

Product Catalog

*Flow, Level, Temperature
& Process Products*



KEP



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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 your 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	SUPERTROL - 1 LE	MINIBATCHER	BATCHTROL II	MASSBATCH	SUPERTROL - 1	MASSTROL - II	LEVELTROL / DPFC	KEPTROL II	INTELLECT F/C	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	SUPERTROL - II	MASSTROL / DPFC	LEVELTROL II	KEPTROL F/C	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 instrumentation requirement 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.

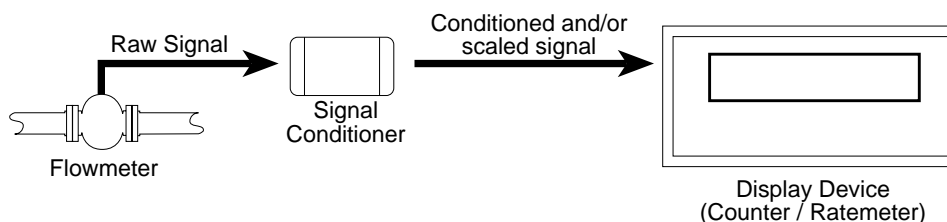
In nearly all cases the signal conditioner/converter is intended to be powered by a DC supply voltage normally available in most instruments with 24 VDC being the most common.

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 k Ω
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 k Ω
Frequency Response: 0-3500 Hz
Trigger Sensitivity: 30 mV p-p
Over Voltage Protection: \pm 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: \pm 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: < \pm 0.1% Span
Output Voltage Effect: < \pm 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

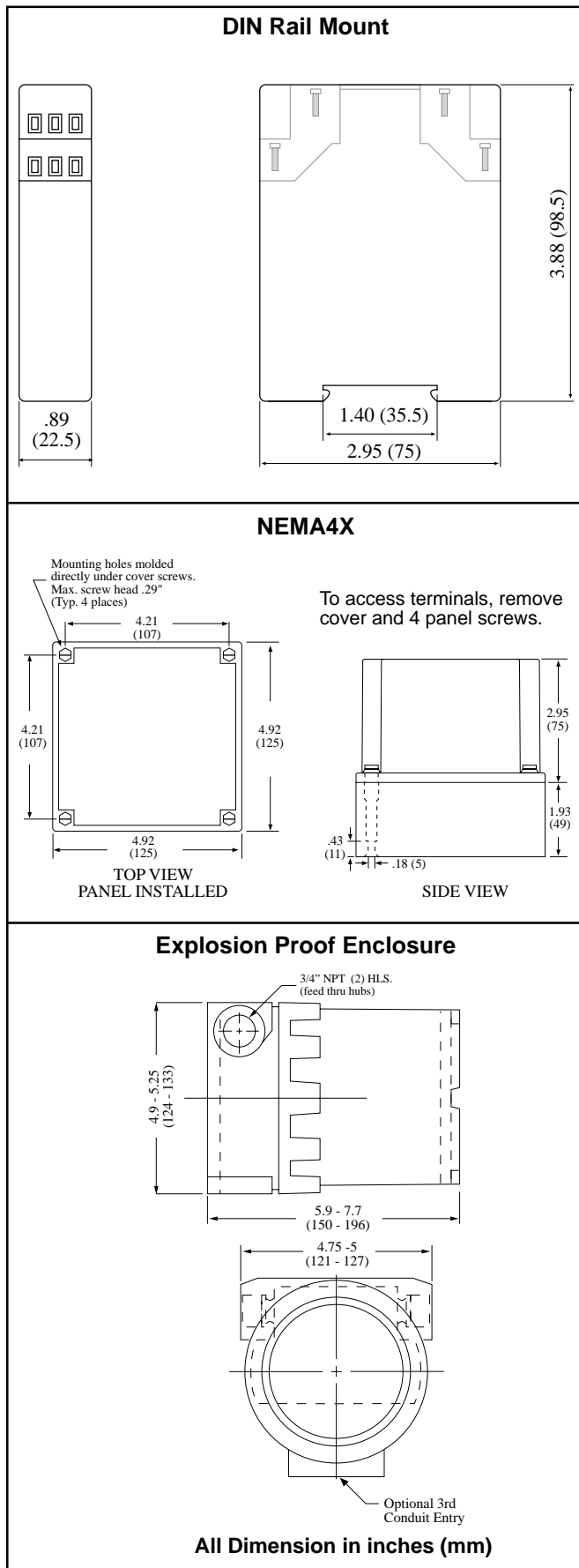
DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

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

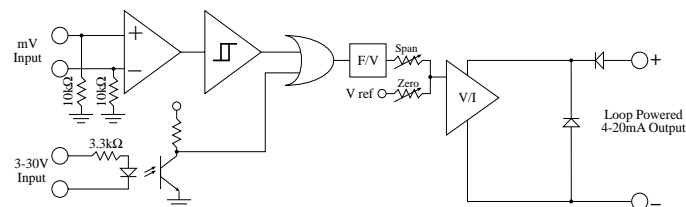
Standard Termination

- 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

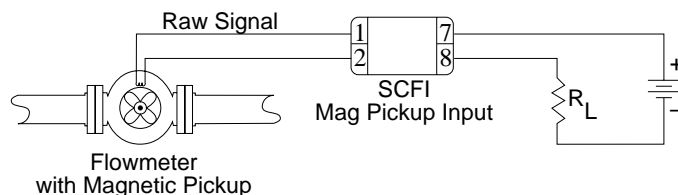
SCFI-X-L (low count speed) Termination

- 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

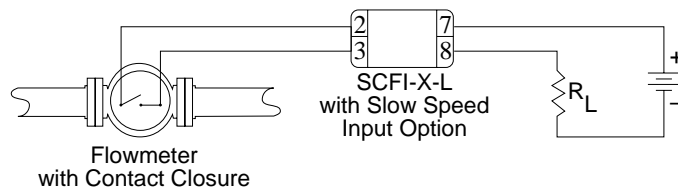
Simplified Block Diagram



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		

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

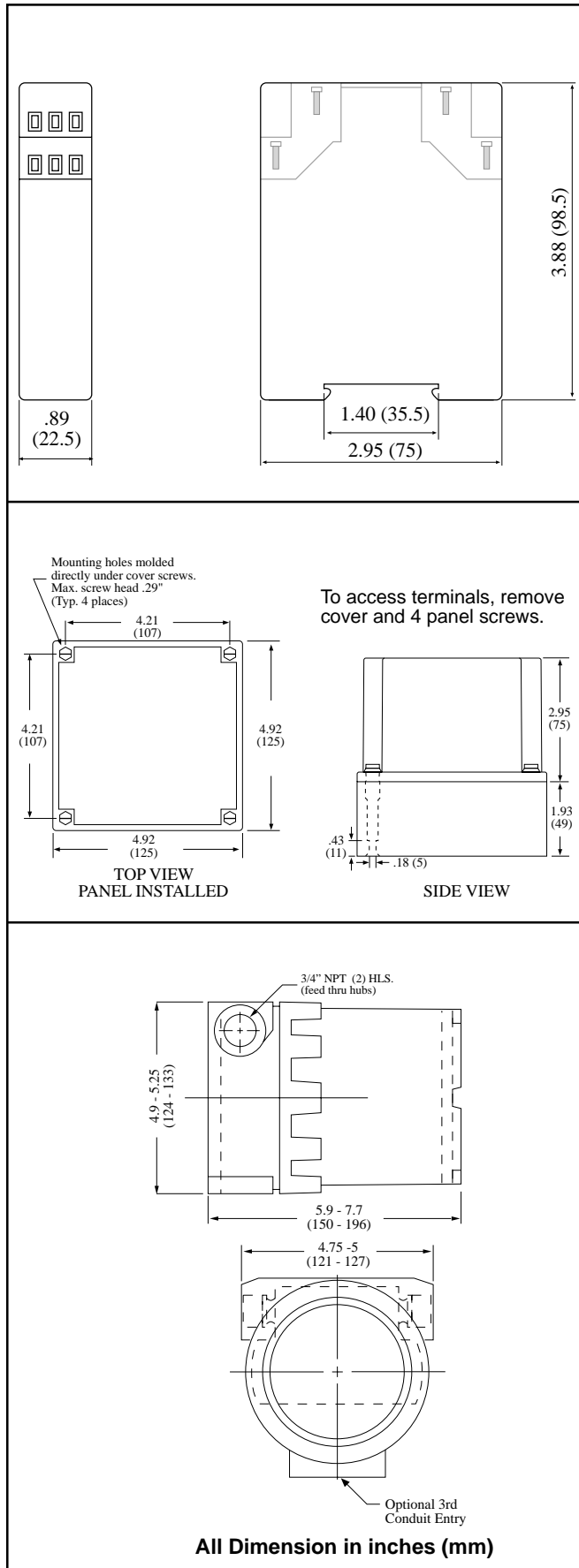
DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

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

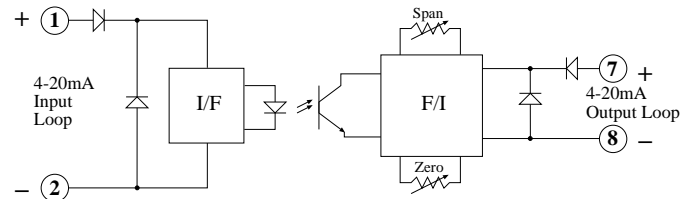
Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Listing: CE Compliant

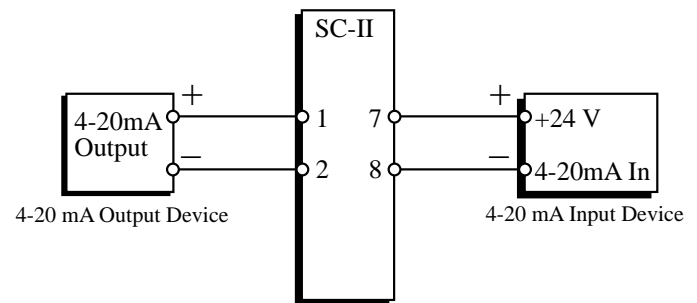
Dimensions



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			
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 it's 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

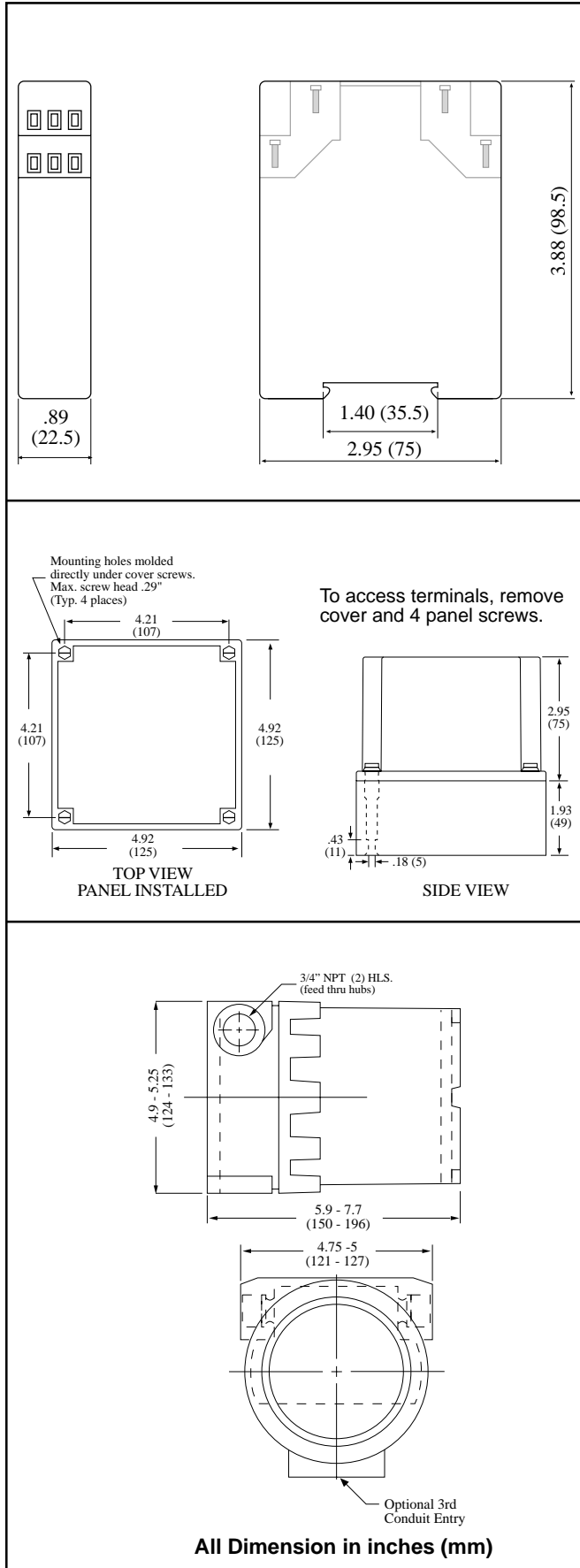
DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

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

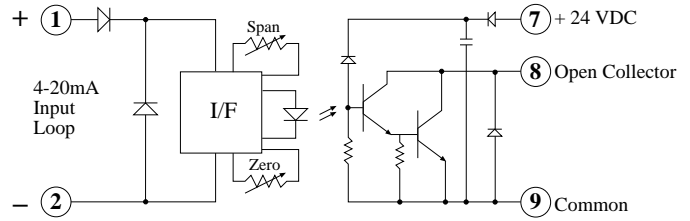
Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Listing: CE Compliant

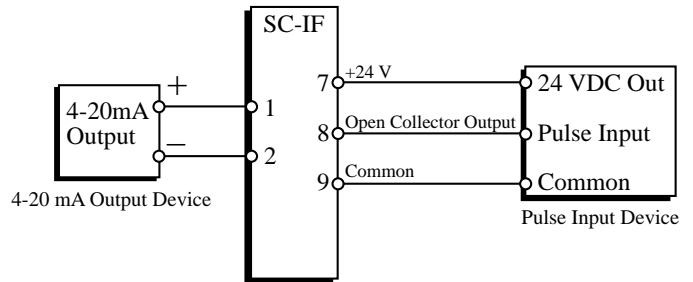
Dimensions



Simplified Block Diagram



Typical Wiring Hookup



Ordering Information

Example	SC-IF	D	ET
Series	IF= Current to Frequency		
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			
Accessories: (add to end of part number)			
DR-4= 4" DIN Rail			

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 kΩ
 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:

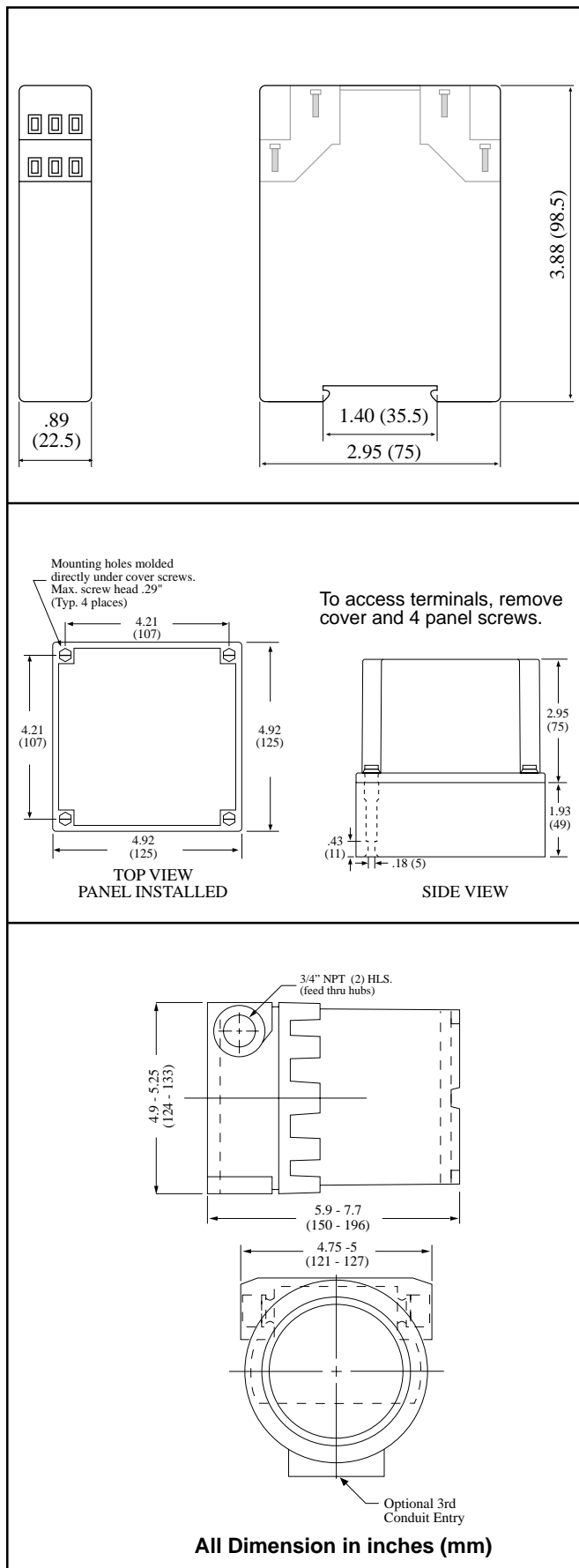
Scaler: 0.0001 to .9999
 Multiplier: X1, X0.1, X0.01, X0.001, X0.0001

Mounting Styles

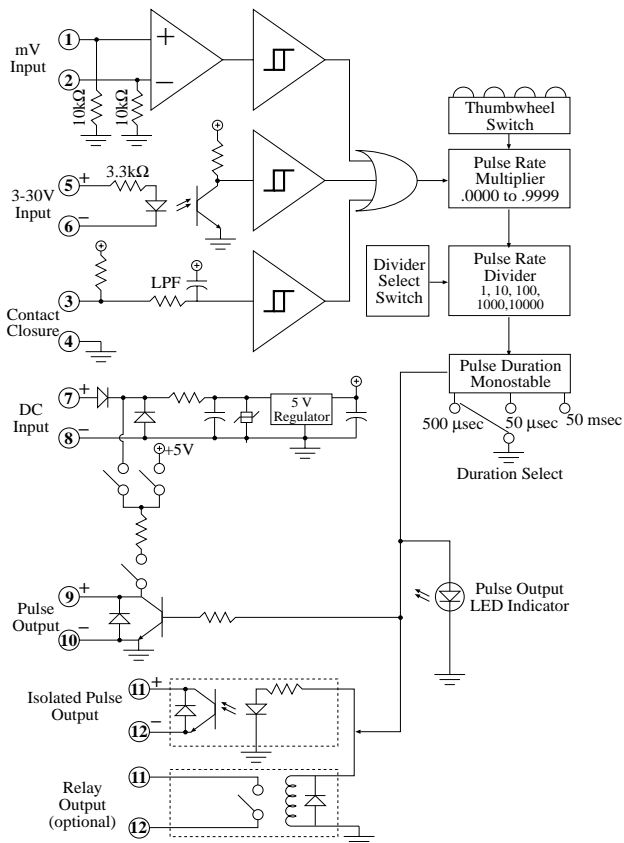
- | | |
|------------------|---|
| DIN Rail Mount: | Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails. |
| NEMA 4X: | 4.92" x 4.92" NEMA 4X Enclosure for wall mounting. |
| Explosion Proof: | Aluminum enclosure for:
Class I, Division 1, Groups B, C & D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

Listing: CE Compliant

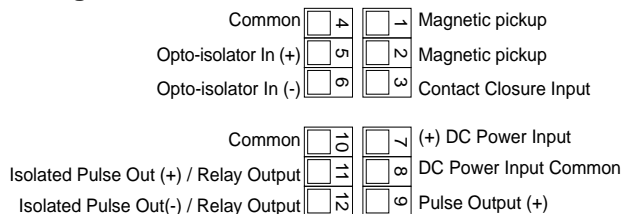
Dimensions



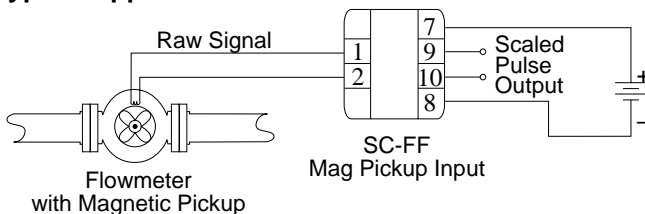
Simplified Block Diagram



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

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 flow 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.

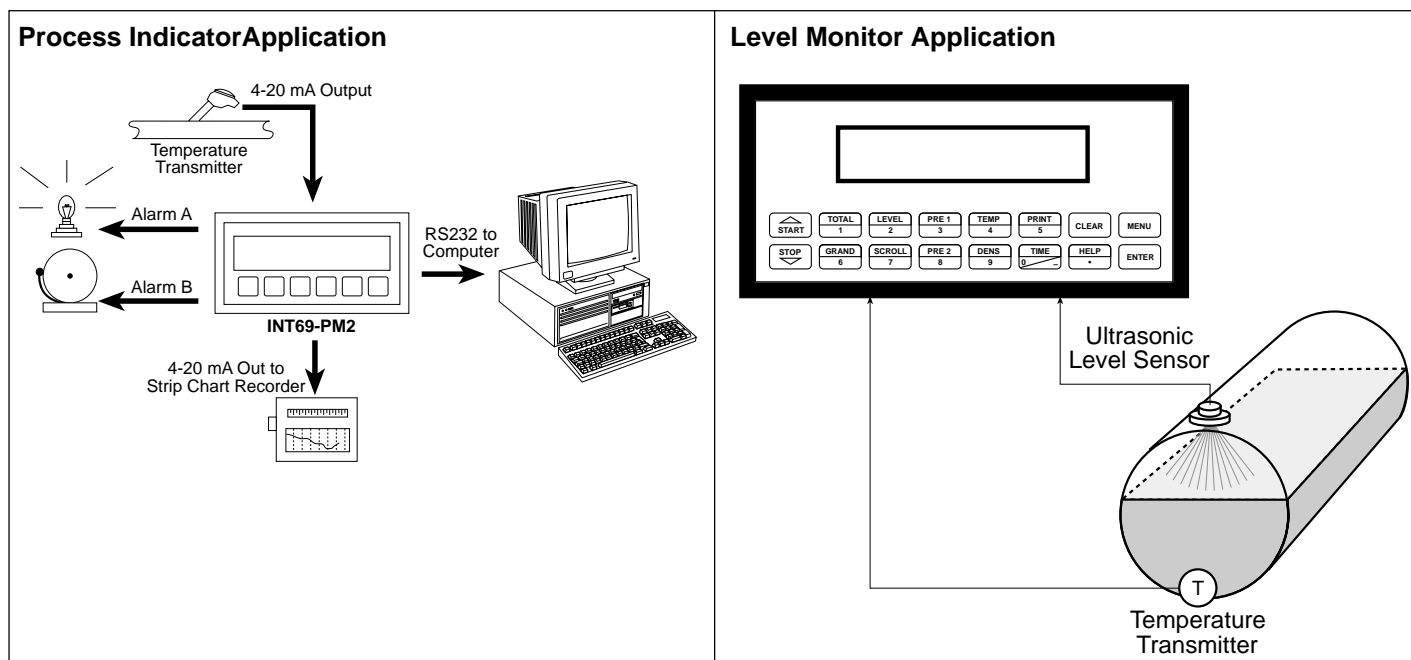
What is an alarm output and why is it used? Relays are often used as controls to activate alarms. An alarm will usually include a provision for setting the alarm point. Additional features may include a programmable delay before the alarm will activate, programmable alarm duration, and/or a programmable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



TP-550 Series

Temperature/Process Monitor With or Without Alarms

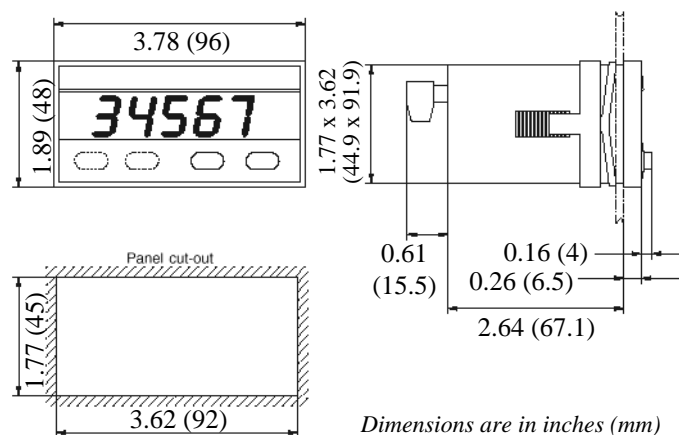
Features

- 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)
- Coming Soon: Serial interface allows reading of the measured values and set-up programming.

