

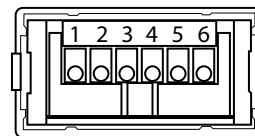
Connection: Finger-proof screw terminal for wires up to 0.06"² (1.5mm²)

Sealing: NEMA 4X/IP65; **Remove film from self adhesive gasket before use!** Overvoltage Category II, Pollution Fegree 2 (IEC 64)

Certifications: UL Listed

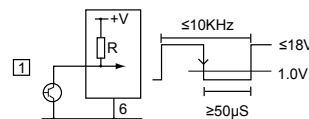


KAL-D06 Wiring:



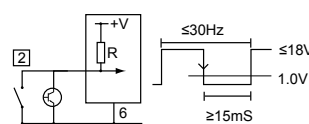
- 1 - High Speed Count Input
- 2 - Low Speed Count Input
- 3 - External Reset Input
- 4 - Direction Input
- 5 - External Power for Backlight
- 6 - 0V, Common

High Speed Count Input:



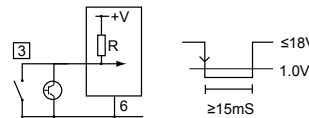
- Sink input NPN
- R = Internal resistor 3.3MΩ
- Max 18V, theshold 1V
- Negative edge trigger
- Max. 10kHz, min. 50µS

Low Speed Count Input:



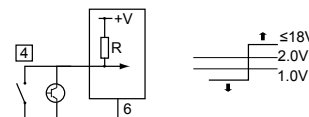
- Sink input NPN or contact closure
- R = Internal resistor 3.3MΩ
- Max 18V, theshold 1V
- Negative edge trigger
- Max. 30Hz, min. 15ms

External Reset Input:



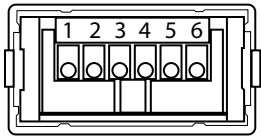
- Sink input NPN or contact closure
- R = Internal resistor 3.3MΩ
- Max 18V, theshold 1V
- Negative edge trigger
- Min. 15ms

Direction Input:



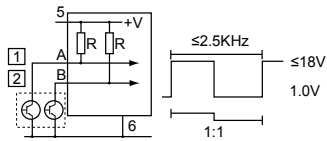
- Sink input NPN or contact closure
- R = Internal resistor 3.3MΩ
- UP: Not connected or >2V (logic 1), max 18V
- DOWN: Connected to common or <1V (logic 0)
- Direction signal must change >5µs before Count signal.

KAL-DQUAD06 Wiring



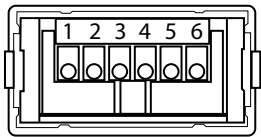
- 1 - Count Input A
- 2 - Count Input B
- 3 - External Reset Input
- 4 - Not used
- 5 - External Power for Backlight and Input Circuit
- 6 - 0V, Common

Quadrature Input:



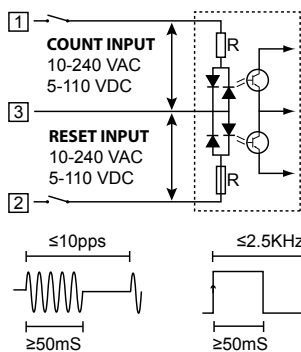
- Count Inputs A & B**
- Sink input NPN or push-pull signals, NOT source only
 - R = Internal resistor 3.3M Ω
 - Max. +V
 - Max. 2.5kHz
 - Mark to space ratio 1:1

KAL-D06AC/DC Wiring



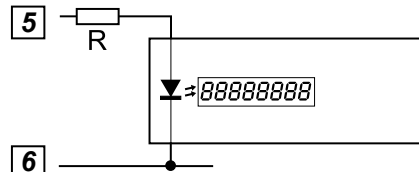
- 1 - High Voltage Count Input
- 2 - High Voltage External Reset Input
- 3 - Common for pins 1 & 2
- 4 - Direction Input
- 5 - External Power for Backlight
- 6 - 0V, Common for pins 4 & 5

High Voltage Input:



- High Voltage Count Input**
- Opto-isolated
 - R = Internal resistor 50k Ω
 - 10 - 240V AC $\pm 10\%$
 - 5 - 110V DC $\pm 10\%$
 - Max. 10 pulses per second
 - Min 50mS
- High Voltage Reset Input**
- Opto-isolated
 - R = Internal resistor 50k Ω
 - 10 - 240V AC $\pm 10\%$
 - 5 - 110V DC $\pm 10\%$
 - Min 15mS

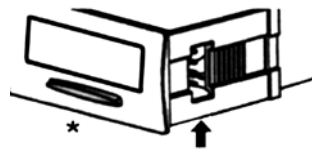
Backlight Wiring



- 5V: R = 0 Ω
- 12V: R = 360 Ω
- 24V: R = 1K Ω
- 30V: R = 1.2K Ω

External supply for backlight is 5 VDC @ 20mA
R = external resistor; see table next to diagram above.

Jumpers



Front Panel Reset Enabled

Front Panel Reset Disabled

88888888

8888888.8

888888.88

88888.888

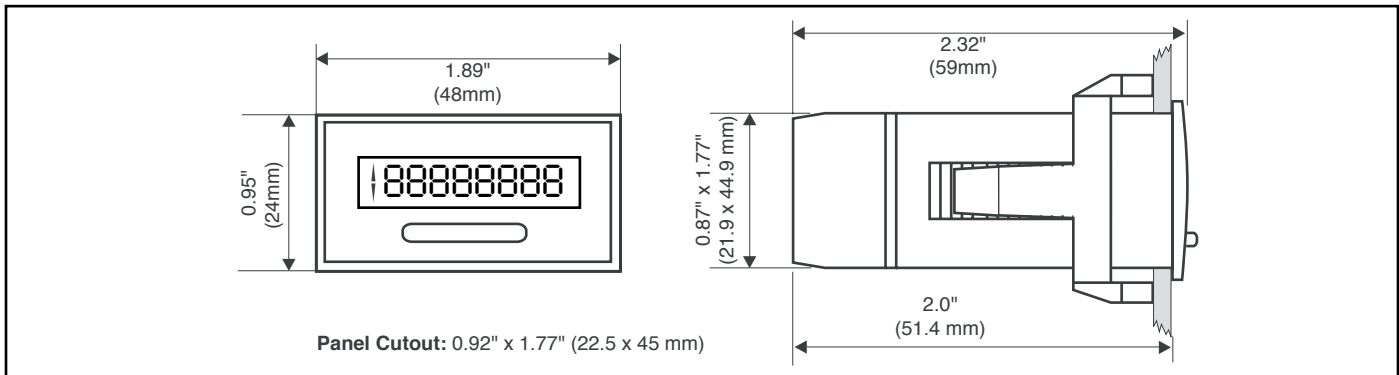
How To Order:

- KAL-D06** 8 digit counter with 10 yr battery
- KAL-DQUAD06** 8 digit counter with 10 yr battery with Quadrature Input
- KAL-D06AC/DC** 8 digit counter with 10 yr battery with High Voltage Input

Accessories

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

Dimensions



CTR54U

Multipurpose Device Counter, Rate Meter and Timer

Features

- Universal, with dual functions, also suitable as maintenance counter
- 2 pulse or time counters for measuring daily and total values
- Count frequency 60 kHz
- Four dual functions in one device, saves on inventory costs
- Separate multiplication and scaling factor for pulse & frequency counter

Specifications:

Supply: 10 ... 30 V DC, with reverse polarity protection

voltage: 90 ... 260 V AC

Current consumption:

max. 50 mA, 6 VA

Display: 6 digit red 7 segment LED display; 14 mm high

Data backup:

EEPROM

Housing: Dimensions 96 x 48 mm according to DIN 43 700; RAL 7021, grey

Polarity of Inputs:

programmable, npn or pnp for all inputs

Input resistance:

appr. 5 kΩ

Counting frequency*:

60 kHz, can be damped to 30 Hz depending on operating mode

Reset time: 5 ms

Input switching level

DC-version: (standard version):

Low: 0 to 0.2 x Input Power Voltage

High: 0.6 x Input Power Voltage to 30VDC

AC-version:

Low 0 ... 4 V DC

High 12 ... 30 V DC

Input switching level (5 V version):

Low 0 ... 2 V DC

High 4 ... 30 V DC

Voltage supply for sensors:

24 V DC ±15 %/100 mA at AC versions

Accuracy: <0.1 % (Frequency display/Rate meter)

Ambient temperature:

-20 ... +65 °C, non-condensing

Storage temperature:

-25 ... +70 °C

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

Immunity to interference:

EN 61000-6-4/EN 55 011 class B

Emitted interference:

EN 61000-6-2

Protection: IP65 (from front)

Weight: appr. 150 g



Applications:

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

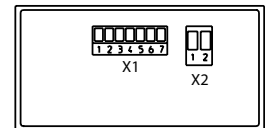
Operating modes:

Adding counter and frequency meter, counter with 2 totalizing ranges, totalizer and time meter, time meter with 2 time ranges.

Wiring:

Connection X2

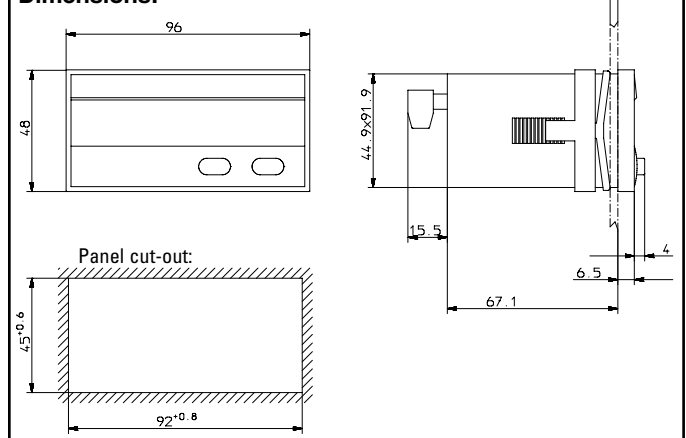
Pin	AC-Version	DC-Version
1	90 ... 260 V AC	0 V DC (GND)
2	90 ... 260 V AC	10 ... 30 V DC



Connection X1

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

Dimensions:



Ordering Information

Example CTR54U 0 0

Series: _____

Input Level: _____

0= Standard

A= 5V level

Power Supply: _____

0= 90 to 260 VAC

3= 10 to 30 VDC



CTR52U

Multipurpose Device Counter, Rate Meter and Timer

Features

- Universal, with dual functions, also suitable as maintenance counter
- 2 pulse or time counters for measuring daily and total values
- Count frequency 60 kHz
- Four dual functions in one device, saves on inventory costs
- Separate multiplication and scaling factor for pulse & frequency counter



Operating modes:

Electronic totalizer and frequency counter, counter with 2 totalizing ranges, totalizer and timer, timer with 2 time ranges

Specifications:

Supply 10 ... 30 V DC,

voltage: with reverse polarity protection

Current consumption:

max. 40 mA

Display: 6 digit red 7 segment LED display; 8 mm high

Data backup:

EEPROM

Housing: Dimensions 48 x 24 mm (1.89" x 0.945")
according to DIN 43 700; RAL 7021, grey

Polarity of Inputs:

programmable, npn or pnp for all inputs

Input resistance:

appr. 5 k Ω

Counting frequency:

max. 60 kHz, can be damped to 30 Hz

Reset time: 5 ms

Resolution counter:

0.001 sec ... 999999 hr

Input switching level

Standard version:

Low: 0 to 0.2 x Input Power Voltage

High: 0.6 x Input Power Voltage to 30VDC

5 V version:

Low 0 ... 2 V DC

High 12 ... 30 V DC

Accuracy: <0.1 % (Frequency display/Rate meter)

Ambient temperature:

-20 ... +50 °C (14°F ... 158°F), non-condensing

Storage temperature:

-25 ... +70 °C (-13F ... 158F)

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

Immunity to interference:

EN 61000-6-4/EN 55 011 class B

Emitted interference:

EN 61000-6-2

Protection: IP65 (from front)