Dimensions



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
- 2 programmable limit values (TP551; unit without presets, has only 2 buttons)
- Outputs: Two (2) SPDT relays (250 VAC / 3A)
- Programmable hysteresis (on, off, on/off)
- SET key to reset the outputs
- Inputs: thermocouple, millivolt, resistance thermometer with measurement on 2, 3 or 4 wires, RESET to reset the outputs, KEY terminal to lock the front keys.

Order Code

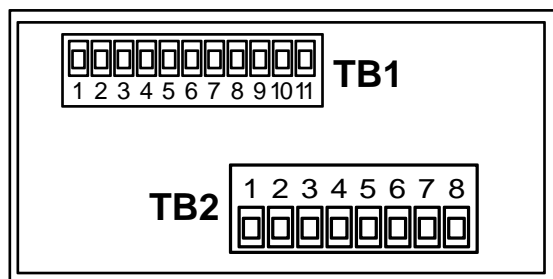
Example: TP554.010 0 00

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= None

Electrical Connections



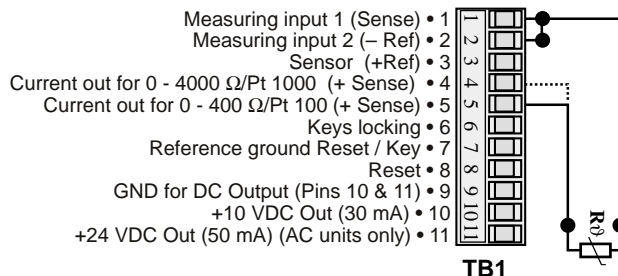
TB1	
1	Measuring input 1 (Sense)
2	Measuring input 2 (– Ref)
3	Sensor (+Ref)
4	Current output for 0 .. 4000 Ω (+ Sense)
5	Current output for 0 .. 400 Ω (+ Sense)
6	Keys locking
7	Reference ground Reset / Key
8	Reset
9	GND for DC Output (Pins 10 & 11)
10	+10 VDC Out (30 mA)
11	+24 VDC Out (50 mA) (AC units only)

TB2			
1	Output 1	Relay C	Optocoupler Emitter
2	Output 1	Relay N.O.	
3	Output 1	Relay N.C.	Optocoupler Collector
4	Output 2	Relay C	Optocoupler Emitter
5	Output 2	Relay N.O.	
6	Output 2	Relay N.C.	Optocoupler Collector
Power Supply			
7	Power In	AC 90 to 260V	DC 10 to 30V
8	Power In	AC 90 to 260V	DC 0V (GND)

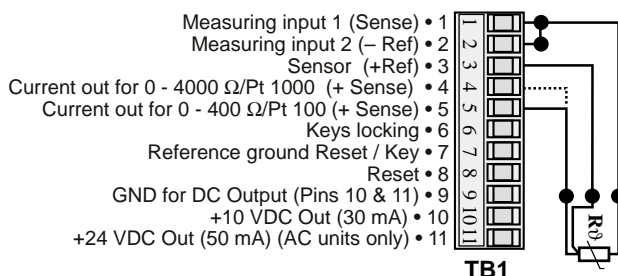
NOTE: Check unit label before applying power

Resistance measurements 0 .. 400/4000 Ω or Pt 100/1000

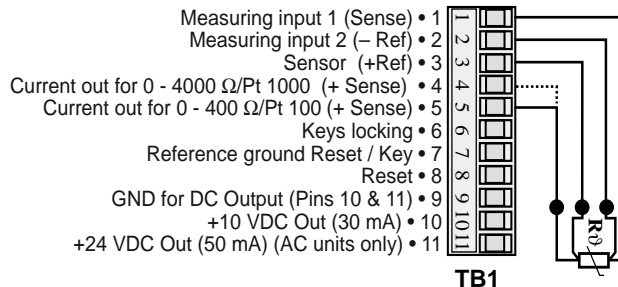
2 wire measurement (measuring resistance 0 .. 400/4000 Ω)
NOTE: Not recommended for long runs.



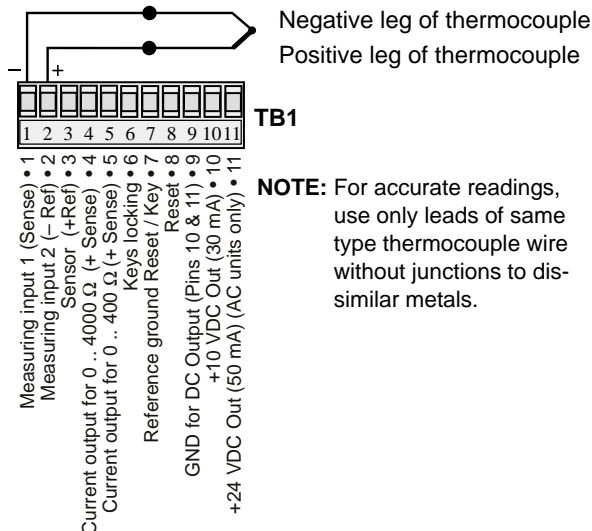
3 wire measurement (measuring resistance 0 .. 400/4000 Ω)
NOTE: Jumper 1 & 2 at meter, wires 3 & 4 must go to sensor



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

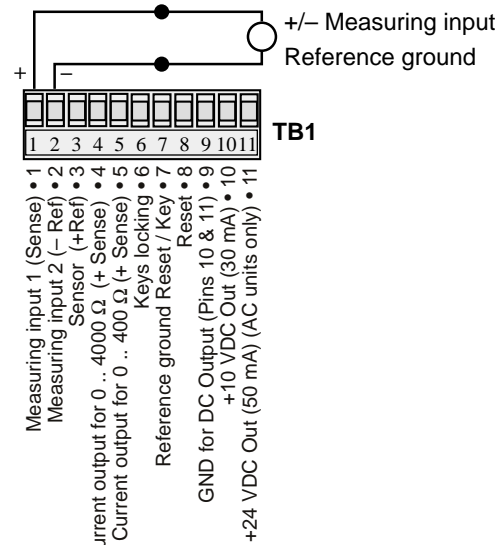


Thermocouples



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

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



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 status, 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 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 at rated AC voltage.

Output Power:

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

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.

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 hysteresis alarm range from 0 to 59999.

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

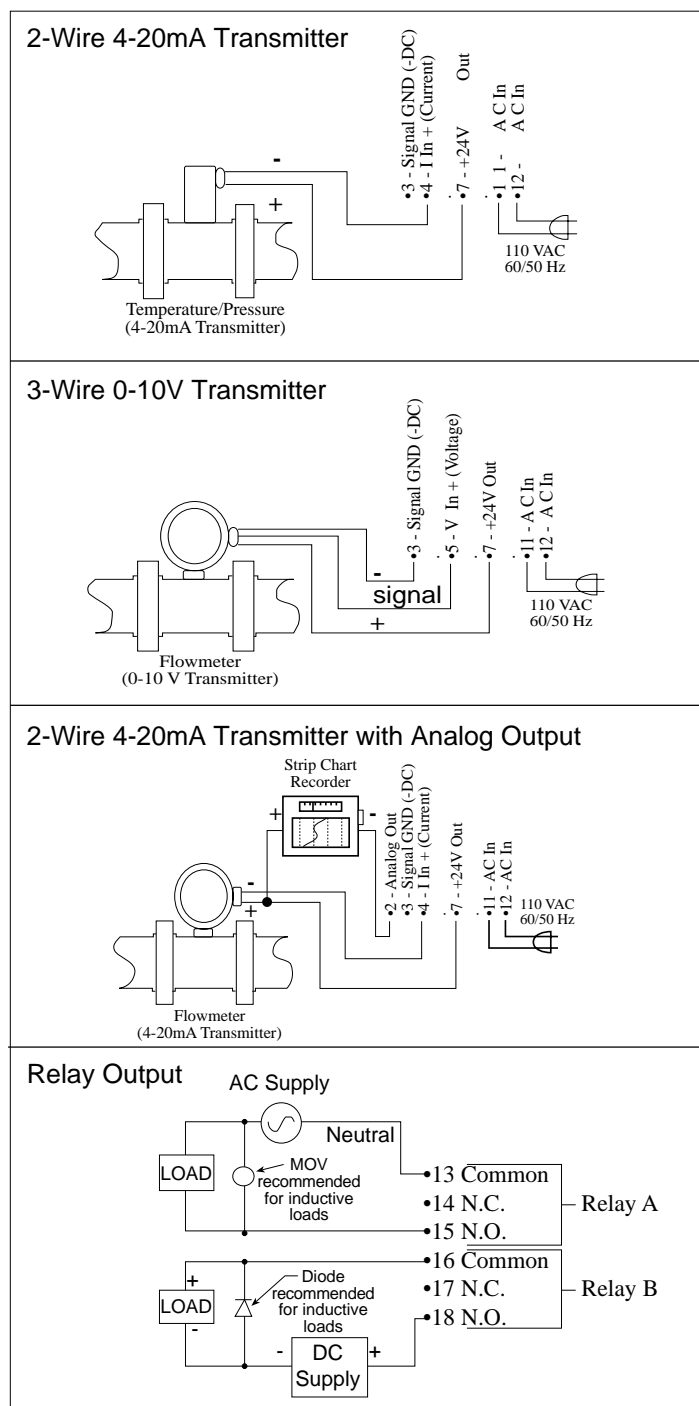
Over-current Protection: 50 mA

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

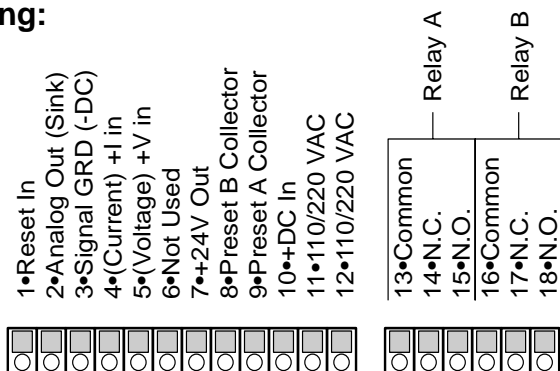
Accuracy: .1% (5 V inputs .16%)

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

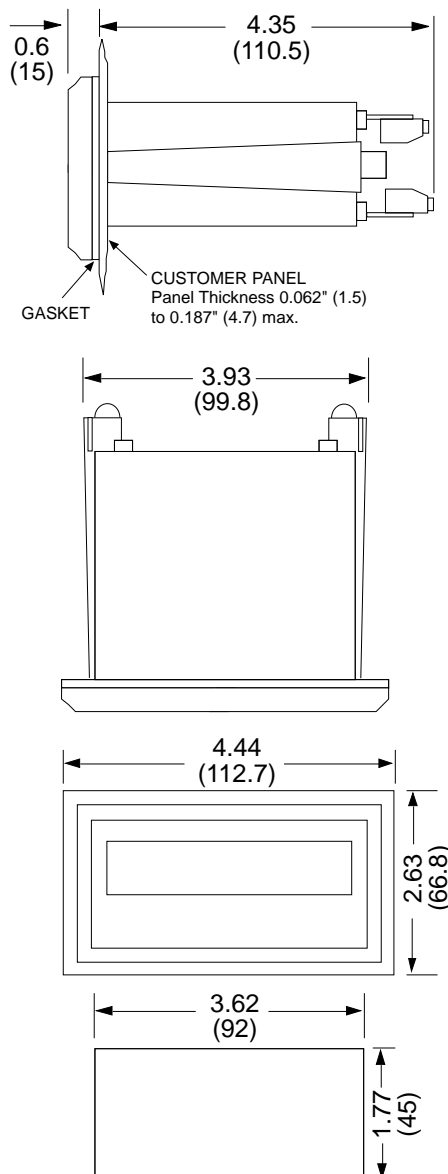
Typical Hookups:



Wiring:



DIMENSIONS:



Ordering Information

EXAMPLE: INT69PM2

Series

INT69PM2= Process Monitor

Operating Voltage

A= 110 VAC \pm 15% or 12 to 24 VDC

B= 220 VAC \pm 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

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: (Rate @ 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

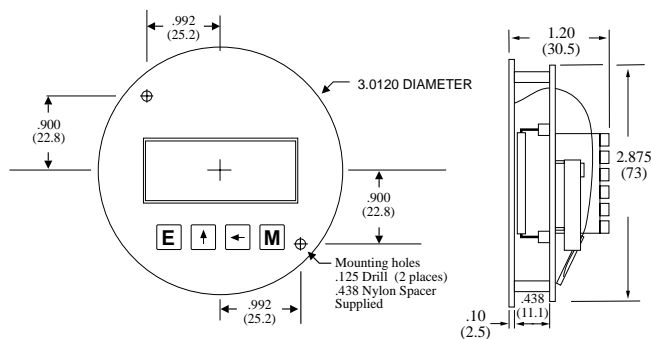
Decimal Point: Via front keypad

Keypad: 4 tactile feedback keys

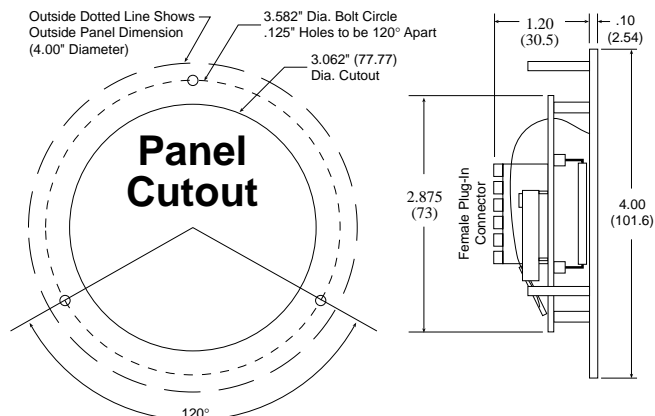
Mounting Styles:

- | | |
|----------------------|---|
| 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 |

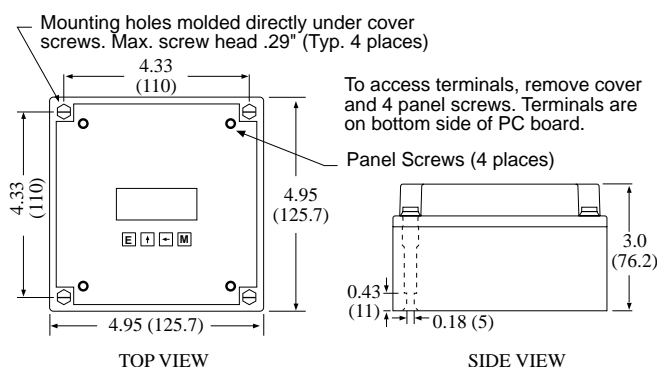
SquirtR-0



SquirtR-1

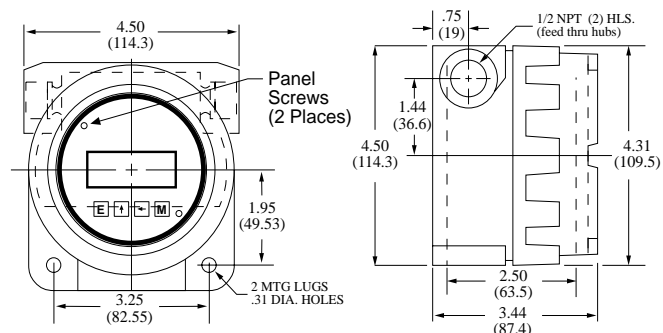


SquirtR-2

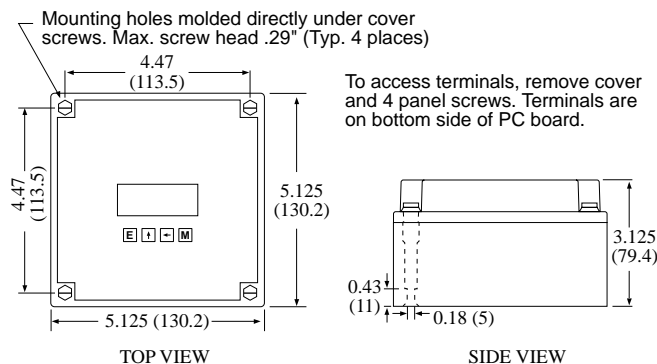


SquirtR-3

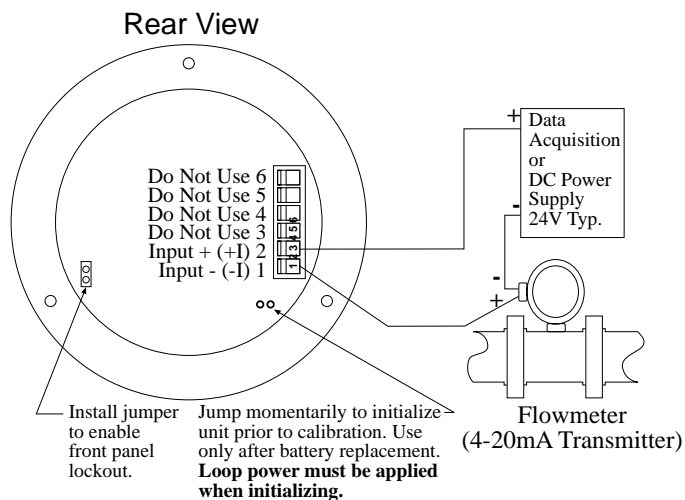
To access terminals, unscrew cover and loosen 2 panel screws. Terminals are on bottom side of PC board.



SquirtR-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 (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)

H2 = 0.875" Hole for mounting styles 2 and 5

HF2 = 0.5" Female NPT Hub fitting

H3 = 1.125" Hole for mounting styles 2 and 5

HF3 = 0.75" Female NPT Hub fitting

LEVELtrol II

Multi-Function Level Indicator, Controller and Batcher

Features

- Level and Tank Volume 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
- 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
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

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. 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.

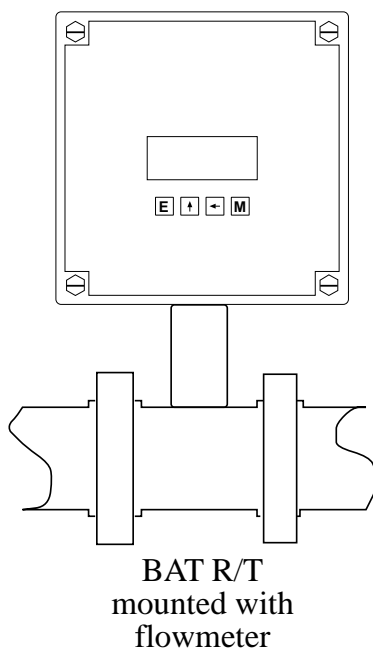
The input signal to a pulse signal conditioner may be a contact closure, a magnetic pickup, or a low level pulse. Some conditioner/converters scale the pulse signal such that each pulse represents a engineering quantity of flow, for example 1 pulse per gallon). Some converters convert the variable frequency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

In 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

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

Loop Powered Indicator



Flow Instruments
FIELD INDICATORS

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 -

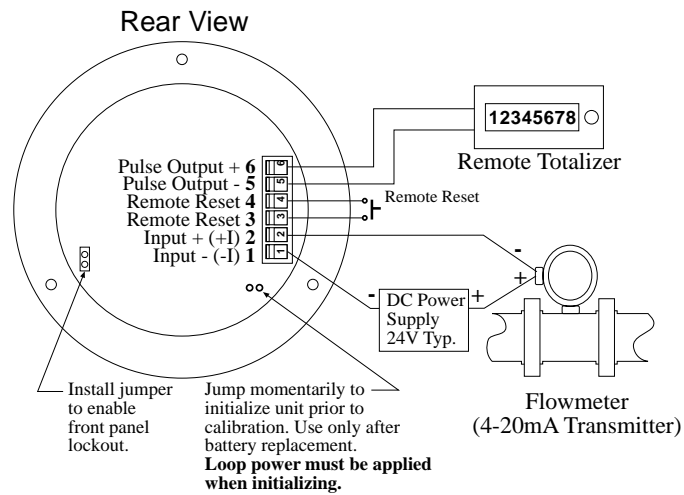
Class I, Division I, Groups B, C & D
Class II, Division I, Groups E, F & G

5- Wall Mount -

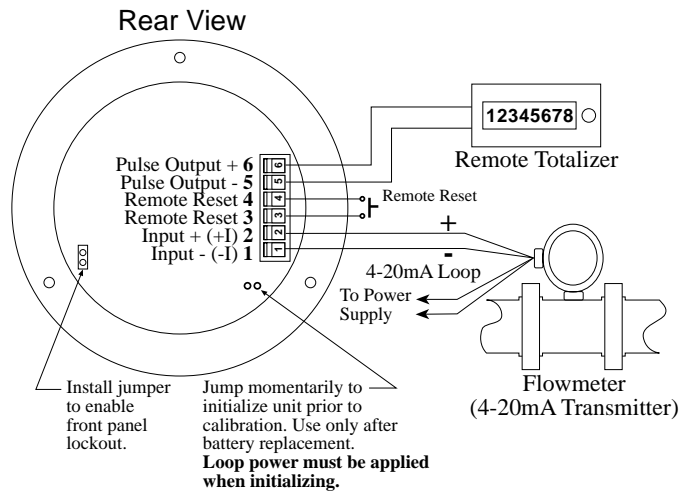
NEMA 4X with Squirt mounted outside opaque cover

Wiring:

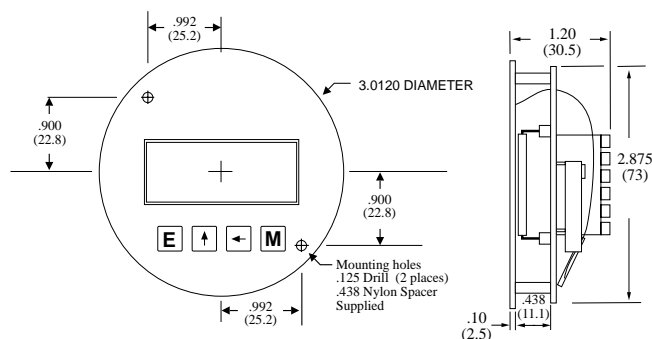
2-Wire Transmitter



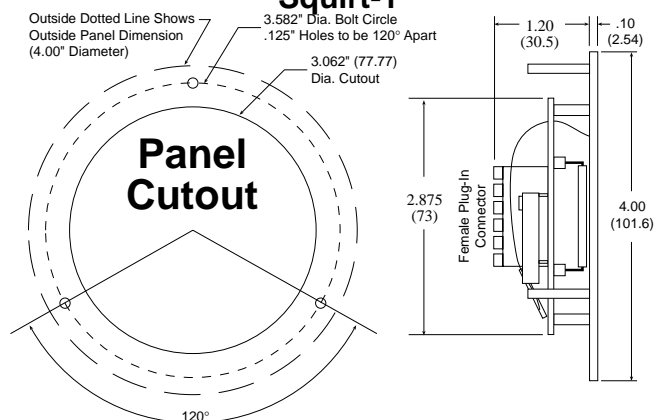
4-Wire Transmitter



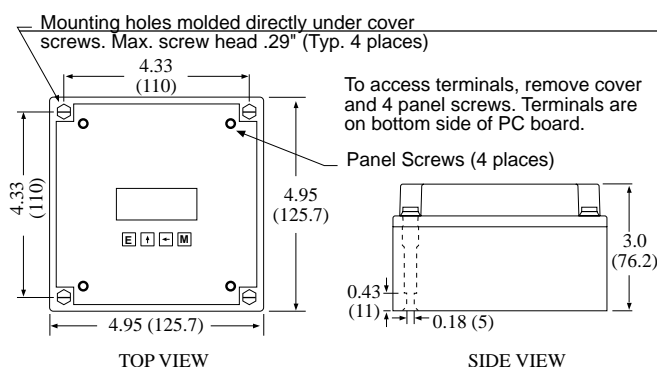
Squirt-0



Squirt-1

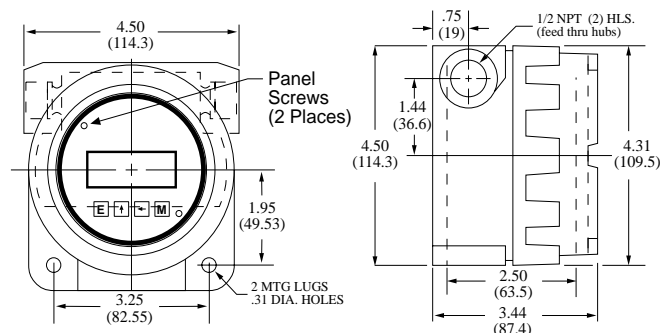


Squirt-2

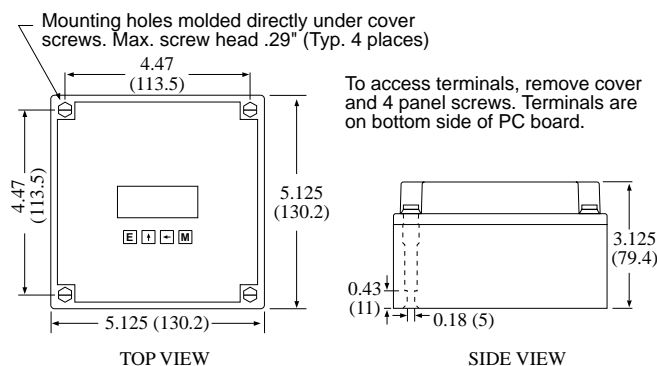


Squirt-3

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
- H3 = 1.125" Hole for mounting styles 2 and 5
- HF3 = 0.75" Female NPT Hub fitting

BAT R/T

Battery Powered Ratometer & Totalizer

Features

- Magnetic Pickup Input, Contact Closure Input, DC Pulse Input (Optically Isolated)
- Displays Rate & Total Simultaneously
- 4 1/2 Digit Rate Display, 8 Digit Totalizer Display
- 4-20mA Analog Output Option
- Powered From Internal Battery, External DC Supply or 4-20 mA Output Loop
- 10 Pt. Linearization
- New & Improved Isolated Scaled Pulse Output
- Intrinsically Safe Option
- New, Attractive NEMA4 Wall Mount Enclosure

Description

Featuring 4 1/2 digits of rate and 8 digits of total, the BAT R/T is a battery powered indicator capable of accepting magnetic pickup, DC pulse and switch closure inputs. The unit can be ordered with an optional 4-20mA output. The BAT R/T 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

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

RUN TIME

	Idle	2hrs/day	8hrs/day	24hrs/day
BATRT A	5 yrs	4.5 yrs	3.5 yrs	2.1 yrs
BATRT A 4	5 yrs	3.7 yrs	2.7 yrs	1.5 yrs
BATRT B/C Standby Operation	2.5 yrs	2.25 yrs	1.75 yrs	1 yr
BATRT B/C External or Loop Power	10 years			

All of the above values are calculated with the pulse output ON.
Turn the pulse output OFF to prolong battery life up to 30%.