Weight: appr. 50 g

Ordering Information

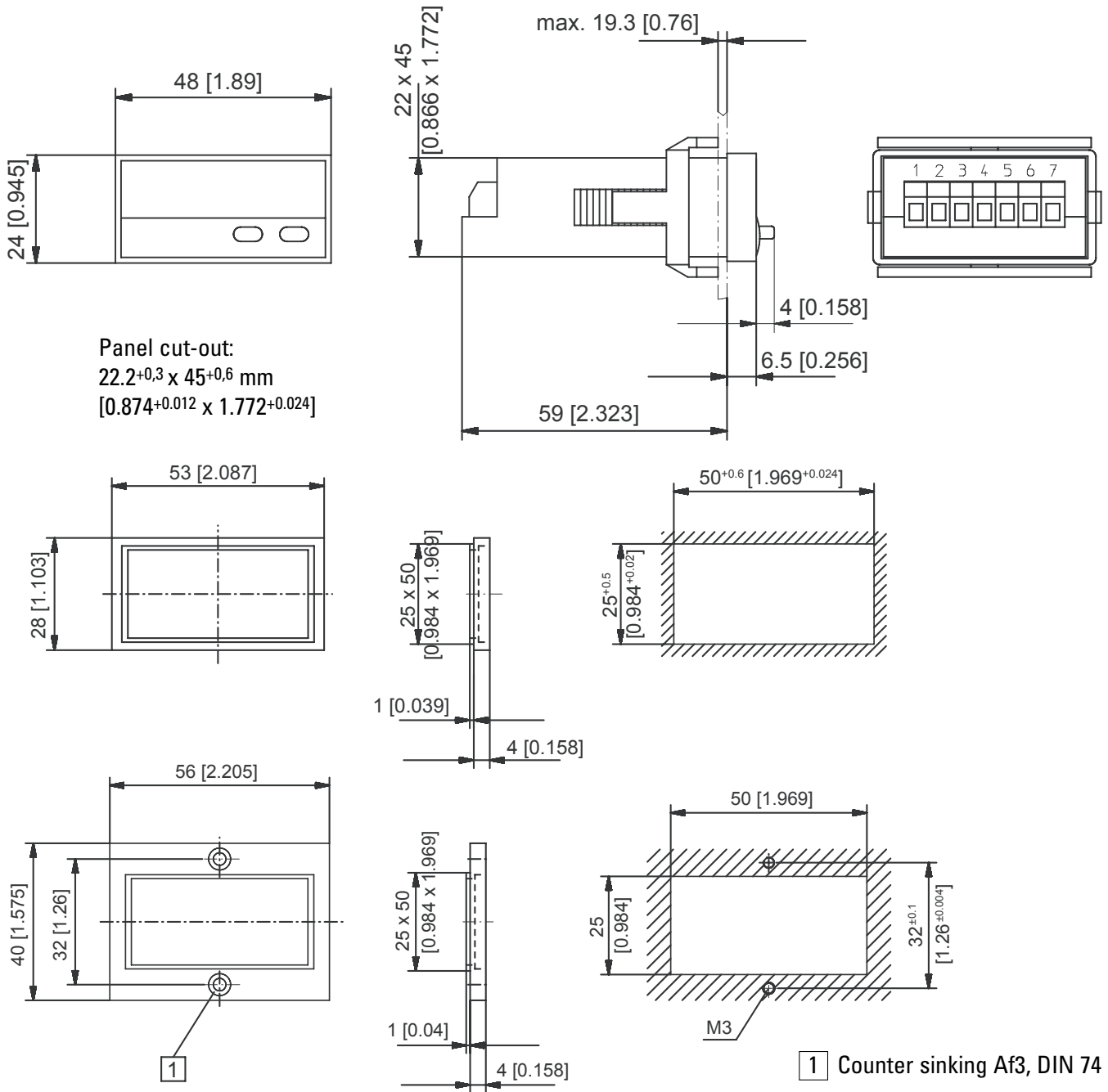
Example CTR52U 0

Series: _____

Input Level: _____

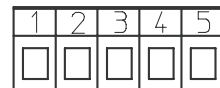
0= Standard
A= 5V level

Dimensions:



Connections:

- 1 10 ... 30 V DC
- 2 0 V GND
- 3 INP A
- 4 INP B
- 5 Reset



SPARE PARTS

Spare Parts

ORDER NO.	DESCRIPTION
Model 36120	Flex Cover
KRTBEZEL	Front panel bezel for KEPtrot R/T
BT2BEZEL	Front panel bezel for BT2
KEPTROLBEZEL	Front panel bezel for KEPtrot
MFCBEZEL	Front panel bezel for MASStrot
FLOWBEZEL	Front panel bezel for FLOWtrot
DPFCBEZEL	Front panel bezel for DPFC
MBBEZEL	Front panel bezel for MASSbatch
LVTBEZEL	Front panel bezel for LEVELtrot
KFCBEZEL	Front panel bezel for KEPtrot F/C
ST1LELCDFRONT	LCD Front panel assembly for SUPERtrot ILE
ST1LEVDFRONT	VFD Front panel assembly for SUPERtrot ILE
ST1LCDFRONT	LCD Front panel assembly for SUPERtrot I
ST1VDFRONT	VFD Front panel assembly for SUPERtrot I
ST2LCDFRONT	LCD Front panel assembly for SUPERtrot II
ST2VDFRONT	VFD Front panel assembly for SUPERtrot II
LT2LCDFRONT	LCD Front panel assembly for LEVELtrot II
LT2VDFRONT	VFD Front panel assembly for LEVELtrot II
KP8CASE	Case for KEPtrot
KRTCASE	Case for KEPtrot R/T
BT2CASE	Case for BT2
FIOCASE	Case for Flowtrot
MASSCASE	Case for MASStrot
DPFCCASE	Case for DPFC
ST1LEREAR	Rear Case for SUPERtrot ILE
ST1REAR	Rear Case for SUPERtrot I
ST2REAR	Rear Case for SUPERtrot II
LT2REAR	Rear Case for LEVELtrot II
Model 34503	Mounting Kit for: MRT series, INT69 series, BEACON series
STMOUNT	Mounting Kit for: ST1 series, ST2 series, LT2 series
TROLCLAMP	Mounting Kit (4 clamps & gasket)
*BATCHEMAINRT3L	KP8, KRT, BT2 Mainboard
*FLOWTROLMAIN	FLOWtrot Mainboard
*MASSMAINAC	MASStrot Mainboard, AC Power
*MASSMAINDC	MASStrot Mainboard, DC Power **
*DPFCMAINAC	DPFC Mainboard, AC Powered
*DPFCMAINDC	DPFC Mainboard, DC Powered **
*ST1LEMAINDC2	SUPERtrot ILE Mainboard, DC Powered, 2 Relays
*ST1LEMAINDC4	SUPERtrot ILE Mainboard, ** DC Powered, 4 Relays
*ST1LEMAINAC2	SUPERtrot ILE Mainboard, AC Powered, 2 Relays
*ST1LEMAINAC4	SUPERtrot ILE Mainboard, ** AC Powered, 4 Relays
*ST1MAINDC2	SUPERtrot I Mainboard, ** DC Powered, 2 Relays
*ST1MAINDC4	SUPERtrot I Mainboard, ** DC Powered, 4 Relays
*ST1MAINAC2	SUPERtrot I Mainboard, ** AC Powered, 2 Relays
*ST1MAINAC4	SUPERtrot I Mainboard, ** AC Powered, 4 Relays
*ST2MAINDC2	SUPERtrot II Mainboard, DC Powered, 2 Relays
*ST2MAINDC3	SUPERtrot II Mainboard, DC Powered, 3 Relays
*ST2MAINAC2	SUPERtrot II Mainboard, AC Powered, 2 Relays
*ST2MAINAC3	SUPERtrot II Mainboard, AC Powered, 3 Relays
*LT2MAINDC2	LEVELtrot II Mainboard, ** DC Powered, 2 Relays
*LT2MAINDC4	LEVELtrot II Mainboard, ** DC Powered, 4 Relays
*LT2MAINAC2	LEVELtrot II Mainboard, ** AC Powered, 2 Relays
*LT2MAINAC4	LEVELtrot II Mainboard, ** AC Powered, 4 Relays
KEPTROLDISP	KP8, KRT, BT2, FLO8 Display Board
MASSTROLDISP	MASStrot & DPFC Display Board