Display:

Rate Display: (selectable decimal)

4.5 Digits (19999), 0.35" High, Display updates once every two seconds

Rate Descriptors: /SEC, /MIN, /HR (/DAY optional)

Min. Input Frequency: .125 Hz to 10 Hz (selectable delay of 0.1 to 8.0 seconds)

Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

Totalizer Descriptors: GAL, LIT, FT3, M3, "blank" (BBL optional)

Warning Displays: Low battery warning "BAT"

Pulse Output:

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

Type: Isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100mA

Pulse Duration: Selectable (see below)

Pulse Output Rate: Selectable (see below)

SPEED (HZ)	1	2	4	8
Min. on/off (msec)	500	250	125	62.5

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

NOTE: Select OFF for max. battery life.

Mounting Styles:

- 0- Circuit Board- OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure with BAT R/T 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

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:0.01% Reading, ± 1 count

Temperature Drift:

50 ppm/°C Worst Case

Inputs:**MAGNETIC PICKUP INPUT**

Frequency Range: 0 to 3500 Hz

Trigger Sensitivity: 30 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 K Ω 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

RESET INPUT (contact closure to common)Internal Pullup Resistor: 100 K Ω to +3.6 VDC

High (logic 1): Open or 4-30 VDC

Low (logic 0): Less Than .5 VDC

Minimum On : 25 msec

K-FACTOR

Range: 0.001 to 59999 (divider)

Decimal Point Locations: XX.XXX to XXXXX

10 Point Linearization Option

This feature allows the user to enter 10 different frequencies with 10 different corresponding K-Factors to linearize non linear signals.

Analog Output Option:

Type: 4-20 mA follows rate display, Two wire hookup

Accuracy: 0.15% Full Scale at 20° C

Temperature Drift:

50 ppm/°C Typical

200 ppm/°C Worst Case

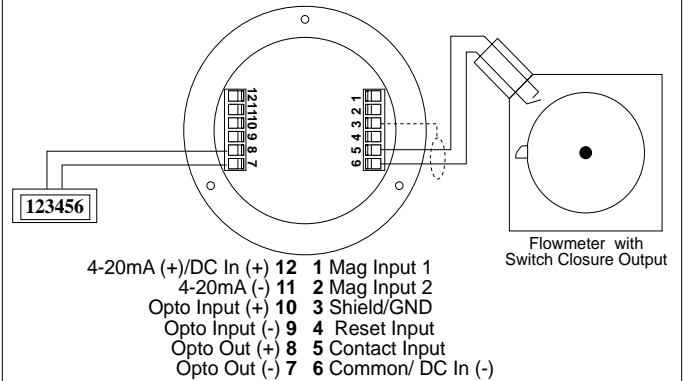
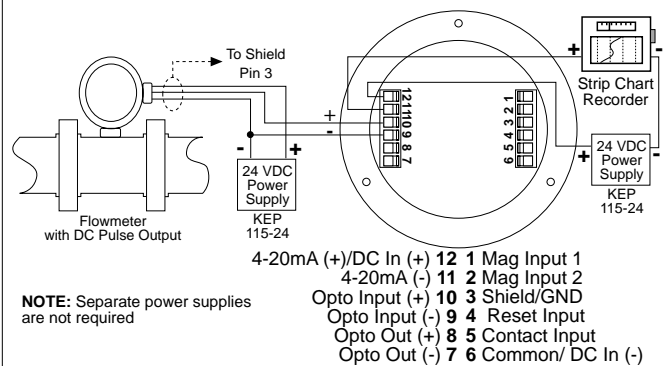
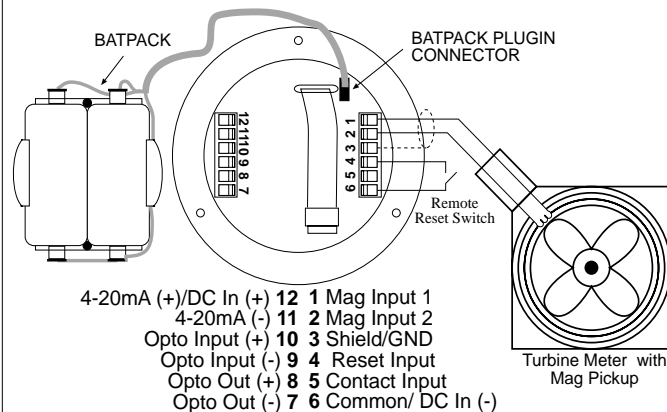
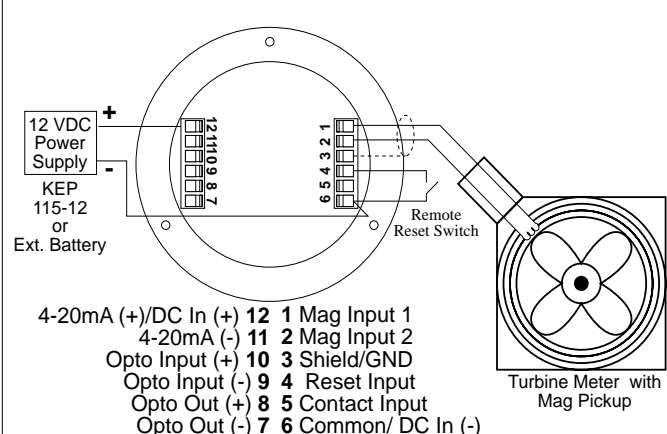
Reverse Polarity Protected

NOTE: The BAT R/T uses the 4-20 mA loop power as its power source when this option is used.

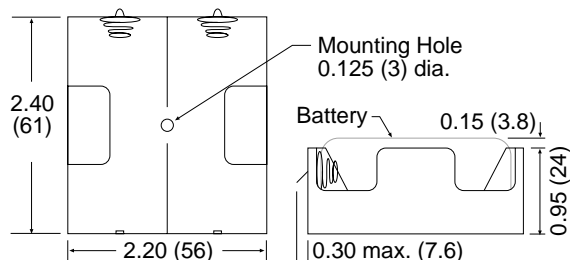
Listing: CE Compliant,

CSA(NRTL/C)(File No. LR91109) (x-proof only)

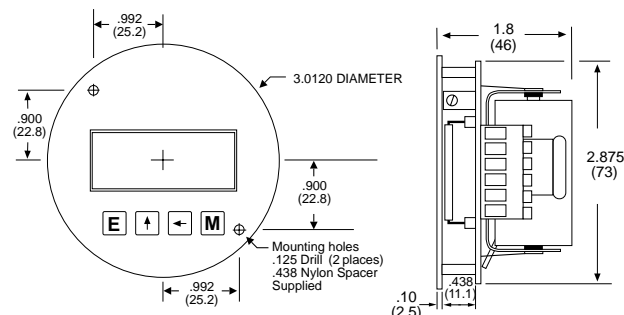
UL IS Pending

Typical Wiring:**CONTACT INPUT / PULSE OUTPUT / BATTERY POWERED****ISOLATED INPUT / 4-20mA LOOP POWERED****MAG INPUT / BATPACK POWERED****MAG INPUT / DC POWERED**

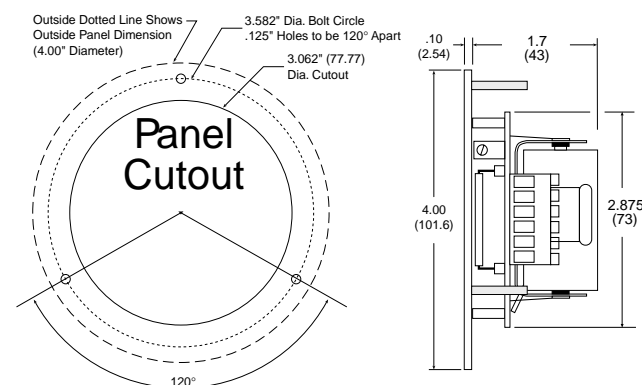
BATPACK



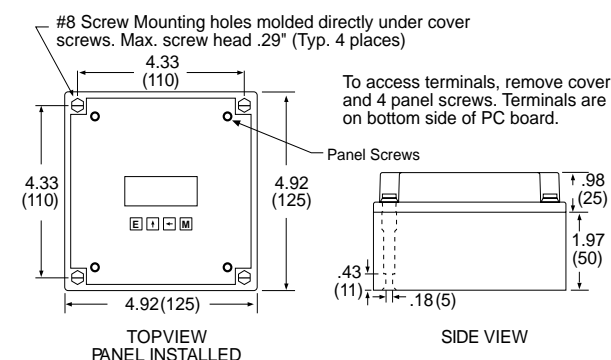
BATRT-0



BATRT-1

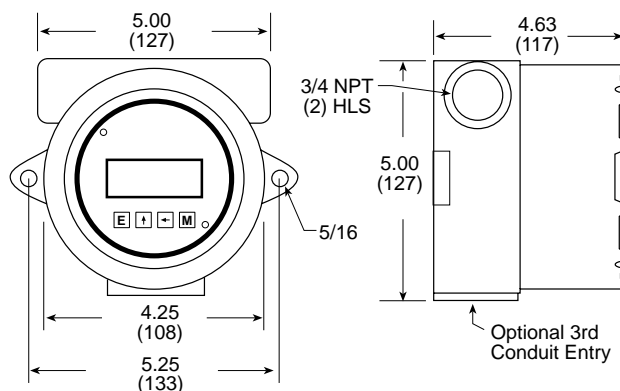


BATRT-2

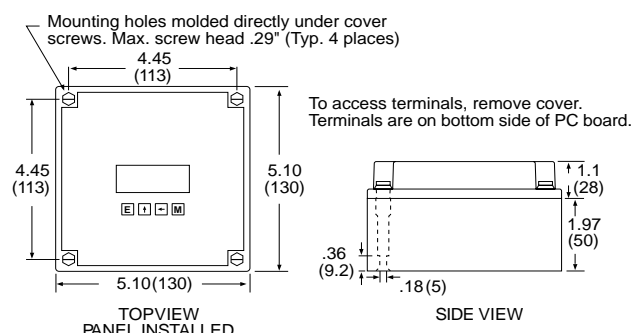


BATRT-3

To access terminals, unscrew cover and loosen 2 panel screws. (If screws are removed, spacers may drop out.) Terminals are on bottom side of PC board.



BATRT-5



Ordering Information

EXAMPLE: BATRT 3 A 4 ET

Series:

Mounting:

- * 0 = OEM
- * 1 = Panel Mount
- 2 = NEMA 4X Box (Bat R/T behind clear cover)
- 3 = Explosion Proof Housing
- 5 = NEMA 4X Box (Bat R/T outside opaque cover)
- 6 = Double Ended Explosion Proof Housing

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)

- 4 = 10 Point Linearization
- D = Rate per Day, Hour or Minute
- ET = Extended Temp.: -22°F to 158°F (-30°C to 70°C)
- CE = CE Approved Version
- CSA = CSA Approved Version (explosion proof)
- IS** = Intrinsically Safe
- TRX = NEMA7 Explosion Proof Reset Switch
- RN = External Magnetic Reset
- T = Third Conduit Entry in Ex-Proof Housing
- H2 = 0.875" Hole for mounting styles 2 and 5
- HF2 = 0.5" Female NPT Hub fitting
- H3 = 1.125" Hole for mounting styles 2 and 5
- HF3 = 0.75" Female NPT Hub fitting

Accessories:

- BATPACK= External Battery Pack with Two C Size Batteries & 12" leads
- BATC = Single Battery: Tadiran P/N TL2200/S 3.6V 5500mAh or equal
- 115-24 = 115 VAC to 24 VDC power supply

* External battery pack supplied with models BATRT0A & BATRT1A
** Contact factory for latest information

BAT RAT

Features

- Magnetic Pickup Input, Contact Closure Input, DC Pulse Input (Optically Isolated)
- Displays Rate & Total Simultaneously
- 4 ^{1/2} 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
- 10 Pt. Linearization
- Isolated Alarm Output
- Intrinsically Safe Option
- New, Attractive NEMA4 Wall Mount Enclosure

Description

Featuring 4^{1/2} digits of rate and 8 digits of total, the BAT RAT is a battery powered indicator with flow rate alarm output. It is capable of accepting magnetic pickup, DC pulse and switch closure inputs. 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

Protection: Reverse Polarity Protection on DC Power Input

LOOP POWERED

Voltage: 8.5 to 30 VDC

Supplied with 1 C size lithium battery

Protection: Reverse Polarity Protection on Current Loop

Loop Burden: 8.5V maximum

Display:

Rate Display: (selectable decimal)

4.5 Digits (19999), 0.35" High, 2 sec. display update rate

Rate Descriptors: /SEC, /MIN, /HR

Min. Input Frequency: .125 Hz to 10 Hz

Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

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

Warning Displays: Low battery warning "BAT"

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 open collector transistor.

Max. voltage (off state): 100 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 |

Battery Powered Ratemeter & Totalizer with Alarm Output



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:

0.01% Reading, ±1 count

Temperature Drift: 50 ppm/°C Worst Case

Inputs:

MAGNETIC PICKUP INPUT

Frequency Range: 0 to 3500 Hz

Trigger Sensitivity: 30 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

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

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

K-FACTOR

Range: 0.001 to 59999 (divider)

Decimal Point Locations: XX.XXX to XXXXX

Multiplier: 1, 10, 100, 1000

10 Point Linearization Option

This feature allows the user to enter 10 different frequencies with 10 different corresponding K-Factors to linearize non linear signals.

Analog Output Option:

Type: 4-20 mA follows rate display, Two wire hookup

Accuracy: 0.15% Full Scale at 20° C

Temperature Drift:

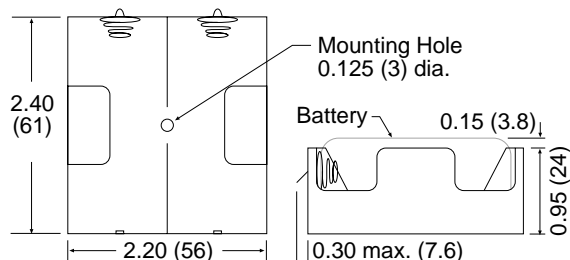
50 ppm/°C Typical (200 ppm/°C Worst Case)

Reverse Polarity Protected

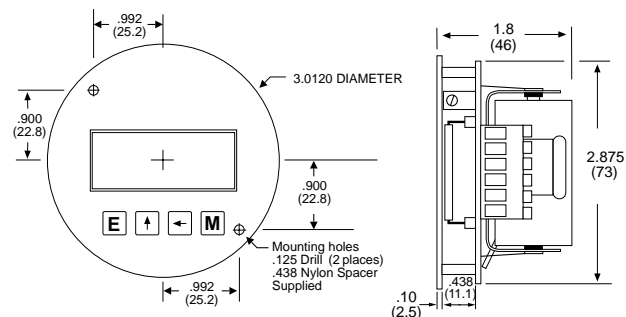
NOTE: The BAT RAT uses the 4-20 mA loop power as its power source when this option is used.

Listing: CE Compliant,
CSA(NRTL/C)(File No. LR91109) (x-proof only)
ULIS Pending

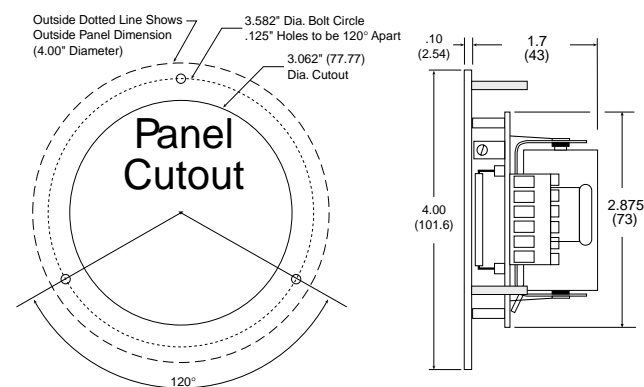
BATPACK



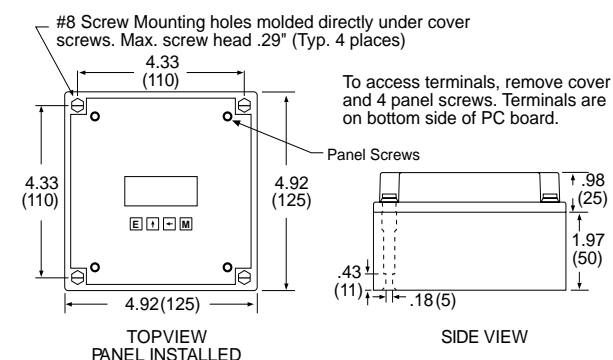
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BATRAT-1

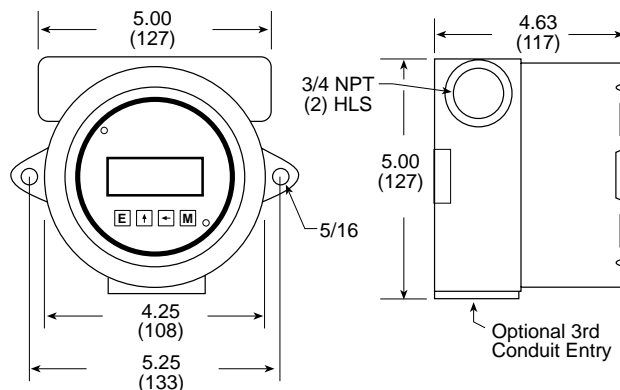


BATRAT-2



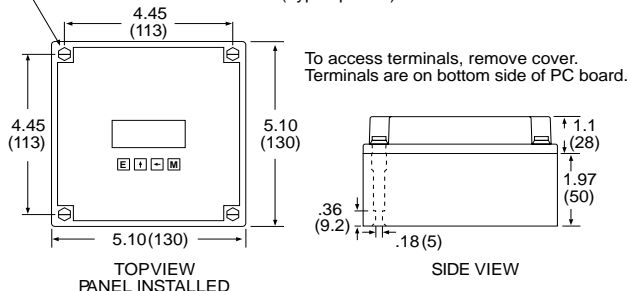
BATRAT-3

To access terminals, unscrew cover and loosen 2 panel screws. (If screws are removed, spacers may drop out.) Terminals are on bottom side of PC board.



BATRAT-5

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



Ordering Information

EXAMPLE: BATRAT 3 A 4 ET

Series:

Mounting:

* 0 = OEM

* 1 = Panel Mount

2 = NEMA 4X Box (Bat R/T behind clear cover)

3 = Explosion Proof Housing

5 = NEMA 4X Box (Bat R/T outside opaque cover)

6 = Double Ended Explosion Proof Housing

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)

4 = 10 Point Linearization

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

CE = CE Approved Version

CSA = CSA Approved Version (explosion proof)

IS** = Intrinsically Safe

TRX = NEMA7 Explosion Proof Reset Switch

on Third Conduit Entry

RN = External Magnetic Reset

T = Third Conduit Entry in Ex-Proof Housing

H2 = 0.875" Hole for mounting styles 2 and 5

HF2 = 0.5" Female NPT Hub fitting

H3 = 1.125" Hole for mounting styles 2 and 5

HF3 = 0.75" Female NPT Hub fitting

Accessories:

BATPACK= External Battery Pack with

Two C Size Batteries & 12" leads

BATC = Single Battery: Tadiran P/N TL2200/S

3.6V 5500mAh or equal

115-24 = 115 VAC to 24 VDC power supply

* External battery pack supplied with models BATRAT0A & BATRAT1A

** Contact factory for latest information

BAT D/T

Battery, Loop or DC Powered Dual Totalizer

Features

- Magnetic Pickup Input, Contact Closure Input, DC Pulse Input (Optically Isolated)
- Displays 5 Digit Resettable Total
8 Digit Grand Total
- Powered From Internal Battery, External DC Supply or 4-20 mA Output Loop
- 10 Pt. Linearization
- New & Improved Isolated Scaled Pulse Output
- Intrinsically Safe Option
- New, Attractive NEMA4 Wall Mount Enclosure

Description

Featuring 5 digits of resettable total and 8 digits of grand total, the BAT D/T is a battery powered indicator capable of accepting magnetic pickup, DC pulse and switch closure inputs.

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

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

RUN TIME

	Idle	2hrs/day	8hrs/day	24hrs/day
BATDT A or AC	5 yrs	4.5 yrs	3.5 yrs	2.1 yrs
BATDT A 4	5 yrs	3.7 yrs	2.7 yrs	1.5 yrs
BATDT B or C Standby Operation	2.5 yrs	2.25 yrs	1.75 yrs	1 yr
BATDT B or C External or Loop Power	10 years			

All of the above values are calculated with the pulse output ON.
Turn the pulse output OFF to prolong battery life up to 30%.

DISPLAY:

Resettable Total Display

5 Digits (99999), 0.35" High, Display updates once every two seconds

Grand Totalizer Display: (selectable decimal)

8 Digits (99999999), 0.2" High

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

Warning Displays: Low battery warning "BAT"

ACCURACY:

±1 count

Listing:

CE Compliant,
CSA(NRTL/C)(File No. LR91109) (x-proof only)
UL IS Pending



Flow Instruments
FIELD INDICATORS

PULSE OUTPUT:

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

Type: Isolated photomos relay

Max. voltage (off state): 30 VDC

Current (on state): 100mA

Pulse Duration: 62.5 mSec (max. output speed: 8 Hz)

Pulse output divider: User selectable, +1, +10, +100 or OFF

NOTE: Select OFF for max. battery life.

MOUNTING STYLES:

- 0- Circuit Board - OEM option (consult factory)
- 1- Panel Mount - NEMA 4X Front
- 2- Wall Mount - NEMA 4X Enclosure with BAT D/T 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

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

INPUTS:

MAGNETIC PICKUP INPUT

Frequency Range: 0 to 3500 Hz

Trigger Sensitivity: 30 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

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

K-FACTOR

Range: 0.001 to 59999

Decimal Point Locations: XX.XXX to XXXXX

10 Point Linearization Option

This feature allows the user to enter 10 different frequencies with 10 different corresponding K-Factors to linearize non linear signals.

ANALOG OUTPUT OPTION:

Type: 4-20 mA follows flow rate, Two wire hookup

Scaling: scaled per second, minute or hour.

0.000 to 59999 (selectable decimal)

Accuracy: 0.15% Full Scale at 20° C

Temperature Drift:

50 ppm/°C Typical

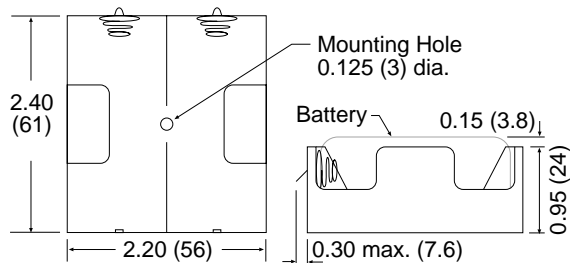
200 ppm/°C Worst Case

Reverse Polarity Protected

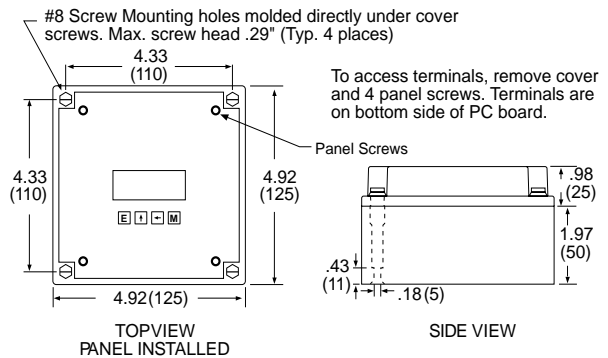
NOTE: The BAT D/T uses the 4-20 mA loop power as its power source when this option is used. The battery is still required to power the display.

DIMENSIONS:

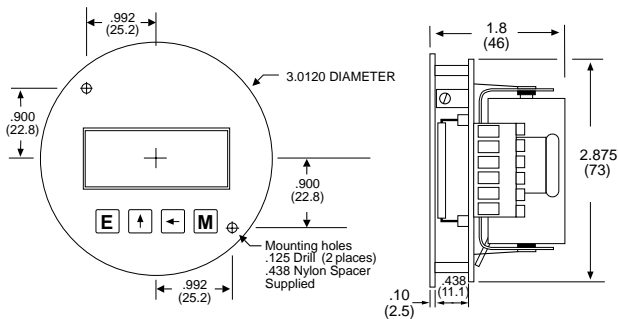
BATPACK



BATDT-2

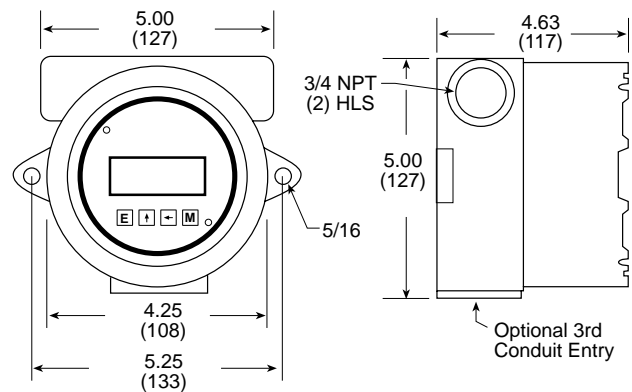


BATDT-0

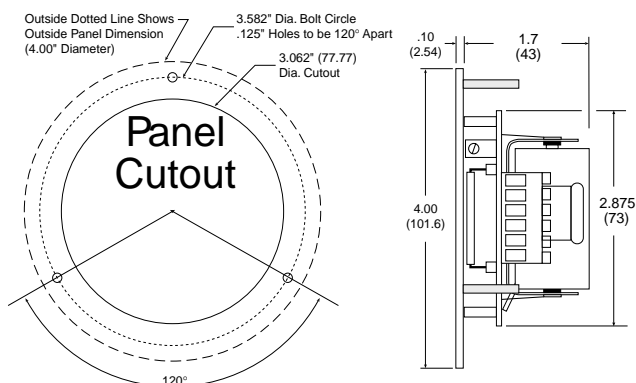


BATDT-3

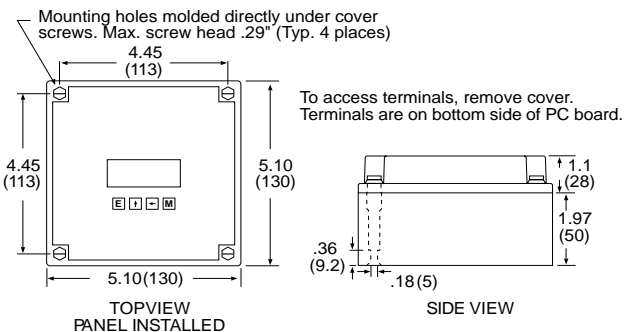
To access terminals, unscrew cover and loosen 2 panel screws. (If screws are removed, spacers may drop out.) Terminals are on bottom side of PC board.



BATDT-1

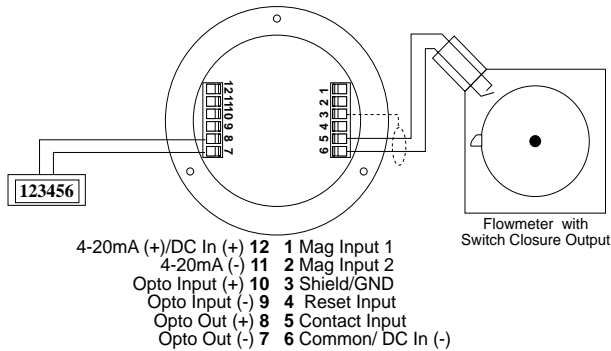


BATDT-5

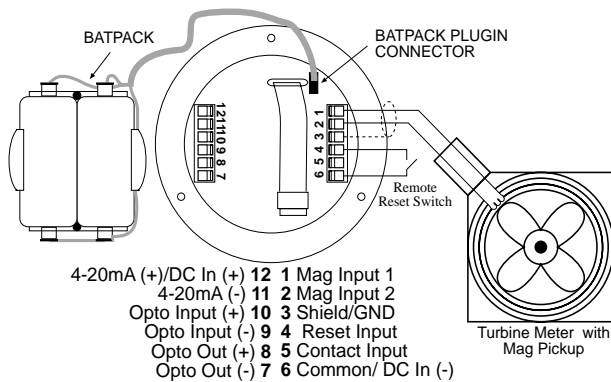


TYPICAL APPLICATIONS

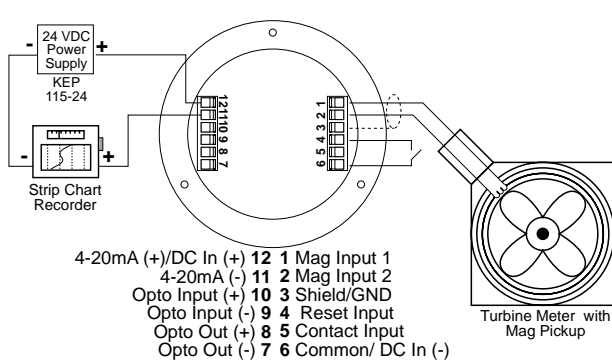
CONTACT INPUT / PULSE OUTPUT / BATTERY POWERED



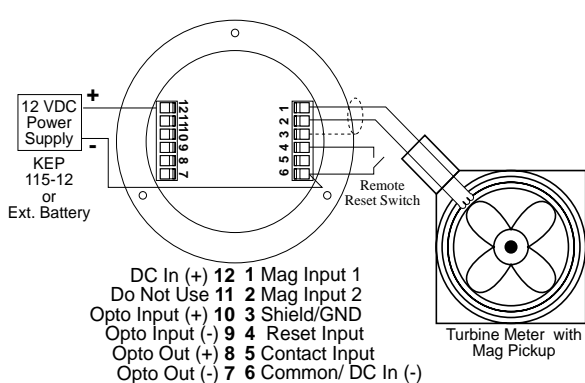
MAG INPUT / BATPACK POWERED



MAG INPUT / 4-20mA LOOP POWERED



MAG INPUT / DC POWERED



Ordering Information

EXAMPLE: BATDT 3 A 4 ET

Series:

Mounting:

* 0 = OEM

* 1 = Panel Mount

2 = NEMA 4X Box (Bat D/T behind clear cover)

3 = Explosion Proof Housing

5 = NEMA 4X Box (Bat D/T outside opaque cover)

6 = Double Ended Explosion Proof Housing

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)

4 = 10 Point Linearization

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

CE = CE Approved Version

CSA = CSA Approved Version (explosion proof)

IS** = Intrinsically Safe

TRX = NEMA7 Explosion Proof Reset Switch

RN = External Magnetic Reset

T = Third Conduit Entry in Ex-Proof Housing

H2 = 0.875" Hole for mounting styles 2 and 5

HF2 = 0.5" Female NPT Hub fitting

H3 = 1.125" Hole for mounting styles 2 and 5

HF3 = 0.75" Female NPT Hub fitting

Accessories:

BATPACK = External Battery Pack with Two C Size Batteries & 12" leads

BATC = Single Battery: Tadiran P/N TL2200/S 3.6V 5500mAh or equal

115-24 = 115 VAC to 24 VDC power supply

* External battery pack supplied with models BATDT0A & BATDT1A

** 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, an programmable alarm duration, and/or a programmable alarm hysteresis.

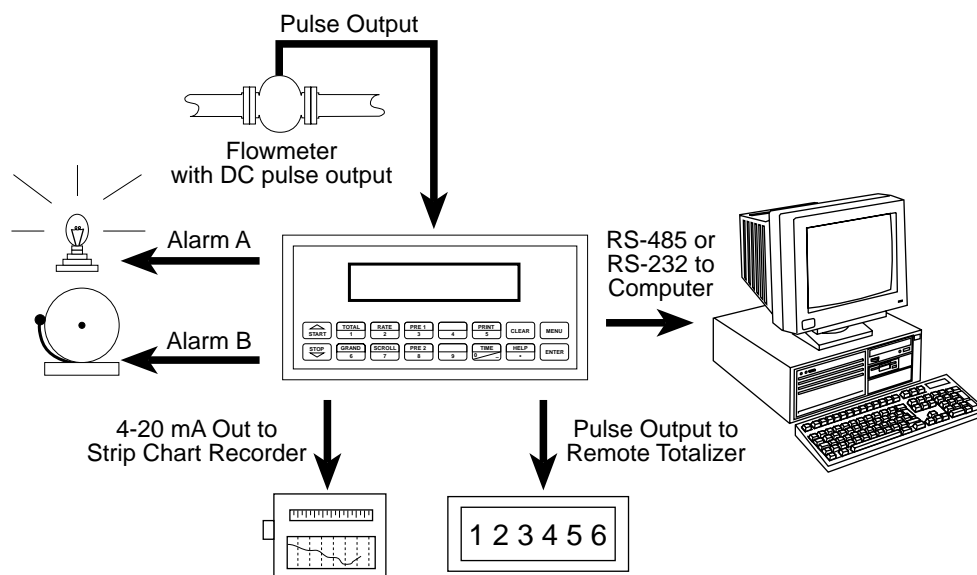
What are remote inputs and how are they used? Often there is a need to connect a remote switch near the operator for such purposes as remote reset, or remote print. Many Rate/Totalizers offer a variety of capabilities as remote inputs.

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 Ratemeter/Totalizer Application



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)
- Easy programming with only 2 buttons
- Connection with screw terminal
- IP65 NEMA 4X (front)
- DC Powered



Flow Instruments
RATEMETERS/TOTALIZERS

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

Order #: 525K.2

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

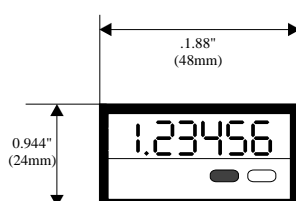
530K.2 = Rate and Total Display

Electrical characteristics:

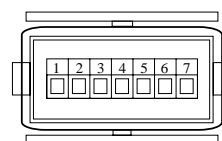
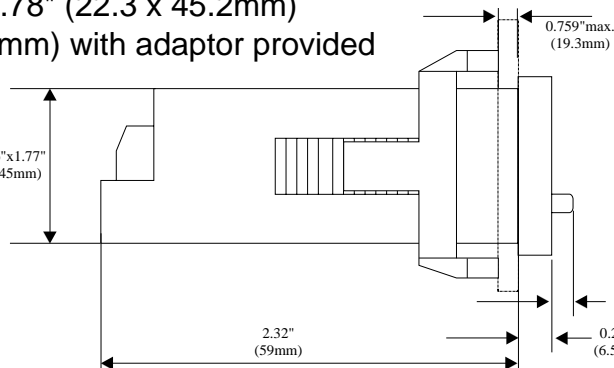
- Supply Voltage: 10 to 30 VDC (50 mA)
- Data retention: EEPROM (1 million cycles or 10 years)
- Noise immunity acc. to EN 50081-2; EN55011 class B; EN 50082-2
- Ambient temperature: 14°F to 122°F (-10°C to +50°C)

- 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



0.866"x1.77"
(22x45mm)



INTELLECT-69

Ratometer / Totalizer From Analog Inputs

Features

- High/Low Scaling From Front Panel
- 2 Set Points Assignable To Rate Or Total
- Display Rate (pressure, level, watts, etc.), Peak & Valley and Integrated Total
- 0-5V, 0-10V, 1-5V, 4-20mA or 0-20mA Analog Input
- NEMA 4X/IP 65 Front Panel
- +24V Output 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. 300 mA DC or 10.0 VA at rated AC voltage.

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

Temperature:

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

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

Humidity: 0-90% Noncondensing

Memory: EEPROM stores data for 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 (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 4 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 rate display. 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 $\pm 0.25\%$ 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).

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:

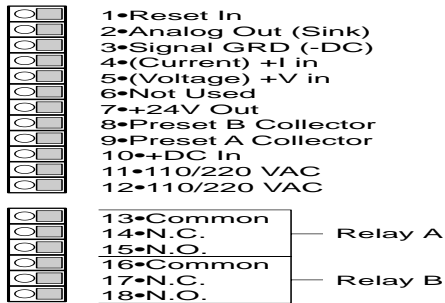
RANGE	% FS ERROR (worst case)	% FS ERROR (typical)
-------	----------------------------	-------------------------

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%

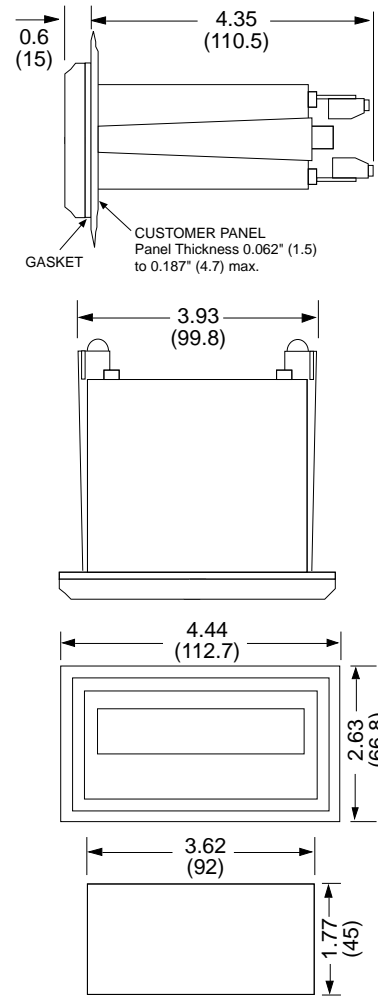
Square Law: (above 5% of bottom range) 0.1%
(5V inputs .4%) Worst case over complete range: 2%

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

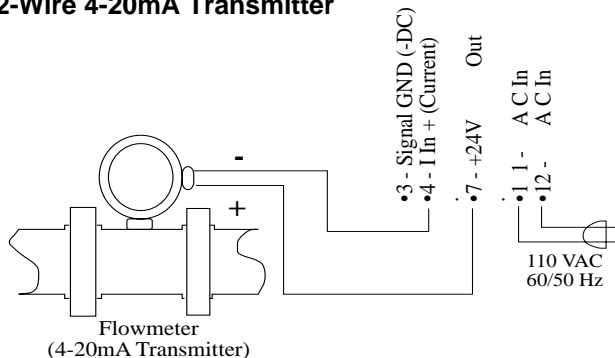
WIRING:



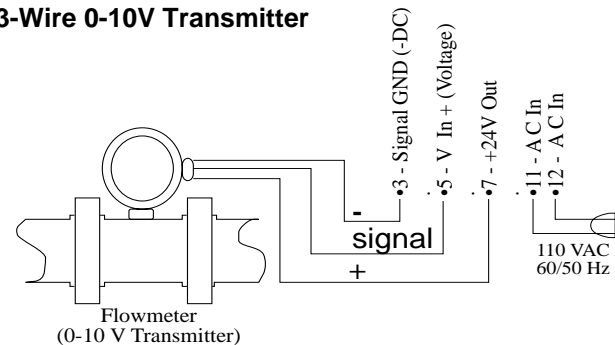
Dimensions:



2-Wire 4-20mA Transmitter



3-Wire 0-10V Transmitter



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

XHV - Explosion proof housing (see accessories section)

NEMA-1/8DIN- NEMA 4X enclosure (see accessories section)

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

MRT (MINITROL)

Features

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

Application:

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

Description:

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

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

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

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

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

Low Cost, Pulse Input Totalizer/Ratemeter



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

Specifications:

Display: 6 digit, 0.55" High LED

Input Power:

110 VAC \pm 15% or 12 to 15 VDC

220 VAC \pm 15% or 12 to 15 VDC

24VAC \pm 15% or 12 to 15 VDC

Current: 250 mA DC max. or 6.5 VA AC

Output Power: (AC powered units only)

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

Temperature:

Operating:

+32°F (0°C) to +130 F (+54°C)

Storage:

-40 F (-40°C) to +200°F (93°C)

Humidity: 0-90% Noncondensing

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

Inputs:

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

Approvals: CSA File# LR91109-7, CE Approved

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 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 rateme-
ter (high/low), one preset for rate and one for total, or two
presets (2 stage shut off) on the A and B totalizers. A 5
digit value can be entered for both presets and the deci-
mal 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 pre-
vented 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 sig-
nificant 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, 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 communi-
cation. 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.

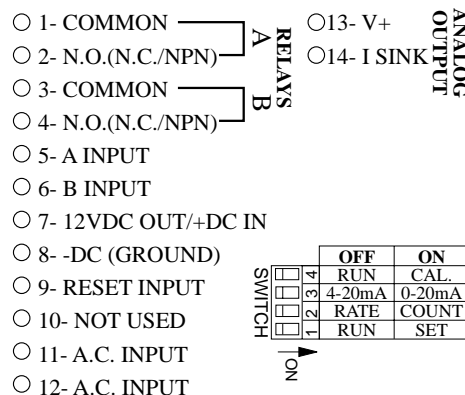
Device ID: 01-247

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

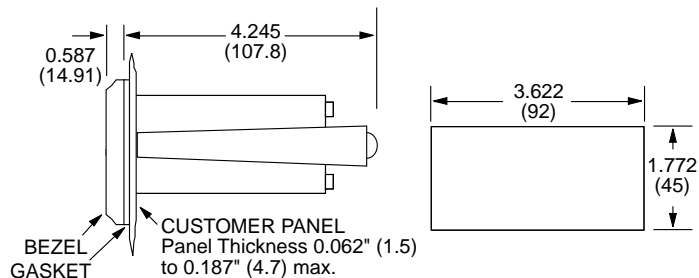
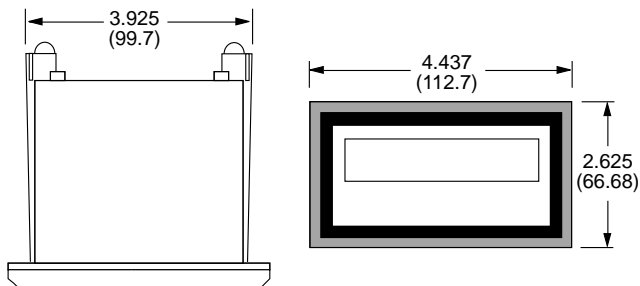
Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Termination:



Mounting:



How To Order:

MINItrol (MRT, MC2, MR2)

Example: **MRT A 3 1 A**

Series:

- MRT=** 6 digit counter / 5 digit ratemeter with presets and scaling.
- MC2=** 6 digits, counter only with presets and scaling.
- MR2=** 5 digits, rate only 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, 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 (Multiple Options Not Available)

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

Accessories

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

MINItrol (MR, MC)

Example: **MC H A 3 M (MR ONLY) 1**

Series:

- MR=** 5 digits, rate display only no presets, no scaling
- MC=** 6 digits, dual input, bi-directional counter only, no presets, no scaling

Input Speed:

- L =** Low speed input debounce filter 40 Hz max.
- H =** High speed input (0 to 9.99 kHz)

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 Input:

- 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)

Rate Time Base: **MR ONLY**

- S=** RPS (rate per second)
- M=** RPM (rate per minute)
- H=** RPH (rate per hour)

Options: (Multiple Options Not Available)

- 1=** RS232 Communications
- 2=** RS422 Communications

Accessories

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

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
- Security Lockout
- RS422/RS232 Serial Communication (optional)
- NEMA 4X / IP65 Front Panel
- 4-20mA or 0-20mA Analog Output (optional)
- CSA Approved



Flow Instruments
RATEMETERS/TOTALIZERS

DESCRIPTION:

The CSA approved totalizer and ratemeter 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 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 (75-240 V AC/DC, Input 8) negative edge resets 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.

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 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 SERIAL INTERFACE:

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 transmitted at selected baud rates using standard seven bit ASCII characters and parity with two additional bits of "Start" and "Stop" to make up the standard ten bit character.

Data is received and transmitted over standard EIA RS232 or RS422 levels. Each 10 bit character is made up of a start bit, 7 bit ASCII code, parity bit and stop bit. Unit number, baud rate and parity are entered in the "Program Setting" set up mode and remain in memory even if power is off.

Note that the input impedance of RS232 is 3K or 7K Ohm worst case. The terminal addressing the unit must be capable of driving all loads in the loop. RS422 input impedance is much higher and there is usually no problem driving 25 units. Unit serial transmit line remains in a high impedance "OFF" state until addressed. A print list can be triggered by external switch.