*PROM sold separately (see _Trot Program Chips at right)

**Specify voltage when ordering

MINITROL Input Chips

ORDER NO.	DESCRIPTION
EPLDMRTIN3	High Impedance input chip for Minitrot
EPLDMRTIN5	Up/down control input chip for Minitrot
EPLDMRTIN9	Quadrature input chip for Minitrot

INT69 & MINITROL ACCESSORIES

ORDER NO.	DESCRIPTION
34235	Non Keyboard Front Panel
34234	Keyboard Front Panel

BT2 & KRT Retrofit Boards

ORDER NO.	DESCRIPTION
3A/3B	High Imp. 3A & 3 B Pulse Inputs
BA8ANA4-20MA	Input 5A; 4-20 mA Input
BA8ANA0-20MA	Input 5B; 0-20 mA Input
BA8ANA1-5V	Input 5C; 1-5 V Input
BA8ANA0-5V	Input 5D; 0-5 V Input
BA8ANA0-10V	Input 5E; 0-10 V Input
BATCHSQROOT	Input 6A; Square Law Input
*BA8IO7A4-20M	Input 7A; 4-20 mA In 4-20 mA Out
*BA8IO7B0-20M	Input 7B; 0-20 mA In 4-20 mA Out
*BA8IO7C1-5V	Input 7C; 1-5 V In 4-20 mA Out
*BA8IO7D0-5V	Input 7D; 0-5 V In 4-20 mA Out
*BA8IO7E0-10V	Input 7E; 0-10 V In 4-20 mA Out
BA8ANAOUT4-20	4-20mA out for 3A & 3B Inputs
BA8ANAOUT0-20	0-20mA out for 3A & 3B Inputs
BA8ANAOUT0-5	0-5V out for 3A & 3B Inputs
BA8ANAOUT0-10	0-10V out for 3A & 3B Inputs
BATCHRS232	RS 232 Interface Kit
BATCHRS422	RS 422 Interface Kit
MB8IN	MASSbatch Input
*MB8IN/OUT	MASSbatch Input w/ 4-20mA Out

* For Other Outputs:
 Add suffix X for 0-20 mA (i.e. BA8IO7A4-20MX, MB8IN/OUTX)
 Add suffix Y for 0-5 V out (i.e. BA8IO7A4-20MY, MB8IN/OUTY)
 Add suffix Z for 0-10 V out (i.e. BA8IO7A4-20MZ, MB8IN/OUTZ)

MASStrot & DPFC Retrofit Boards

ORDER NO.	DESCRIPTION
MASSRS232	RS 232 Interface Kit

...TROL Program Chips

ORDER NO.	DESCRIPTION
PROMBT2	PROM for BATCHtrot II
PROMBT216PT	PROM for BT2 w/16Pt
PROMFLO	PROM for FLOWtrot
PROMKFC	PROM for KEPtrot F/C
PROMKP8	PROM for KEPtrot
PROMKRT	PROM for KEPtrot R/T
PROMKRT16PT	PROM for KRT w/16Pt
PROMMFC	PROM for MASStrot(2 chips)
PROMRS	PROM for Trot RS422 & RS232
PROMRS422M	PROM for Trot RS422M
PROMMB	PROM for MASSbatch
PROMMB16PT	PROM for MASSbatch w/ 16Pt
PROMDPFC	PROM for DPFC (2 chips)
PROMLTR	PROM for LEVELtrot
PROMMS627	PROM for MS627 (2 chips)
PROMST1LE	PROM for SUPERtrot-ILE
PROMST1	PROM for SUPERtrot-I
PROMST2	PROM for SUPERtrot-II
PROMLT2	PROM for LEVELtrot-II
PROMST485	PROM for RS-485 option card for SUPERtrot
PROMPEELST2	PEEL PROM for SUPERtrot-II