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:

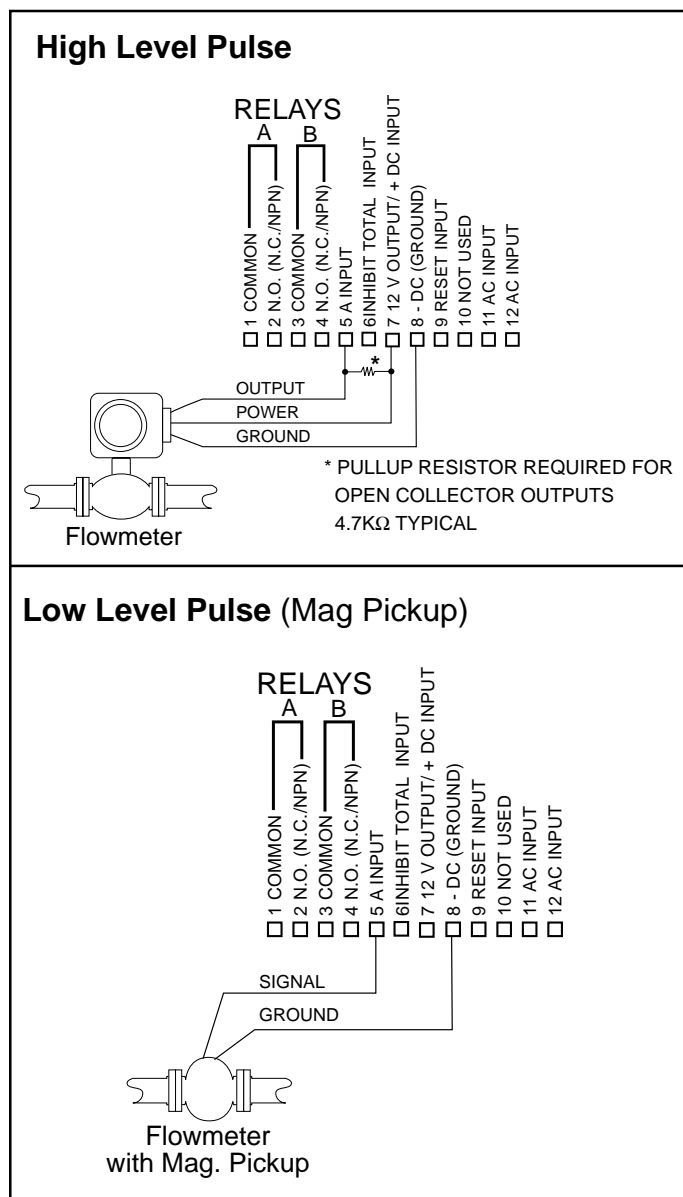
- accept almost any number of pulses per unit of measurement
- sample from 2 to 24 seconds maximum
- auto-range up to 5 digits of significant information.

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

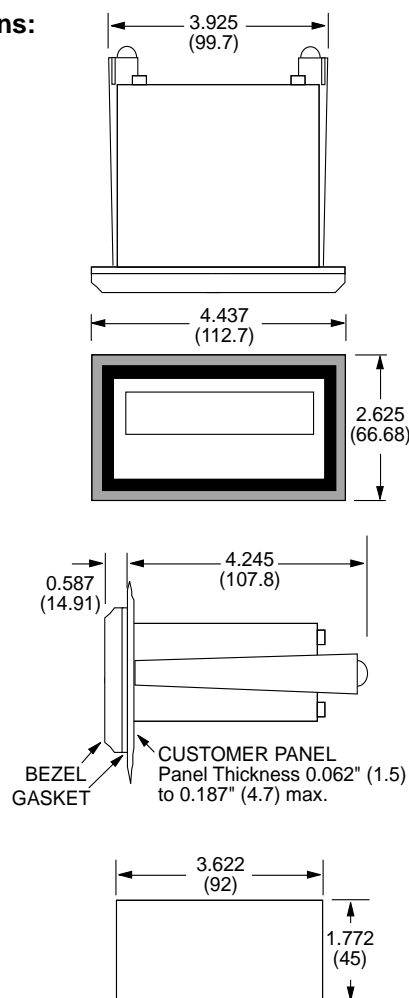
TOTALIZER:

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.

TYPICAL SENSOR HOOKUP:



Dimensions:



Ordering Information

Example: MRTS A 3 1

Series:

MRTS= 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

3= Modbus RTU RS232

4= Modbus RTU RS422/RS485

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

CE = CE Compliant Version

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

Accessories

XHV - Explosion proof housing (see accessories section)

NEMA-1/8DIN- NEMA 4X enclosure (see accessories section)

P1000- Serial Printer (see accessories section)

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

MINITROL-PW

Totalizer/Ratemeter for Paddle or Pelton Wheel Turbine Flowmeters

Features

- Display Rate & Total
Flowrate Display = $\frac{\text{Input Frequency} + \text{Offset B}}{\text{Factor A}}$
- Pulse Input - 10 kHz Max.
- 30mV Magnetic Pickup Inputs (optional)
- Security Lockout
- RS422/RS232 Serial Communication (optional)
- NEMA 4X / IP65 Front Panel
- 4-20mA or 0-20mA Analog Output (optional)
- CSA Approved

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:

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 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: up to 300Hz @ 30mV, 5KHz @ .25V to 50V max.

INHIBIT TOTAL INPUT

Terminal 6: 4-30 VDC level will inhibit totalization

RESET:

Front Panel: Resets displayed value and control output
Remote: 4-30 VDC, negative edge resets Totalizer (Total A) and control output

NOTE: The remote reset will not reset Grand Total (Total B)

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

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.



Flow Instruments
RATEMETERS/TOTALIZERS

LOW FLOW CUTOFF:

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

CONTROL OUTPUTS:

Relays:

The relays may be assigned to rate or total.

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 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.

RS232/RS422 SERIAL INTERFACE

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 transmitted at selected baud rates using standard seven bit ASCII characters and parity with two additional bits of "Start" and "Stop" to make up the standard ten bit character.

Data is received and transmitted over standard EIA RS232 or RS422 levels. Each 10 bit character is made up of a start bit, 7 bit ASCII code, parity bit and stop bit. Unit number, baud rate and parity are entered in the "Program Setting" set up mode and remain in memory even if power is off.

Note that the input impedance of RS232 is 3K or 7K Ohm worst case. The terminal addressing the unit must be capable of driving all loads in the loop. RS422 input impedance is much higher and there is usually no problem driving 25 units. Unit serial transmit line remains in a high impedance "OFF" state until addressed. A print list can be triggered by external switch.

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 alarm (high/low), or for total (A) or grand total (B). 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. This may be used to create a relay pulse output instead of grand total.

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 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

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

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

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

If Freq. In < Cutoff

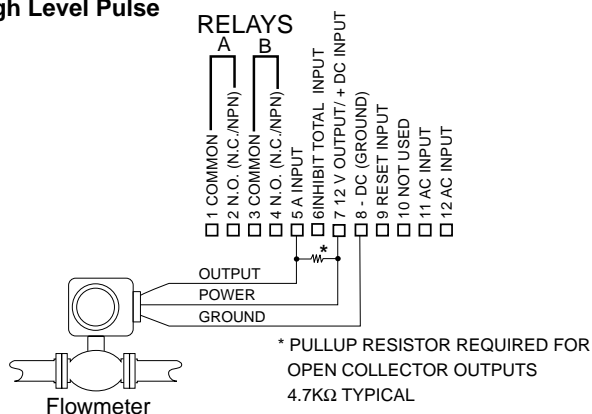
Total Increment = 0

Rate = 0

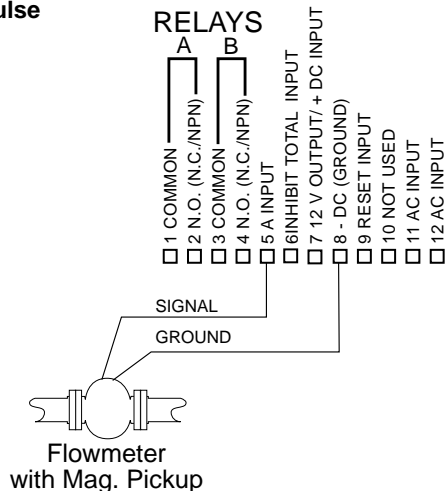
Total B (grand total) increments with Total A.

TYPICAL SENSOR HOOKUP

High Level Pulse



Low Level Pulse (Mag Pickup)



THEORY OF OPERATION

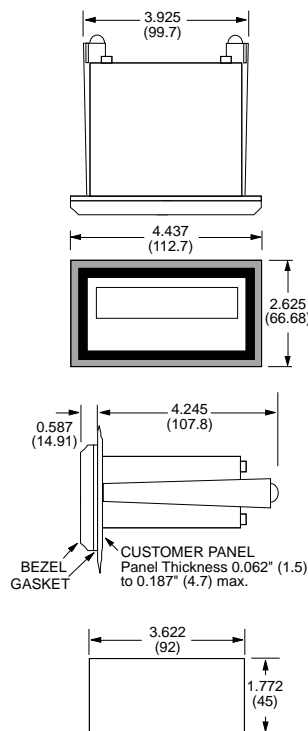
Low flow, Pelton Wheel turbine flowmeters have a transfer characteristic which can best be represented by the following equation for frequencies above the minimum usable flowrate for the device:

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

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.

Dimensions:



Ordering Information

Example: MRTPW A 3 1

Series:

MRTPW= 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)

CE = CE Compliant Version

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

Accessories

XHV - Explosion proof housing (see accessories section)

NEMA-1/8DIN- NEMA 4X enclosure (see accessories section)

P1000- Serial Printer (see accessories section)

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

DRT (Dual rate/totalizer)

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

DESCRIPTION:

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

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

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

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

SPECIFICATIONS:

DISPLAY:

6 digit, 0.55" High LED

INPUT POWER:

110 VAC ± 15% or 12 to 15 VDC

220 VAC ± 15% or 12 to 15 VDC

24VAC ± 15% or 12 to 15 VDC

CURRENT:

250 mA DC max. or 6.5 VA AC

OUTPUT POWER: (AC powered units only)

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

TEMPERATURE:

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

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

HUMIDITY: 0-90% Noncondensing

2 Separate Rate/Total Displays with Combination Function



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

MEMORY:

EEPROM stores data for 10 years if power is lost.

INPUTS:

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

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

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

RESET:

Front Panel: Resets displayed value and control output

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

K FACTOR/SCALING

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

CONTROL OUTPUTS:

Relays:

2 each N.O. Relay; 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.

COUNTER

The two 5-digit counters can count at 10Khz speed. Each has a separate 5-digit dividing scale factor. The counters 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÷BX100 (percent of A to B), A÷A+BX100 (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, 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.

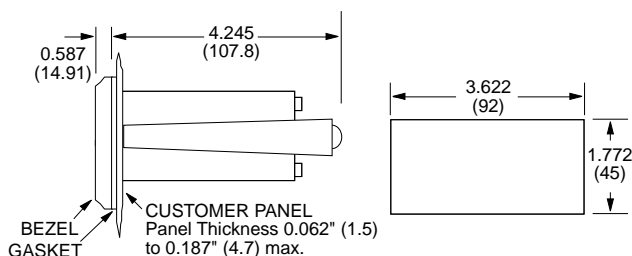
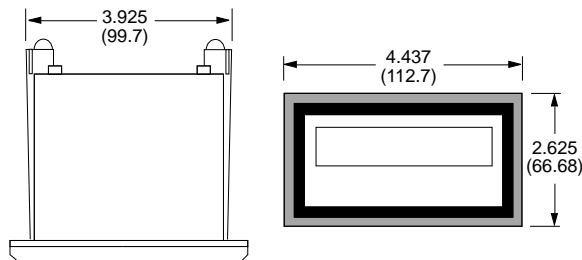
Device ID: 01-247

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

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Mounting:



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

	1	2	3	4	RELAYS		ANALOG OUTPUT
					A	B	
OFF							
RUN							
4-20mA							
RATE							
COUNT							
SET							

Ordering Information

Example: DRT A 3 1

Series: DRT= 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, Input A only, 30mV input (Input B, 4-30V)

3MB = Mag. Input, Inputs A & B, 30mV input

Options: (Multiple Options Not Available)

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

1= RS232 Communications

2= RS422 Communications

3= Modbus RTU RS232

4= Modbus RTU RS422/RS485

Accessories:

Separate non keyboard panel order #34235

Separate keyboard panel - order #34234

SUPERtrol-I LE

Economical Flow Totalizer, Ratemeter and Batcher

Features

- EZ Setup Feature
- Setup Diskette
- Advanced Batching Features
- 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:

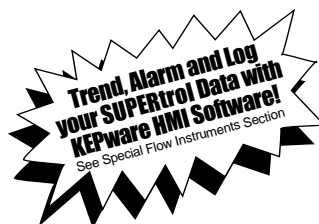
Environmental

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

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)

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.

KEPTROL R/T

TOTALIZER / RATEMETER

Features

- Pulse or Analog Input
- 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
- Two Stage Security Lockout
- Two Way RS232/422/ Communications Option
- NEMA 4X/IP 65 Front Panel
- Scalable Analog Output of Rate or Total
- 16 Point Linearization Option



Flow Instruments
RATEMETERS/TOTALIZERS

Description:

Featuring 8 digits of bright, .55", alpha-numeric 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 of the batch, the rate of flow and the grand total count. Two control outputs can be assigned independently by the user to activate at preset batch 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 electro-mechanical 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. With RS422M it is possible to communicate with up to 256 units on a single serial link. This option is also compatible with Opto 22's Optomux Network.

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 250 mA DC or 3.2 VA 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 (-DC)

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, 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. Press the "C" button while the unit is displaying the total to display the rate; "R" is displayed on the left side of the display.

Lockout: Two stage lockout 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 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 pulses are lost. If factored rate exceeds 7 digits "RFF..." flashes. These alarms indicate 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)

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. 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°C (max. drift .01%/C°).

Preset Alarms: Two control presets 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 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 999999999. 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. 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.

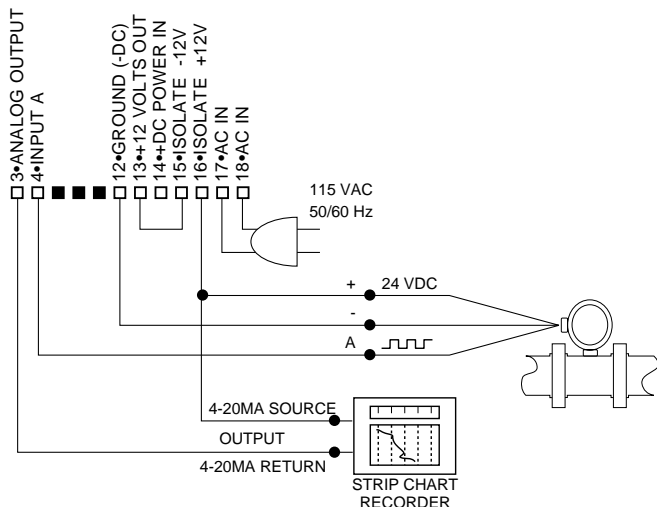
Outcard: RS232 or RS422 serial two way communication options are available. Several units can be linked together and addressed separately to transmit unit status or accept new set points in the standard ASCII format. Baud rates of 300, 600, 1200, 2400, 4800 or 9600 as well as choice of odd, even, space or mark parity can be selected by keypad control. With RS422M up to 256 units can be linked together and addressed separately to transmit unit status or accept new set points. Baud rate is automatically selected from 300 to 19.2K. It is also OPTOMUX compatible.

Termination:

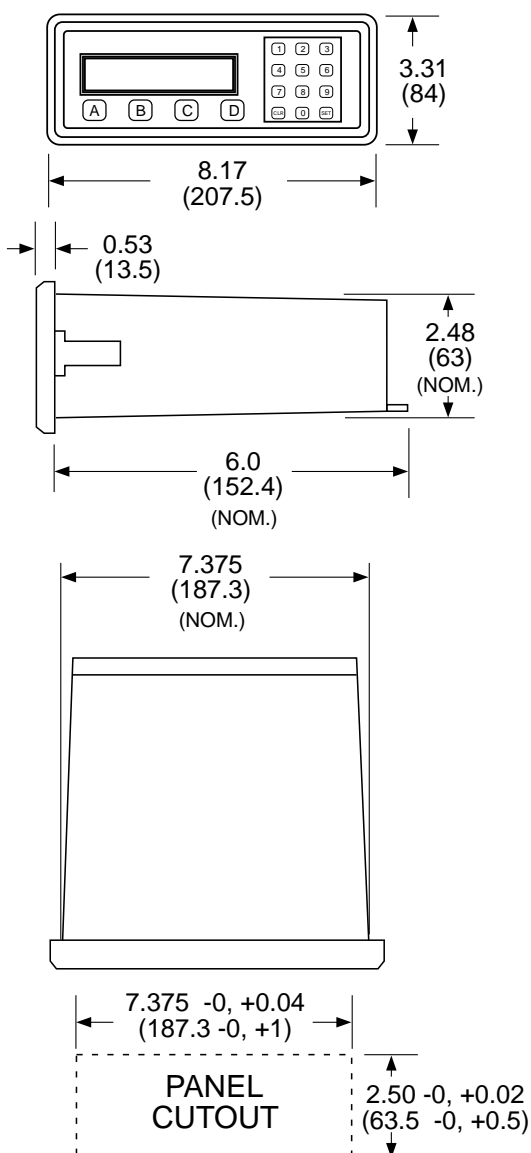
<input type="checkbox"/>	1•Not Used
<input type="checkbox"/>	2•Scaled Pulse Output O.C.
<input type="checkbox"/>	3•Analog Output (Sink)
<input type="checkbox"/>	4•Input A (Pulse/Analog)
<input type="checkbox"/>	5•Reset Input
<input type="checkbox"/>	6•Not Used
<input type="checkbox"/>	7•Not Used
<input type="checkbox"/>	8•Not Used
<input type="checkbox"/>	9•Not Used
<input type="checkbox"/>	10•Not Used
<input type="checkbox"/>	11•Ground (-DC)
<input type="checkbox"/>	12•Ground (-DC)
<input type="checkbox"/>	13•+12 Volts Out
<input type="checkbox"/>	14• +DC Power In
<input type="checkbox"/>	15•Isolate -12 Volts
<input type="checkbox"/>	16•Isolate +12 Volts
<input type="checkbox"/>	17•AC In
<input type="checkbox"/>	18•AC In
<input type="checkbox"/>	19•Preset B Open Collector
<input type="checkbox"/>	20•Preset A Open Collector

<input type="checkbox"/>	R1•N.O.	A
<input type="checkbox"/>	R2•N.C.	
<input type="checkbox"/>	R3•Common	
<input type="checkbox"/>	R4•N.O.	B
<input type="checkbox"/>	R5•N.C.	
<input type="checkbox"/>	R6•Common	

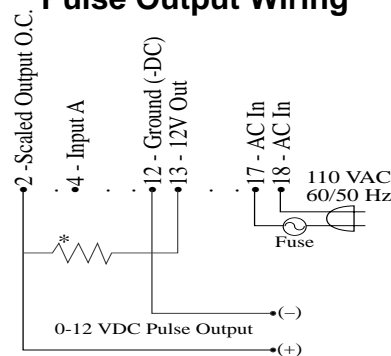
Pulse Input With Analog Output



Dimensions:



Pulse Output Wiring



* Must be greater than 150 Ohms

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
2: SPDT Relay 10A

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 4X1 - NEMA 4X/IP 65 Enclosure for
wall mounting accommodating 1 'TROL Series unit.
NEMATROL 4X2 - NEMA 4X/IP 65 Enclosure for
wall mounting accommodating 2 'TROL Series unit.
FLEXCOVER #36120
XTROL7/4- Explosion proof housing (see Accessories)
P1000 Printer (see Accessories)

MS-716

Flow Totalizer, Ratemeter and Batcher for Vehicle & Skid Mounting

Features

- NEW! - Vehicle Mount Enclosure; Rugged Aluminum Construction
- 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
- Enhanced Modem Features for Remote Metering



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.

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

Operating Temperature: -4°F to +131°F (-20°C to +55°C)

Storage Temperature: -40°C to +85°C

Humidity : 0-95% Non-condensing

Materials: U.L. approved

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 (11.0 VA)

220 VAC Power: 170 to 276 Vrms, 50/60 Hz (11.0 VA)

DC Power:

12 VDC (10 to 14 VDC); 300 mA max.

24 VDC (14 to 28 VDC); 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 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 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 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)

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:

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 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: Open Collector

Maximum On Current: 25 mA

Maximum Off Voltage: 30 VDC

Saturation Voltage: 1.0 VDC

Maximum Off Current: 0.1 mA

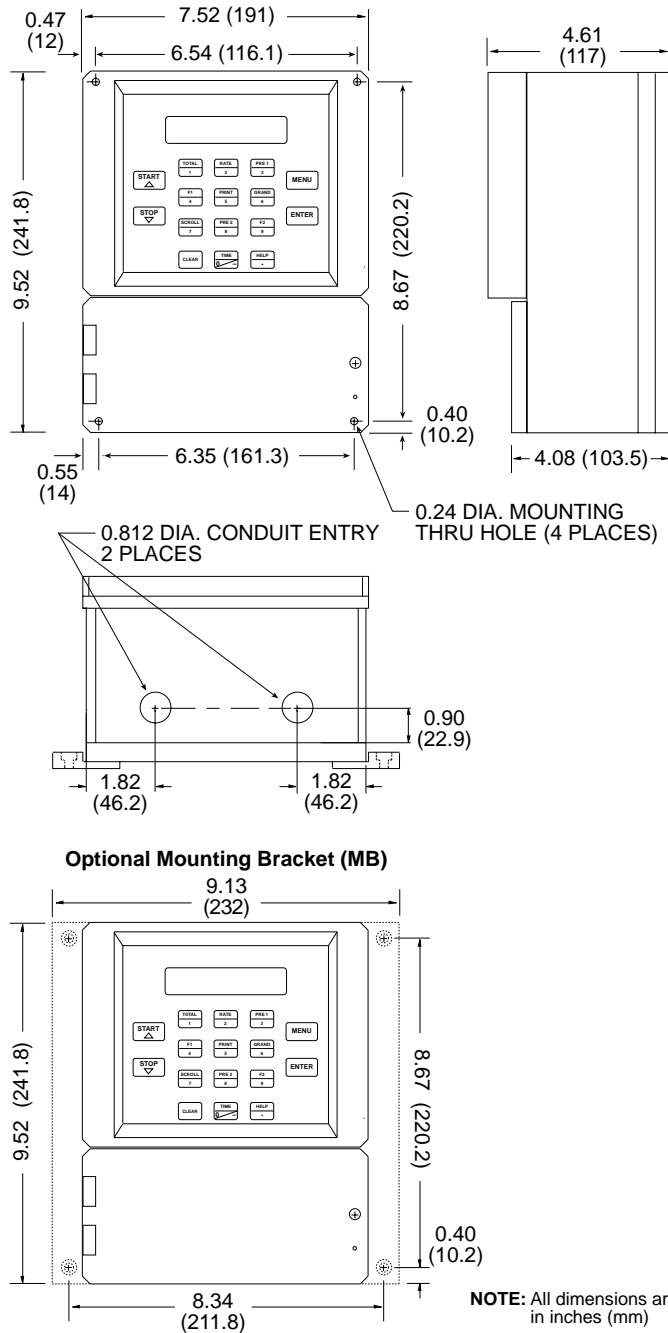
Pulse Duration: 10 mSec or 100 mSec(user selectable)

Pulse output buffer: 256

Fault Protection

Reverse polarity: Shunt Diode

Vehicle Mount Dimensions



Terminal Designations

1	DC OUTPUT	2	PULSE IN 1	3	PULSE IN 2	4	COMMON	5	*****	6	RTD EXCIT +	7	RTD SENS +	8	RTD SENS -	9	CNTR IN 1	10	CNTR IN 2	11	CNTR IN 3	12	COMMON	13	PULSE OUTPUT +	14	PULSE OUTPUT -	15	ANALOG OUTPUT +	16	ANALOG OUTPUT -	17	NC	18	COM RLY1	19	NO	20	NC	21	COM RLY2	22	NO	23	AC LINE	24	AC LINE	25	NC	26	COM RLY3	27	NO	28	NC	29	COM RLY4	30	NO	31	DC +	32	DC -	33	POWER IN	34	POWER IN
---	-----------	---	------------	---	------------	---	--------	---	-------	---	-------------	---	------------	---	------------	---	-----------	----	-----------	----	-----------	----	--------	----	----------------	----	----------------	----	-----------------	----	-----------------	----	----	----	----------	----	----	----	----	----	----------	----	----	----	---------	----	---------	----	----	----	----------	----	----	----	----	----	----------	----	----	----	------	----	------	----	----------	----	----------

Ordering Information

Example MS716 L 1 A 0 V ET MB

Series: _____

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
C= 2 Form A Solid State Relays

Network Card: _____
0= None (STD)
2= RS485/Modbus

Mounting: _____
V= Vehicle Mount, Skid Mount, Field Mount

Environmental: _____
ET= Extended Temperature (STD)

Options: _____
MB= Aluminium Mounting Brackets (2) (recommended)

Accessories:
KEPS-KEP1-32 = KEP RS232 for SUPERtrol 1, SUPERtrol 1LE, SUPERtrol 2 and LEVELtrol 2 • 32 Bit DDE Server
P1000 Printer (see Accessories)
IM-2400 = Internal Modem for SUPERtrol Family
MPP2400 = Port Powered Modem
MPP2400N = Port Powered Modem in NEMA4 enclosure

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 set-point 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 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.

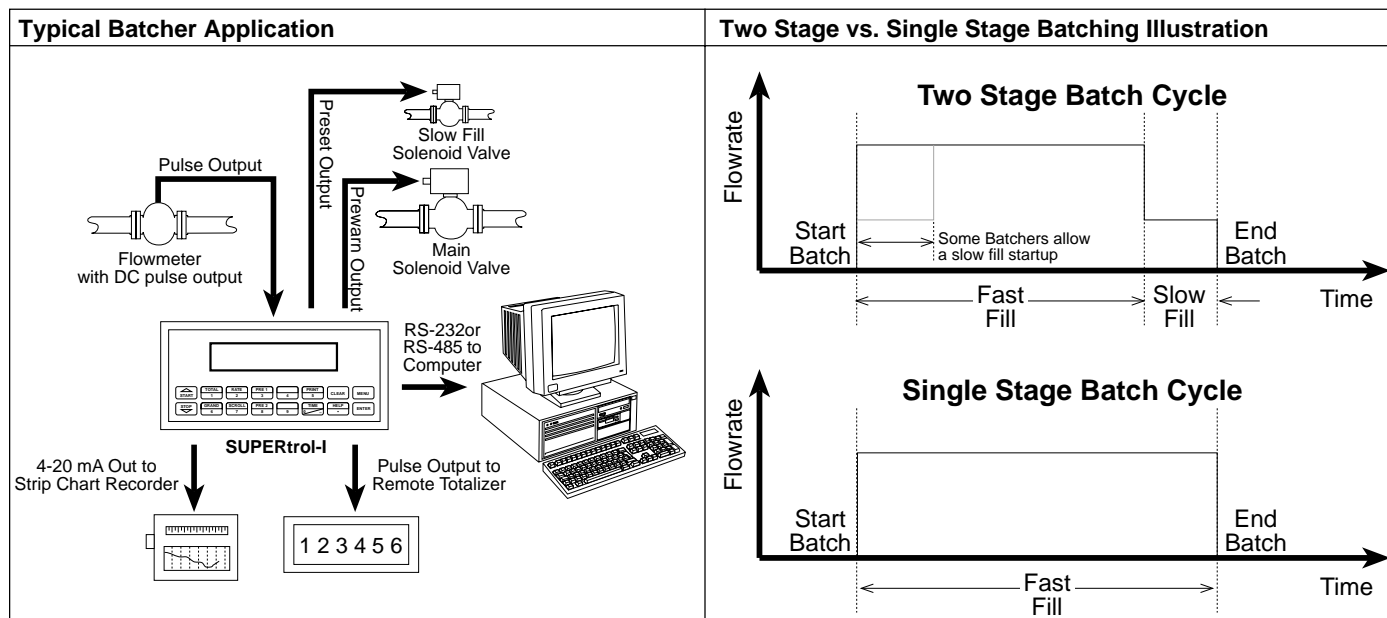
Drain Time- This is a feature in some batchers which delays the print of batch record for a user programmable time to permit draining of a fluid into the receiving vessel.

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.



MB2 (MINI-Batcher)

Low Cost, Pulse Input Batch Controller

Features

- 5 Digit Scaling Factor
- Display Rate, Batch Size and (Batch Total 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 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 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 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 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 pro-

grammable 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.

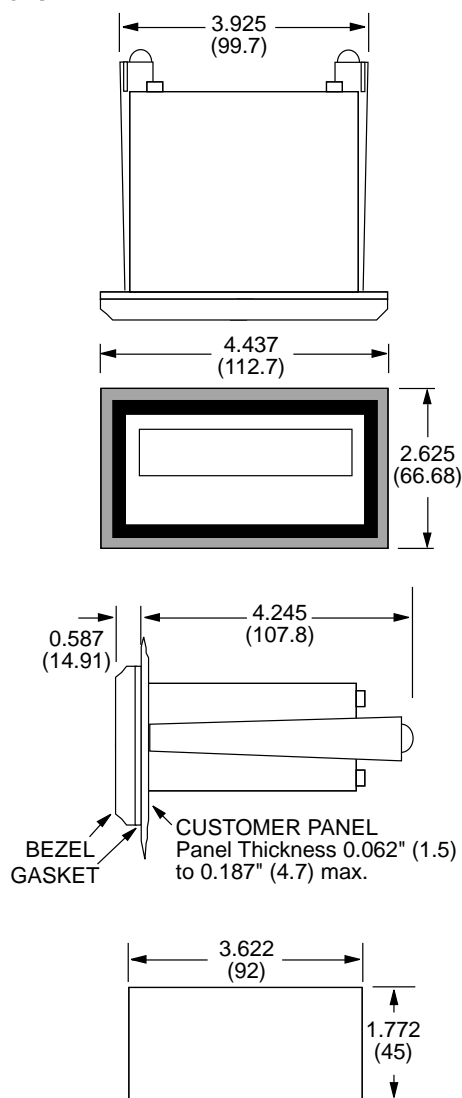
Device ID: 01-247

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

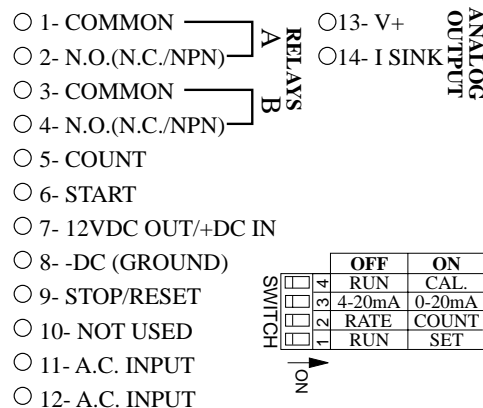
Parity: None, Odd, Even

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)			
CE	CE Compliant Version			

Accessories

XHV - Explosion proof housing (see accessories section)

NEMA-1/8DIN- NEMA 4X enclosure (see accessories section)

P1000- Serial Printer (see accessories section)

Separate non keyboard panel order #34235

Separate keyboard panel - order #34569

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, 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
- NEW! - Attractive Wall Mount Enclosure

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.

**Trend, Alarm and Log
your SUPERtrol Data with
KEPware HMI Software!**
See Special Flow Instruments Section



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 (11.0 VA)

220 VAC Power: 170 to 276 Vrms, 50/60 Hz (11.0 VA)

DC Power:

12 VDC (10 to 14 VDC); 300 mA max.

24 VDC (14 to 28 VDC); 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 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

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 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.

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

RS-485:

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 1000 transactions. This
information can be used for later uploading or printing.
Storage format is selectable for Comma-Carriage Return
or Printer formats.

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, alpha-numeric 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 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 280 mA DC or 5.3 VA 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 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 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 number of counts 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. The maximum factored count speed is 20,000 Hz. The maximum factored rate is 7 digits.

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 total counter.

RATEMETER:

Accurate to 51/2 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:

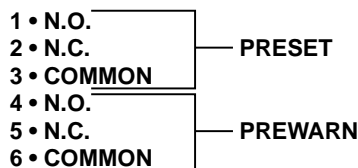
Unauthorized front panel changes can be prevented by entering a user selected four digit code.

OUTCARD:

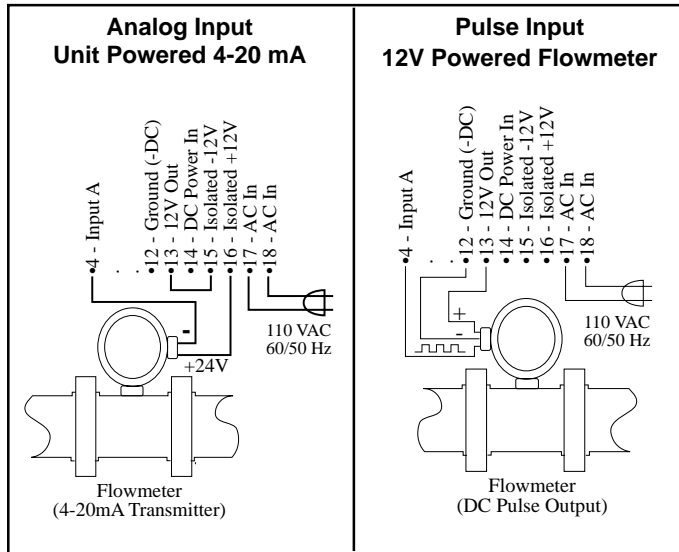
RS232 or RS422 serial two way communication options are available. Up to 15 units can be linked together and addressed separately to transmit unit status or accept new set points in the standard ASCII format. Baud rates of 300, 600, 1200, 2400 4800 or 9600 as well as choice of odd, even, space or mark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

Termination:

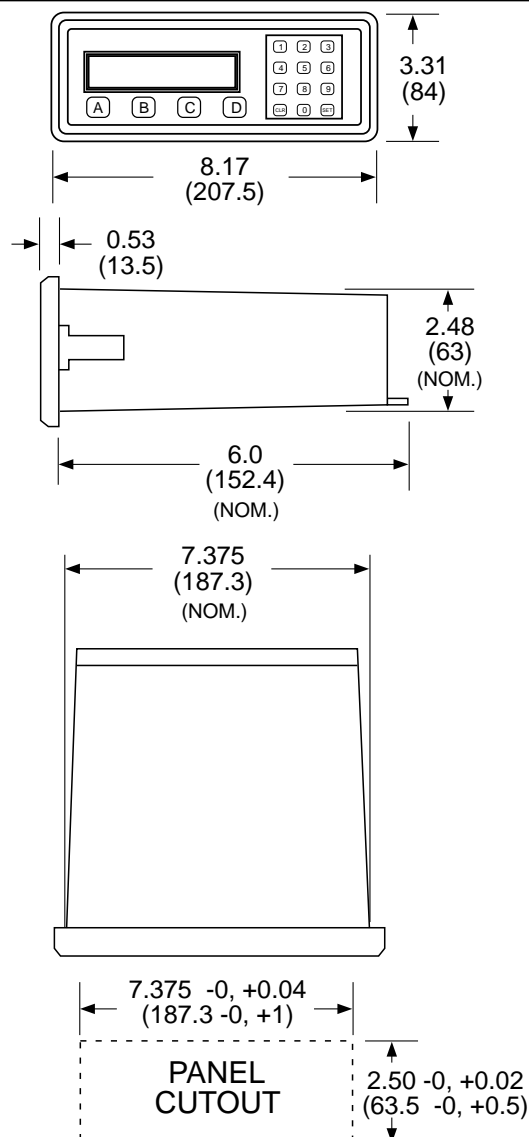
- 1 • NOT USED
- 2 • SCALED OUTPUT (OPEN COLLECTOR)
- 3 • ANALOG OUTPUT (SINK)
- 4 • INPUT (PULSE/ANALOG)
- 5 • STOP / RESET INPUT
- 6 • NOT USED
- 7 • NOT USED
- 8 • NOT USED
- 9 • NOT USED
- 10 • START INPUT
- 11 • NO CONNECTION
- 12 • GROUND (-DC)
- 13 • 12 VOLTS OUT
- 14 • + DC POWER IN (12 to 27 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:	Batchtrol II					
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					
Control Outputs:	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					
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:	NEMATROL 4X1 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 1 'TROL Series unit. NEMATROL 4X2 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 2 'TROL Series unit. FLEXCOVER #36120 XTROL7/4- Explosion proof housing P1000 Printer (see Accessories)					

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

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.

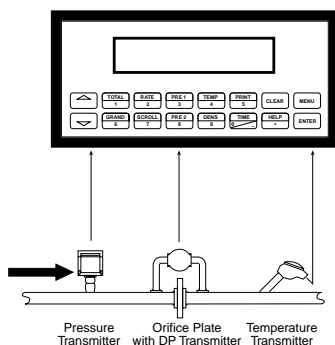
How are fluid properties determined? Fluid properties are stored within the flow computer. Properties are then computed as a function of measured fluid temperature and/or pressure. Density and viscosity are among the most commonly computed fluid properties.

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

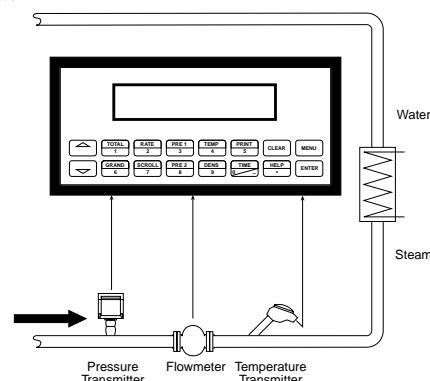
Mass Flow

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

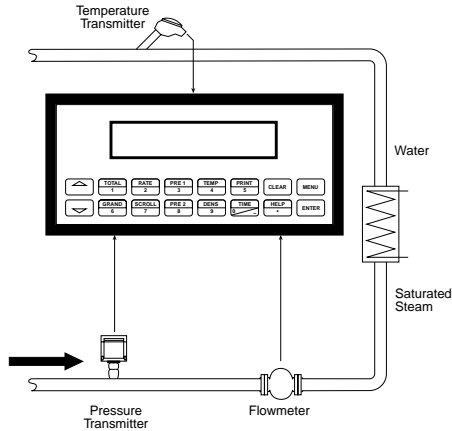
Net Heat Flow =
Volume flow • density (T, p) • [E_D (T, p) – E_W (T_{S(p)})]

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 =

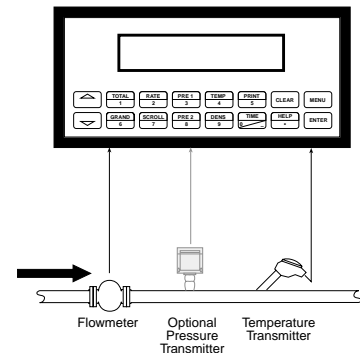
$$\text{Volume flow} \cdot \text{density (p)} \cdot [E_D (\text{p}) - E_W (\text{T})]$$

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

$$\text{Corrected Volume Flow} = \text{vol. flow} \cdot (1 - \alpha \cdot (T_f - T_{ref}))^2$$

Mass Flow

Mass Flow =

$$\text{volume flow} \cdot (1 - \alpha \cdot (T - T_{ref}))^2 \cdot \text{ref. density}$$

Heat Flow

Heat Flow =

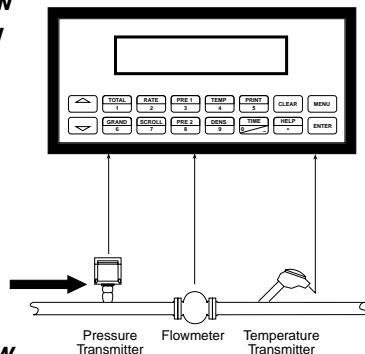
$$C \cdot \text{volume flow} \cdot (1 - \alpha \cdot (T - T_{ref}))^2 \cdot \text{ref. density}$$

α = Thermal expansion coefficient $\cdot 10^{-6}$

C = Specific combustion heat

Gas

Corrected Volume Flow Combustion Heat Flow Mass Flow Illustration



Calculations

Corrected Volume Flow

Corrected Volume Flow =

$$\text{Volume Flow} \cdot P/P_{ref} \cdot T_{ref}/T \cdot Z_{ref}/Z$$

Combustion Heat Flow

Combustion Energy =

$$C \cdot \rho_{ref} \cdot Q \cdot P/P_{ref} \cdot T_{ref}/T \cdot Z_{ref}/Z$$

Mass Flow

Mass Flow =

$$\text{Actual Volume Flow} \cdot \rho_{ref} \cdot P/P_{ref} \cdot T_{ref}/T \cdot Z_{ref}/Z$$

ρ_{ref} = Reference density

T_{ref} = Reference temperature

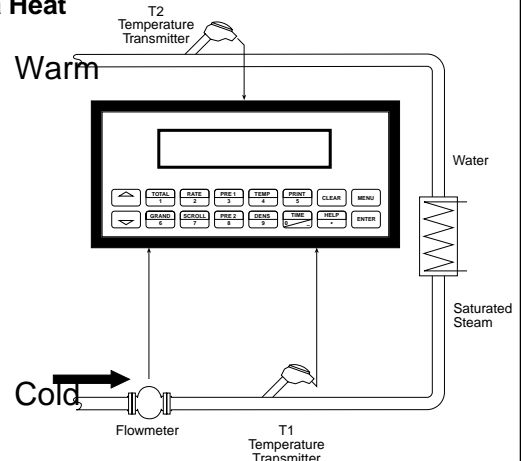
P_{ref} = Reference pressure

Z_{ref} = Reference Z-factor

C = Specific combustion heat

Q = Volume flow

Liquid Delta Heat Illustration



Calculations

Water

$$\text{Heat} = \text{Volume Flow} \cdot \rho(T_1) \cdot [h(T_2) - h(T_1)]$$

Other heat carrying liquids

$$\text{Heat} = C \cdot \text{volume flow} \cdot (1 - \alpha \cdot (T_1 - T_{ref}))^2 \cdot \rho_{ref} \cdot (T_2 - T_1)$$

α = Thermal expansion coefficient $\cdot 10^{-6}$

C = Mean specific heat

$\rho(T_1)$ = Density of water at temperature T_1

$h(T_1)$ = Specific enthalpy of water at temperature T_1

$h(T_2)$ = Specific enthalpy of water at temperature T_2

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, RS-485 Optional Windows™ Setup Software
- NX19 Gas Equations, Stacked DP Transmitters
- DDE Server & HMI Software Available
- Remote Metering by Wireless or Modem
- NEW! - Attractive Wall Mount Enclosure

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

**Trend, Alarm and Log
your SUPERtrol Data with
KEPware HMI Software!**
See Special Flow Instruments Section



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
DC Power: 300 mA max.

Flow Meter Types:

Linear: Vortex, Turbine, Positive Displacement, Magnetic, GilFlo, Laminar 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: 0.01% 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: 0.01 C

Stored Information (ROM)

Steam Tables (saturated & superheated),
 Fluid Properties: Water, Air, Natural Gas or Generic

User Entered Stored Information (EEPROM / Nonvolatile RAM)

Transmitter Ranges, Signal Types
 Fluid Properties
 (specific gravity, 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)

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/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:
 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 1000 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.

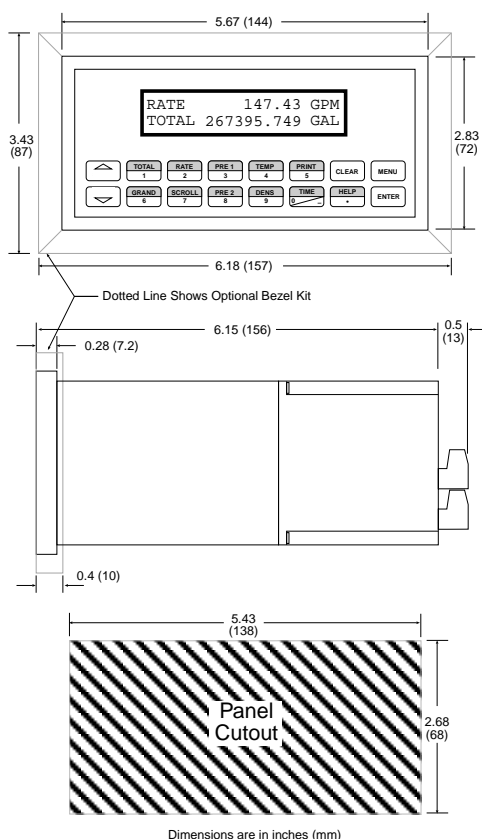
Pulse Output Form (menu selectable): Open Collector NPN or 24 VDC voltage pulse
 Nominal On Voltage: 24 VDC
 Maximum Sink Current: 25 mA
 Maximum Source Current: 25 mA
 Maximum Off Voltage: 30 VDC
 Saturation Voltage: 0.4 VDC
 Pulse Duration: User selectable
 Pulse output buffer: 8 bit
 Fault Protection
 Reverse polarity:
 Shunt Diodes
 Over-current Protected
 Over-voltage Protected

Real Time Clock

The Flow Computer is equipped with a non-volatile real time clock with display of time and date.

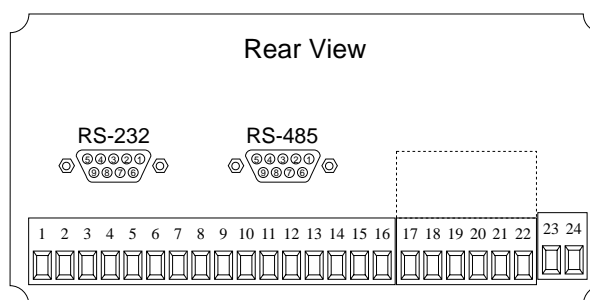
Format:
 24 hour format for time
 Day, Month, Year for date

Terminal Designations

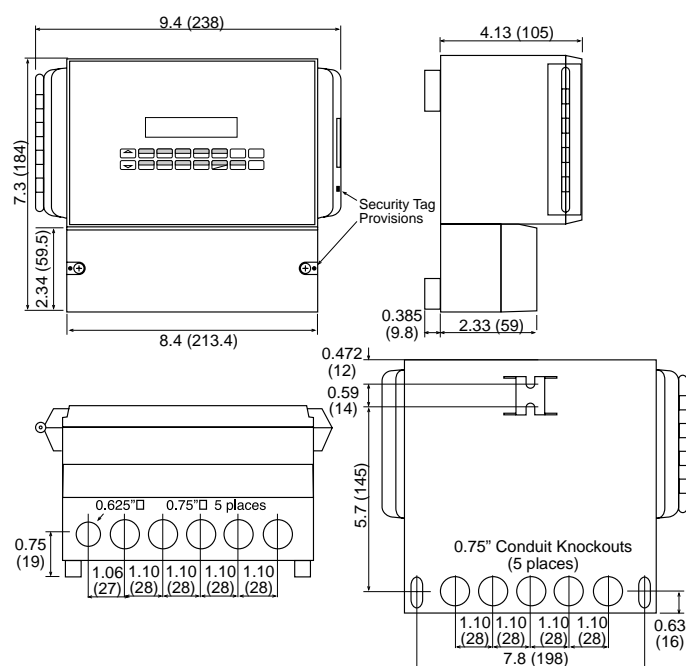


	DC OUTPUT	Vin (+)	FLOW IN
1	PULSE IN	Iin (+)	
2	-----		
3	COMMON		
4	RTD EXCIT (+)	TEMPERATURE	
5	RTD SENS (-)	Iin (+)	
6	RTD SENS (+)		
7			
8	DC OUTPUT		
9	RTD EXCIT (+)	PRESSURE (TEMP 2)	
10	RTD SENS (+)	Iin (+)	
11	RTD SENS (-)		
12	PULSE OUTPUT (+)		
13	PULSE OUTPUT (-)		
14	ANALOG OUTPUT 1 (+)		
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	DC (+)	POWER IN
24	AC LINE	DC (-)	

Terminal Layout



Wall Mount (option W)



Ordering Information

Example	ST2	L	1	0	P	TU
Series: _____ ST2 = Flow Computer Display Type: _____ L= LCD V= VFD Input Type: _____ 1= 85 to 276 VAC 3= 24 VDC (16 to 48 VDC) Network Card: _____ 0= None 1= RS485/Modbus 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: _____ 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) TU = Translation Utility Disk TB = RS485 Terminal Block for Panel Mount Enclosure						

Accessories:

KEPS-KEP1-32 = KEP RS232 DDE server for SUPERtrol.
KEPS-MBS32 = Modbus RTU OPC/DDE server
SUPERtrol 2 and LEVELtrol 2 + 32 Bit DDE Server
P1000 Printer (see Accessories)
IM-2400 = Internal Modem for SUPERtrol Family
MPP2400 = Port Powered Modem
MPP2400N = Port Powered Modem in NEMA4 enclosure
TWP = Industrial Two Way Pager Wireless Data Transceiver

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
- 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 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: -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

DC Power: 300 mA max.

Flow Meter Types:

Linear: Vortex, Turbine, Positive Displacement, Magnetic, GilFlo, Laminar 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: 0.01% 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: 0.01 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)

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 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:
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 1000 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

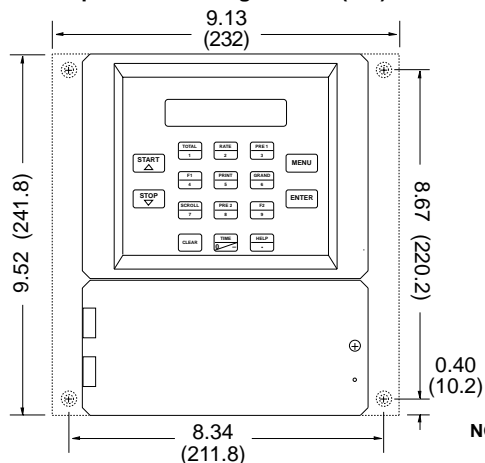
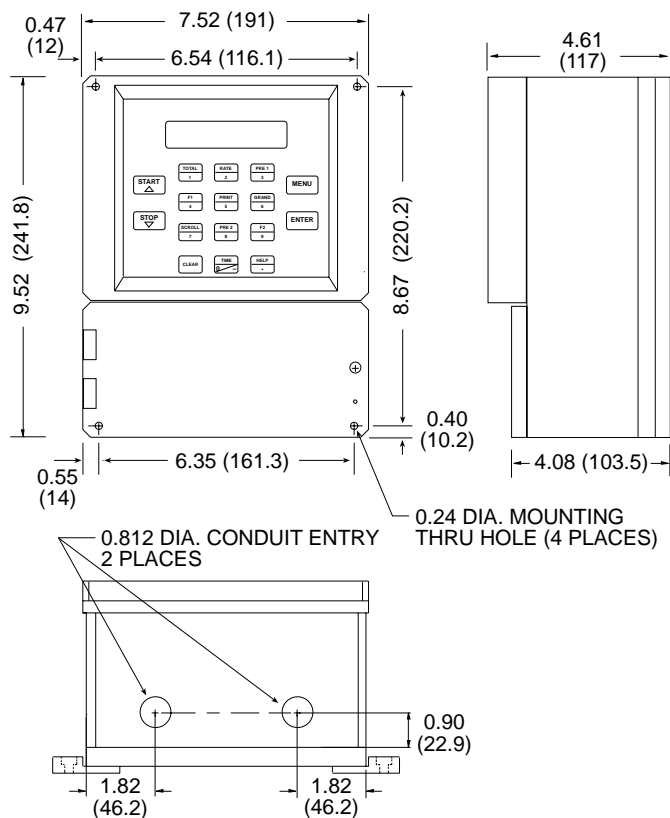
The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total, Heat Total or Mass Total.

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 non-volatile real time clock with display of time and date.

Format:
24 hour format for time
Day, Month, Year for date



NOTE: All dimensions are in inches (mm)

Terminal Designations

[illegible]

Ordering Information

Example	MS-748	L	1	0	V	MB
Series: _____ MS-748 = Flow Computer Display Type: _____ L= LCD V= VFD Input Type: _____ 1= 85 to 276 VAC 3= 24 VDC (16 to 48 VDC) Network Card: _____ 0= None 1= RS485/Modbus Mounting: _____ V= Field, Skid, Vehicle Mount 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) TU = Translation Utility Disk MB= Aluminum Mounting Brackets (2) (recommended)						

Accessories:

KEPS-KEP1-32 = KEP RS232 DDE server for SUPERtrol.
 KEPS-MBS32 = Modbus RTU OPC/DDE server
 SUPERtrol 2 and LEVELtrol 2 • 32 Bit OPC/DDE Server
 P1000 Printer (see Accessories)
 IM-2400 = Internal Modem for SUPERtrol Family
 MPP2400 = Port Powered Modem
 MPP2400N = Port Powered Modem in NEMA4 enclosure
 TWP = Industrial Two Way Pager Wireless Data Transceiver

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



- Isolated Pulse and Analog Outputs Standard
- RS-232 Port Standard, RS-485 Optional
- Windows™ Setup Software
- DDE Server & HMI Software Available

Description:

The ES-747 Flow Computer satisfies the instrument requirements for pulse producing turbine 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.

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)

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 (11.0 VA)

220 VAC Power: 170 to 276 Vrms, 50/60 Hz (11.0 VA)

DC Power:

12 VDC (10 to 14 VDC); 300 mA max.

24 VDC (14 to 28 VDC); 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

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

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 input when performing compensated flow calculations. It can also be used as a general purpose input for display and alarming.

Number of inputs: 2

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

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: 0.01 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:

Device ID: 01-247

Baud Rates: 2400, 4800, 9600, 19200

Parity: None, Odd, Even

Protocol: Modbus RTU (Half Duplex)

Serial Communication

The serial port can be used for printing, data recording, 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:

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

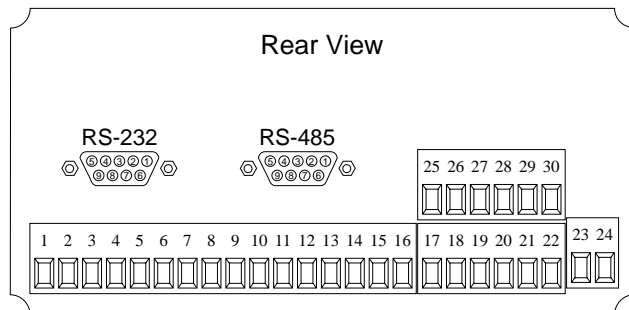
Call Out Capabilities:

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

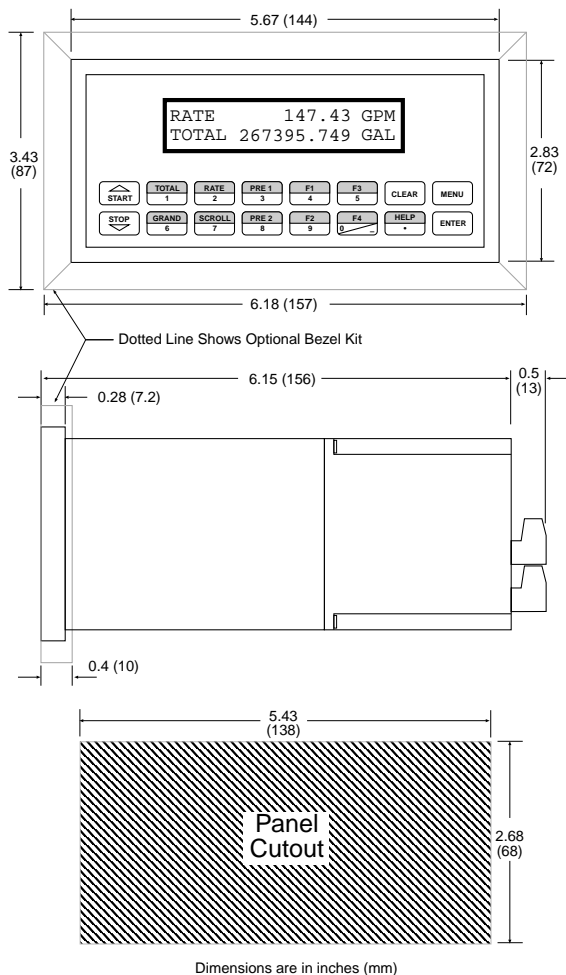
Terminal Layout



Terminal Designations

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
DC OUTPUT	PULSE IN 1	PULSE IN 2	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 -	NC	COM RLY1	NC	COM RLY2	NC	AC LINE	DC +	POWER IN
					Vin +	Thermistor	lin +			SEE USER MANUAL				4-20 mA		25	26	27	28	29	30	DC -	
																NC	COM RLY3	NO	NC	COM RLY4	NO		

Dimensions



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
C= 2 Form A Solid State Relays

Network Card: 0= None (STD)
2= RS485/Modbus

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 (consult factory)
-4°F to 131°F (-20°C to 55°C)
CSA= CSA Approved Unit (pending) (consult factory)

Accessories: KEPS-KEP1-32 = KEP RS232 for SUPERtrol 1, 1LE, 2, 3 and LEVELtrol 2 • 32 Bit DDE Server
P1000 Printer
MPP2400 = Port Powered Modem
MPP2400N = Port Powered Modem in NEMA4 enclosure

MASStrol

Mass Flow Computer

Features

- Compensates Steam, Gases and Liquids for Temperature and Pressure to Yield Corrected Volume, Mass and Heat Flow.
- Two Line by 20 Character Super Twist Back-Lit LCD Display
- Square Root Extraction of DP Inputs
- 16 Point Linearization
- Displays Compensated Rate and Total Flow
- Takes a Direct 100 Ω Platinum RTD
- Flow Rate, Temperature and Pressure Alarms
- 4-20 mA and Pulse Output Based on Compensated Flow
- Non-volatile Memory
- 24 Volt Excitation Provided
- Front Panel NEMA 4X/IP 65 Rated

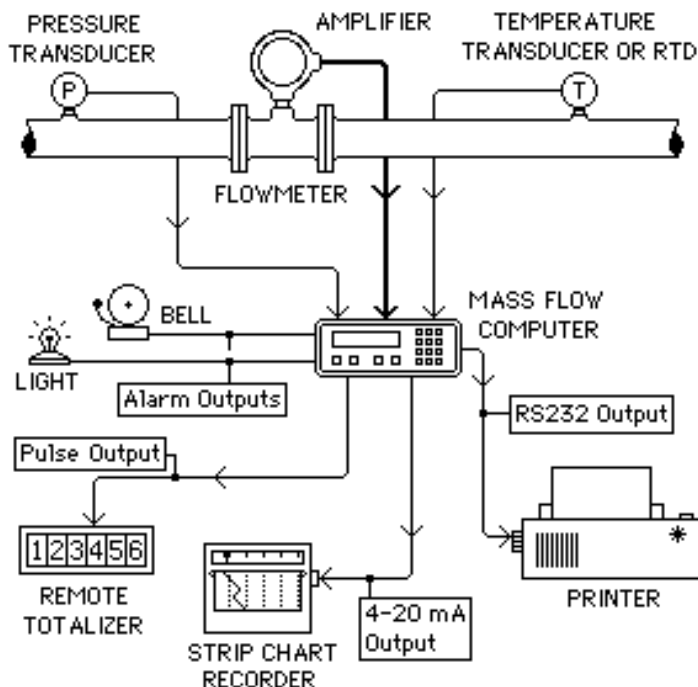


Description:

The KEP MASStrol is a microprocessor based instrument designed to measure compensated flow in an industrial environment. Three analog inputs for temperature, pressure and flow are provided to measure the parameters needed to calculate the actual compensated mass, volume or heat flow.

Special signal conditioning circuitry is included to allow direct connection of platinum resistance temperature detectors (RTD'S). A high speed digital input is provided to interface with pulse output type flowmeters. As an alternative, voltage inputs or current loops can be used for the above.

All instrument interface is with a 32 point screw terminal strip on the rear of the instrument.



Flow Computer Application

- § Pressure transducer sends 0-5V or 4-20mA signal to Flow Computer.
- § 100 Ω , 4 wire, RTD direct hook-up to Flow Computer.
- § Turbine flowmeter sends digital signal to Flow Computer.
- § Flow Computer calculates flow and generates output signals.
- § 5 V pulse out to remote totalizer in supervisory area.
- § 4-20 mA out to strip chart recorder tracks trends.
- § RS232 out to printer for data logging.
- § Alarm relays activate bell and/or light as needed.

General Specifications:

OVERALL ACCURACY: .25%

ENVIRONMENTAL:

Operating Temperature:

32° to 122° F (0° to 50° C)

Storage Temperature:

-10 to 160 F (-23 to 71 C)

Humidity: 0 to 90% Noncondensing

Front Bezel: NEMA 4X/IP 65

Case: ABS Plastic

Listing: CE Compliant

POWER: (Internally Fused)

Nominal Line Voltage: 100, 110, 220 or 240 VAC (50/60 Hz)

24VDC $\pm 20\%$ or 12VDC $+20\%/-10\%$

Power Consumption: 10 Watts max

Input Specifications:

The following applies to all inputs. Inputs are referenced to signal ground. All ground terminals are connected internally.

NOTE: All inputs are single-ended with one leg grounded. The exception is the RTD input which is differential but is referenced to ground.

CURRENT INPUTS:

Input Impedance: 100 Ω

Range: 0-20mA, 4-20mA

Maximum sustained input voltage:

5 VDC (Fault Condition)

Resolution: $\pm 0.024\%$ FS

VOLTAGE INPUTS:

Input Impedance: 115 k Ω

Range: 0-5V, 0-10V

Resolution: $\pm 0.024\%$ FS

TEMPERATURE INPUTS:

Compatible RTD type: 100 Ω Platinum

($\alpha = .00385$; DIN 43-760 Calibration)

Lead Wire Compensation: 4 Wire

Configuration: 2, 3 or 4 wire

Excitation Current: 2mA typical

Max Fault Current: 15mA

Max Volt on sense inputs: 50 VDC

Rejection of 50 or 60Hz signal: 40dB minimum (Automatically based on line frequency)

Raw Accuracy: $\pm .5^\circ\text{C}$

DIGITAL FLOW INPUT:

Range: 3-30 VDC Pulse

Max Input Frequency: 40kHz max

Min pulse width: 10 μsec (with 40kHz filter)

Thresholds: OFF is less than 2.0V; ON is greater than 2.5V

Input Impedance: 40k Ω to ground.

Minimum Frequency to Maintain Rate Display: 5 Hz

Output Specifications:

ANALOG OUTPUT:

Range: 4-20mA DC, sink only.

Compliance Voltage Range: 3.0 - 24 VDC

Load Type: Non Inductive

Accuracy: $\pm .5\%$ FS

Update Rate: 1Hz

RELAY OUTPUTS:

One relay is a flow alarm output and a second is for other alarm conditions. Each has the following electrical specifications:

Type: Dry Contact, Form C

Contact Rating: 10A @ 115/230VAC/28VDC

AUXILIARY POWER OUTPUT: (AC powered units only)

Voltage: 24VDC regulated and filtered

Isolation: 230VAC max

Current: 0 to 100mA

Protection: Short Circuit Proof

The 24VDC Output is supplied with a resettable fuse.

DIGITAL FLOW PULSE OUTPUT:

This output is intended to drive a counter with a minimum input impedance of 1000 Ω . It is compatible with TTL and 5V CMOS logic inputs.

Output High Voltage:

No load: 4.5 Volts min

4.0 mA source: 4.0 Volts min

Output Low Voltage:

No Load: 0.2 Volts max

4.0 mA sink: 1.0 Volts max

Output waveform: Symmetric square wave above 1Hz

100msec pulse below 1Hz

Frequency Range: 0 to 50kHz

Max Slew Rate: 27 Volts/ μsec

Sustained Fault Voltage for no permanent damage: 7 Volts

RS232 COMMUNICATIONS:

Connector: 25 Pin Sub-D

Input Impedance: 3000 Ω to 7000 Ω

Compliance Voltage:

Output: -25 to -5 (Mark);

5 to 25 (Space); Volts

Input: -25 to -3 (Mark);

3 to 25 (Space); Volts

Protection: Short circuit proof.

Protocol: 8 bits, 1 Stop bit

Parity: None (Not monitored)

Available Baud Rates: 300, 1200, or 9600

DATA DISPLAY AND KEYPAD:

Internal 2 line by 20 character dot matrix, Backlit LCD display.

Sealed, 16 key panel featuring numeric keys

0- 9, plus the following keys:

A Advance through menus

B Back up through menus

C Cancel current menu selection

D Decimal point key

ENT General purpose enter or recall data key

CLR Data clear key

OPERATION:

Through the 16 button, NEMA 4X/IP 65, front keypad, the operator enters all parameters necessary to configure the mass flow computer. One MASStrol will handle all of your mass flow requirements.

The type of flow equations desired (steam tables, ideal gas law or liquids) must be selected first. For steam flow and heat measurement, the 1967 ASME steam tables for both saturated and superheated steam are stored in memory. For gases, the ideal gas law is used. For liquids and heat calculations, factors are entered through the front keypad.

Additionally, the following hardware parameters must be entered to configure the MASStrol input signal types (from the flow, temperature and pressure transmitters) along with their corresponding ranges or K factors; alarm set points may be entered; the output range for the 4-20 mA signal and the pulse output scaling factor. The operator can select, in any order, up to 16 parameters to display on the read out.

If it is so desired, the operator then can lockout the unit from changes by entering a five digit lockout code.

Optional RS232 serial communications for ease of programming and timely printouts of flow results and/or parameters is available. If RS232 two way communications and the keypad are being used simultaneously, the serial port takes precedence.

SOFTWARE ACCESSORIES:

K1 Diskette:

A diskette program is available to assist in the computation of the K1 term. The K1 factor is used in Orifice/Pitot/Annubar calculations. The K1 factor is the calibration factor for the meter run. It is part of the Variables menu for flow input values (analog).

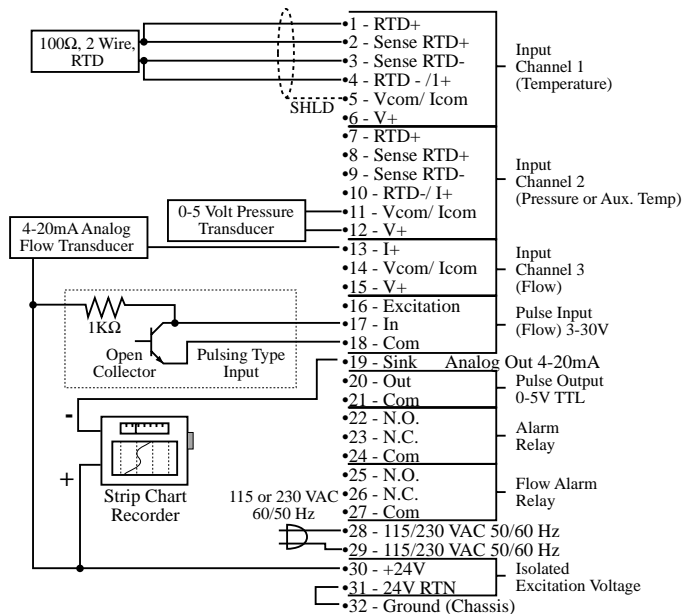
MASSCON Diskette:

The MASSCON diskette program facilitates the configuration and calibration of the flow computer. The program runs on PC compatibles and communicates through the RS232 port.

TERMINAL BLOCK DESIGNATIONS:

	RTD	VOLTAGE IN	CURRENT IN	FUNCTION
1	RTD EXCITATION +	-----	-----	CHANNEL 1 TEMPERATURE
2	RTD SENSE +	-----	-----	
3	RTD SENSE -	-----	-----	
4	RTD EXCITATION -	-----	I IN +	
5	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
6	-----	V IN +	-----	
7	RTD EXCITATION +	-----	-----	CHANNEL 2 PRESSURE or AUX. TEMP.
8	RTD SENSE +	-----	-----	
9	RTD SENSE -	-----	-----	
10	RTD EXCITATION -	-----	I IN +	
11	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
12	-----	V IN +	-----	
13	-----	-----	I IN +	CHANNEL 3 FLOW ANALOG INPUT
14	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
15	-----	V IN +	-----	
16	EXCITATION VOLTAGE (5.6K PULL-UP TO 5VDC)			
17	PULSE INPUT (3-30VDC)			CHANNEL 3 FLOW PULSE INPUT
18	GROUND (SHIELD)			ANALOG OUT
19	ANALOG OUTPUT (SINK)			
20	PULSE OUTPUT			5V SCALED PULSE OUT
21	GROUND (SHIELD)			
22	N.O.			ALARM RELAY
23	N.C.			
24	COMMON			
25	N.O.			FLOW ALARM RELAY
26	N.C.			
27	COMMON			
28	115/230 VAC 50/60Hz			POWER (AC)
29	115/230 VAC 50/60Hz			
30	+24 VOLTS	24VDC OUT	+ VDC IN	POWER (DC) (DC POWERED UNITS ONLY)
31	24 VOLTS RETURN	(AC POWERED UNITS ONLY)	-DC (GND)	
32	CHASSIS GROUND			

TYPICAL HOOKUP:



Ordering Information

Example: **MFC A 1 BL**

Series: _____

MFC

Operating Voltage: _____

A: 115 VAC \pm 15% at 50/60HzB: 230 VAC \pm 15% at 50/60HzC: 24 VDC \pm 20%

D: 12 VDC -10, +20%

Options: _____

1: RS-232 Serial Interface

Display: _____

BL: Backlit Display (standard)

Accessories:

NEMATROL 4X1 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 1 'TROL Series unit.

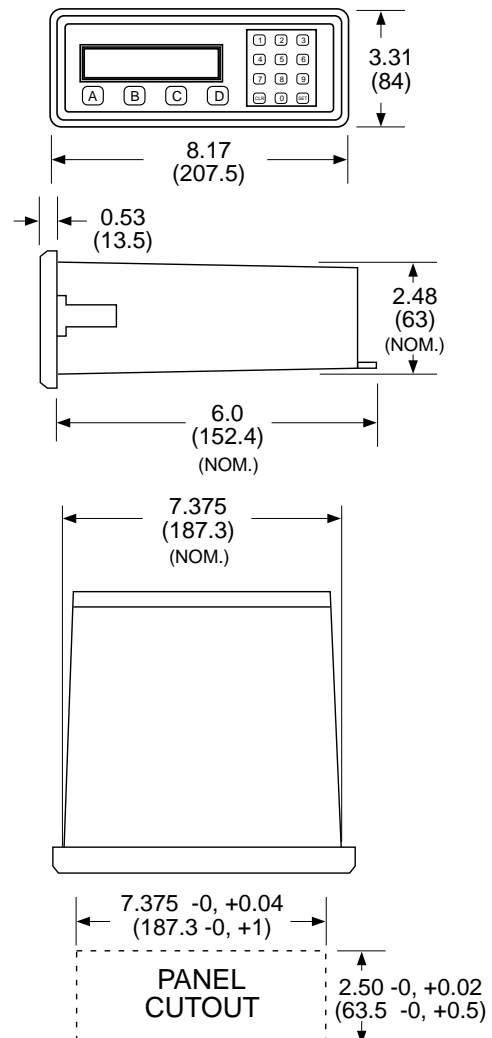
NEMATROL 4X2 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 2 'TROL Series unit.

FLEXCOVER #36120

XTROL7/4- Explosion proof housing

P1000 Printer (see Accessories)

Dimensions:



DPFC

DIFFERENTIAL PRESSURE FLOW COMPUTER

Features

- Compensates Steam, Gases and Liquids for Temperature and Pressure to Yield Corrected Volume, Mass and Heat Flow.
- Two Line by 20 Character Super Twist Back-Lit LCD Display
- Accepts Dual Differential Pressure (DP) Inputs
- Square Root Extraction of DP Inputs
- 16 Point Linearization
- Displays Compensated Rate and Total Flow
- Takes a Direct 100 Ω Platinum RTD
- Flow Rate, Temperature and Pressure Alarm
- 4-20 mA and Pulse Output Based on Compensated Flow
- 24 Volt Excitation Provided
- Front Panel NEMA 4X/IP 65 Rated

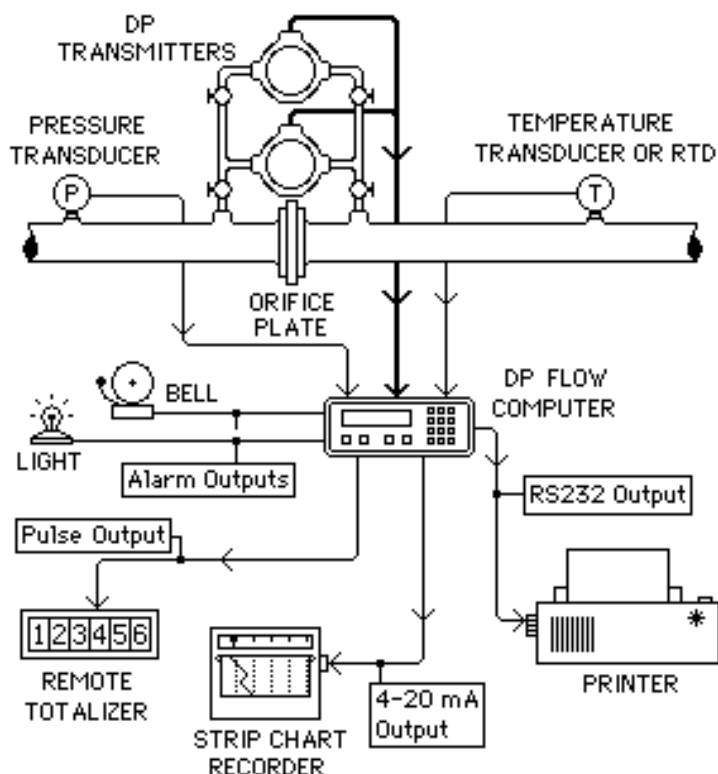


Description

The KEP DPFC is a microprocessor based instrument designed to measure compensated flow in an industrial environment. Four analog inputs for temperature, pressure and dual differential pressure are provided to measure the parameters needed to calculate the actual compensated volume, mass or heat flow.

Special signal conditioning circuitry is included to allow direct connection of platinum resistance temperature detectors (RTD'S). Voltage inputs or current loops can be used for the above.

All instrument interface is with a 32 point screw terminal strip on the rear of the instrument.



DP Flow Computer Application

- § Pressure transducer sends 0-5V or 4-20 mA signal to Flow Computer.
- § 100 Ω , 4 wire, RTD direct hook-up to Flow Computer.
- § DP transmitters send signals to Flow Computer.
- § Flow Computer calculates flow and generates output signals.
- § 5 V pulse out to remote totalizer in supervisory area.
- § 4-20 mA out to strip chart recorder tracks trends.
- § RS232 out to printer for data logging.
- § Alarm relays activate bell and/or light as needed.

General Specifications**OVERALL ACCURACY:** .25%**ENVIRONMENTAL:**

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

Storage Temperature: -10 to 160 F (-23 to 71 C)

Humidity: 0 to 90% Noncondensing

Front Bezel: NEMA 4X/IP 65

Case: ABS Plastic

Listing: CE Compliant**POWER:** (Internally Fused)115 / 230 VAC $\pm 15\%$ (Switch Selectable)or 24VDC $\pm 20\%$ or 12 VDC $+20\%/-10\%$

Frequency: 50/60Hz.

Power Consumption: 10 Watts max

Input Specifications:

The following applies to all inputs. Inputs are referenced to signal ground. All ground terminals are connected internally.

NOTE: All inputs are single-ended with one leg grounded. The exception is the RTD input which is differential but is referenced to ground.

CURRENT INPUTS:Input Impedance: 100 Ω

Range: 0-20mA, 4-20mA

Maximum sustained input voltage:

5 VDC (Fault Condition)

Resolution: .0244% FS

VOLTAGE INPUTS:Input Impedance: 115 k Ω

Range: 0-5V, 0-10V

Resolution: .0244% FS

TEMPERATURE INPUTS:Compatible RTD type: 100 Ω Platinum($\alpha = .00385$; DIN 43-760 Calibration)

Lead Wire Compensation: 4 Wire

Configuration: 2, 3 or 4 wire

Excitation Current: 2mA typical

Max Fault Current: 15mA

Max Volt on sense inputs: 50 VDC

Rejection of 50 or 60Hz signal: 40dB minimum (Automatically based on line frequency)

Raw Accuracy: $\pm .5^\circ\text{C}$ **Output Specifications:****ANALOG OUTPUTS:**

Range: 4-20mA DC, sink only.

Compliance Voltage Range: 3 - 24 VDC

Load Type: Non Inductive

Accuracy: $\pm .5\%$ FS

Update Rate: 1Hz

PULSE OUTPUT:This output is intended to drive a counter with a minimum input impedance of 1000 Ω . It is compatible with TTL and 5V CMOS logic inputs.

Output High Voltage

No load: 4.5 Volts min

4.0 mA source: 4.0 Volts min

Output Low Voltage

No Load: 0.2 Volts max

4.0 mA sink: 1.0 Volts max

Output waveform: Symmetric square wave above 1Hz 100msec pulse below 1Hz

Frequency Range: 0 to 50kHz

Max Slew Rate: 27 Volts/ μsec

Sustained Fault Voltage for no permanent damage: 7 Volts

RELAY OUTPUTS:

One relay is a flow alarm output and a second is for other alarm conditions. Each has the following electrical specifications:

Type: Dry Contact, Form C

Contact Rating: 10A @ 115/230VAC/28VDC

AUXILIARY POWER OUTPUT: (AC Powered units only)

Voltage: 24VDC regulated and filtered

Isolation: 230VAC max

The 24VDC Output is supplied with a resettable fuse.

Current: 0 to 100mA

Protection: Short Circuit Proof

RS232 COMMUNICATIONS:

Connector: 25 Pin Sub-D

Input Impedance: 3000 Ω to 7000 Ω

Compliance Voltage:

Output: -25 to -5 (Mark);

5 to 25 (Space); Volts

Input: -25 to -3 (Mark);

3 to 25 (Space); Volts

Protection: Short circuit proof.

Protocol: 8 bits, 1 Stop bit

Parity: None (Not monitored)

Available Baud Rates: 300, 1200, or 9600

DATA DISPLAY AND KEYPAD:

Internal 2 line by 20 character dot matrix LCD display. Sealed, 16 key panel featuring numeric keys

0- 9, plus the following keys:

A Advance through menus

B Back up through menus

C Cancel current menu selection

D Decimal point key

ENT General purpose enter or recall data key

CLR Data clear key

OPERATION:

Through the 16 button, NEMA 4X/IP 65, front keypad, the operator enters all parameters necessary to configure the DPFC. No additional input cards or dipswitch settings are needed.

The operator selects the type of compensation desired for the medium (steam, ideal gas or liquid). For steam flow and heat measurement the 1967 ASME steam tables for saturated and superheated steam are stored in memory. For gases and liquids, the necessary factors are entered in by the operator.

Additionally, the following hardware parameters must be entered to configure the DPFC input signal types (from the temperature, pressure and differential pressure transmitters) along with their corresponding ranges or factors and alarm set points. Also the 4-20mA output, pulse output and optional serial port can be set up. If desired, the operator can lockout the unit from changes by entering a five digit lockout code.

The optional RS232 serial communications allows for timely printouts of flow results and/or parameters as well as parameter down load and up load for easy computer programming.

SOFTWARE ACCESSORIES:K1 Diskette:

A diskette program is available to assist in the computation of the K1 term. The K1 factor is used in Orifice/Pitot/Annubar calculations. The K1 factor is the calibration factor for the meter run. It is part of the Variables menu for flow input values (analog).

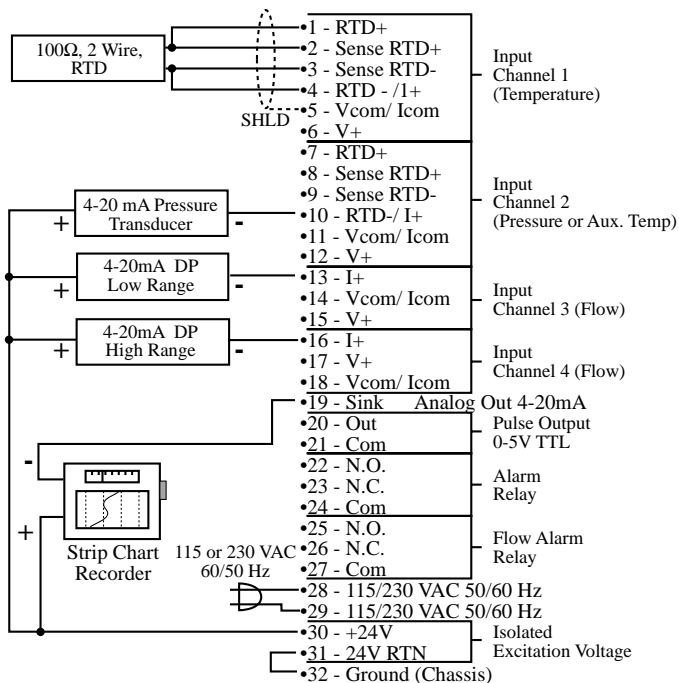
MASSCON Diskette:

The MASSCON diskette program facilitates the configuration and calibration of the flow computer. The program runs on PC compatibles and communicates through the RS232 port.

TERMINAL BLOCK DESIGNATIONS:

PIN	RTD	VOLTAGE IN	CURRENT IN	FUNCTION
1	RTD EXCITATION +	-----	-----	CHANNEL 1 TEMPERATURE
2	RTD SENSE +	-----	-----	
3	RTD SENSE -	-----	-----	
4	RTD EXCITATION -	-----	I IN +	
5	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
6	-----	V IN +	-----	
7	RTD EXCITATION +	-----	-----	CHANNEL 2 PRESSURE or AUX. TEMP.
8	RTD SENSE +	-----	-----	
9	RTD SENSE -	-----	-----	
10	RTD EXCITATION -	-----	I IN +	
11	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
12	-----	V IN +	-----	
13	-----	-----	I IN +	CHANNEL 3 FLOW (LOW) DP
14	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
15	-----	V IN +	-----	
16	-----	-----	I IN +	CHANNEL 4 FLOW (HIGH) DP2
17	-----	V IN +	-----	
18	GROUND (SHIELD)	V IN - (GND)	I IN - (GND)	
19	ANALOG OUTPUT (SINK)			ANALOG OUT
20	PULSE OUTPUT			5V SCALED PULSE OUT
21	GROUND (SHIELD)			
22	N.O.			ALARM RELAY
23	N.C.			
24	COMMON			
25	N.O.			FLOW ALARM RELAY
26	N.C.			
27	COMMON			
28	115/230 VAC 50/60Hz			POWER (AC)
29	115/230 VAC 50/60Hz			
30	+24 VOLTS	24VDC OUT	+ VDC IN	POWER (DC) (DC POWERED UNITS ONLY)
31	24 VOLTS RETURN	(AC POWERED UNITS ONLY)	-DC (GND)	
32	CHASSIS GROUND			

TYPICAL HOOKUP:



Ordering Information

Example: DPFC A 1

Series: DPFC

Operating Voltage:

- A: 115 VAC \pm 15% at 50/60Hz
- B: 230 VAC \pm 15% at 50/60Hz
- C: 24 VDC \pm 20%
- D: 12 VDC -10, +20%

Options:

- 1: RS-232 Serial Interface

Accessories:

NEMATROL 4X1 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 1 'TROL Series unit.

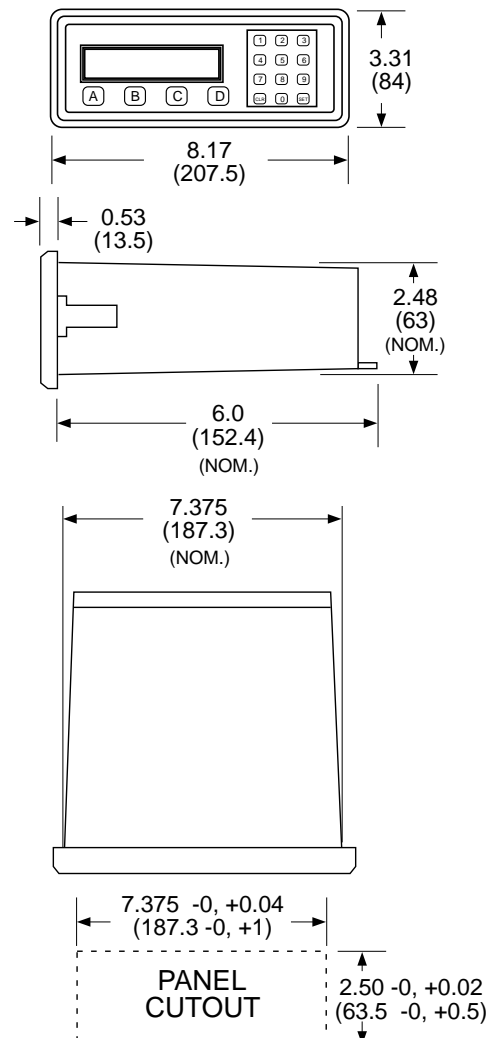
NEMATROL 4X2 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 2 'TROL Series unit.

FLEXCOVER #36120

XTROL7/4- Explosion proof housing

P1000 Printer (see Accessories)

Dimensions:



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 data-logging, 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 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, 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 is 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 Support

Supported Devices

- Multidrop Supported
- SUPERtrol 1LE , SUPERtrol I, SUPERtrol II and LEVELtrol II

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

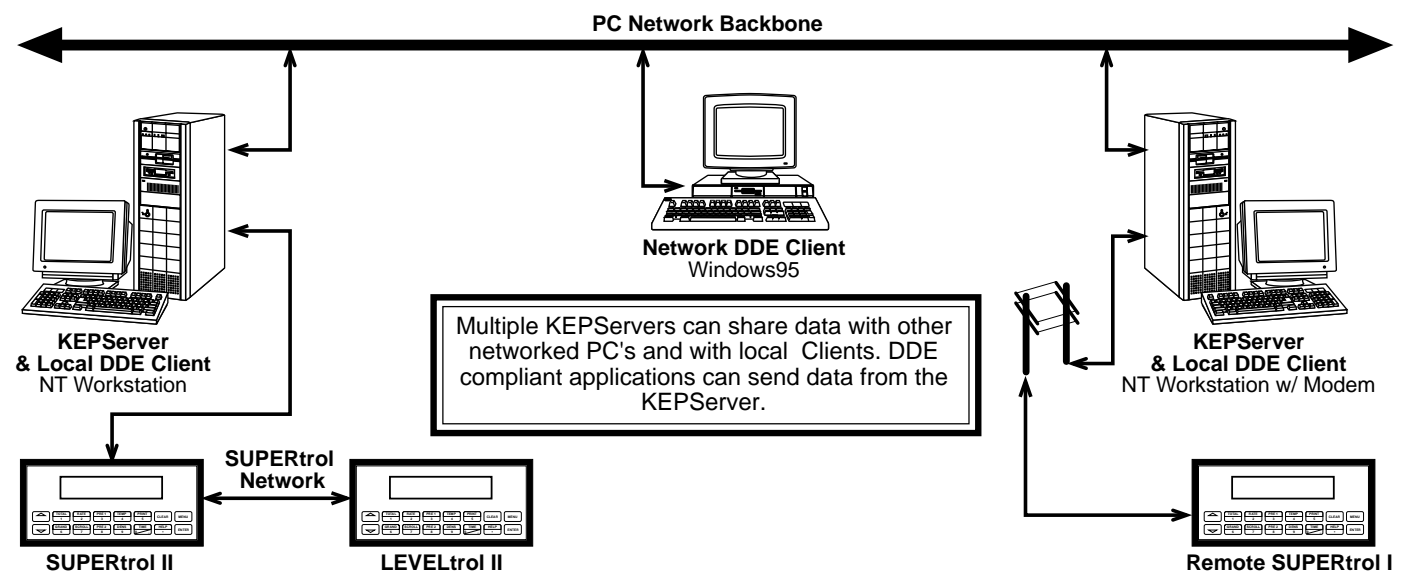
Action Routines: Initiate Print, Clear Totalizer, Clear Alarms, Start Batch, Stop Batch and many others

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



IEPS3000

Intelligent Ethernet Port Server

Features

- LAN-Attached Serial Port Expansion
- Optional Ethernet Hub
- Remote Monitoring
- IP Routing for Multi-Site Networks

Description:

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.

The IEPS3000 gives users the ability to use 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 Infilink-HMI software, Server software or ST2 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.



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).

Ordering Information

IEPS3182	2-port
IEPS3282	2 port with optional HUB port
IEPS3184	4-port
IEPS3284	4 port with optional HUB port

CA-285

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.

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.

RS-422/485 to RS-232 Interface Converter



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

MPP-2400

Port Powered Modem 2400 Baud Rate

Features

- Operates on All Telephone Lines
- RS-232 Powered; No Batteries or AC Required
- 2400 BPS Operation
- Automatic Fallback
- Compatible with All Communications Software
- Automatic Answer
- Tone & Pulse Dialing
- Compact Size

Description:

The MPP-2400 Modem is ultra-compact and easy to install. It needs no batteries or AC power because it's designed to run on extremely low current from the interface to which it attaches.

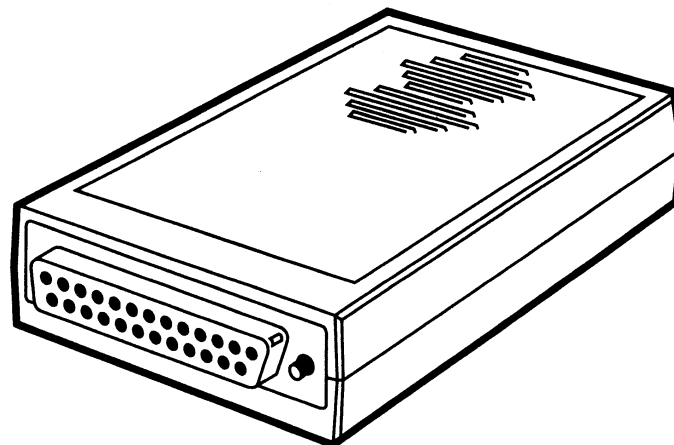
The Modem operates at speeds up to 2400 bps. If you are connected to a slower speed modem on the other end of the line, the MPP-2400 automatically "falls back" to match the speed of the slower modem so your data transmission is not interrupted.

The MPP-2400 also features automatic answer, so it can operate unattended.

It will operate over rotary or pushbutton lines since it works in tone or pulse dialing modes.

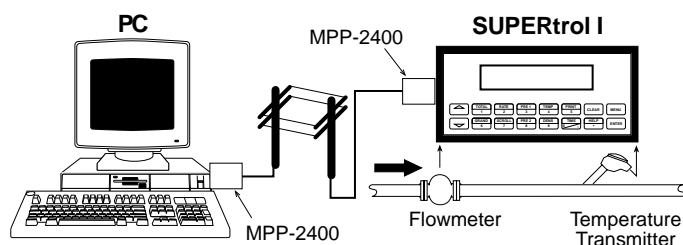
The Modem is very small and simple to install. It offers a standard DB25 female connector for your RS-232 port connection and an RJ-11 jack for your telephone cabling.

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.



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:	Line powered (RS-232 pins 4 & 20, 6 VDC, max. load 100 milliwatts)
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 Port Powered Modem

MS-722 MPP-2400N

Features

- Operates on All Telephone Lines
- RS-232 Powered from SUPERtrol-II
- 2400 BPS Operation
- Automatic Fallback
- Compatible with All Communications Software
- 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 interface to which it attaches.

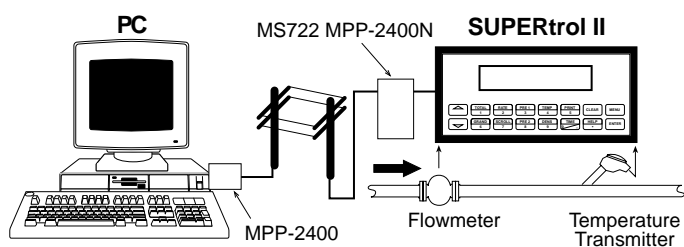
The Modem operates at speeds up to 2400 bps. If you are connected to a slower speed modem on the other end of the line, the MPP-2400 automatically "falls back" to match the speed of the slower modem so your data transmission is not interrupted.

The MS722MPP-2400 also features automatic answer, so it can operate unattended.

It will operate over rotary or pushbutton 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.



Wall Mount Port Powered Modem



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.

Ordering Information

EXAMPLE MS722MPP2400N

Series

MS722MPP-2400N Wall Mount, Port Powered Modem

MPP-2400N

Wall Mount Port Powered Modem

Features

- Operates on All Telephone Lines
- RS-232 Powered from SUPERtrol
- 2400 BPS Operation
- Automatic Fallback
- Compatible with All Communications Software
- 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-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 pushbutton lines since it works in tone or pulse dialing modes.

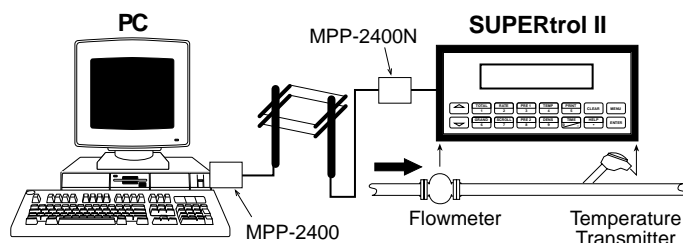
The Modem is very small and simple to install. It offers a standard DB-9 male connector for your RS-232 port connection and an RJ-11 jack for your telephone cabling.

The MPP-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) 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

TWP

Industrial Two Way Pager Wireless Data Transceiver

Features

- Wireless Communications Over ReFLEX Two Way Paging Network
- Compatible with KEP SUPERtrol II Flow Computers
- Request Information From SUPERtrol II on Demand, by Exception or on a Scheduled Basis
- Low Cost Solution for Moderate Message Lengths
- Up to 500 Bytes of Data per Transmission

APPLICATIONS:

Remote Wireless Metering Applications
Fixed Telemetry
Call Out/Call In capabilities to a host system

DESCRIPTION:

The TWP is a two way wireless data transceiver intended for applications where ReFLEX Two-Way Wireless Messaging will be used in remote metering applications using SUPERtrol II flow computers.

The TWP is intended for fixed telemetry applications requiring moderate message length wireless communications.

TWP can initiate a transmission as well as receive and store a transmission. Messages are loaded/sent and received/read using a RS-232 Port and CLP communication linking protocol commands.

USER WIRING TERMINATIONS:

RS-232 Port Pin Assignment

- | | |
|---|----------------|
| 1 | DO NOT USE |
| 2 | RECEIVE (IN) |
| 3 | TRANSMIT (OUT) |
| 4 | DO NOT USE |
| 5 | SIGNAL GROUND |
| 6 | DO NOT USE |
| 7 | RTS |
| 8 | DC POWER - |
| 9 | DC POWER + |

Ordering Information

EXAMPLE **TWP** **N** **W** **6ST2**

Series _____

TWP = Two Way Pager

Enclosure _____

N = NEMA4X

Antenna Type _____

X = None

W = Internally mounted Dipole Whip (std)

R = Internal Radome with 5' Antenna Cable

Interconnecting Cable _____

6ST2 = 6 foot ST2 Cable (other lengths available)

Accessories _____

TWP-AMK = Antenna Mounting Kit for Radome Antenna



- Confirmed Message Delivery
- Check Meter Readings Over Internet or Pager

SPECIFICATIONS:

Antenna:	Internal Dipole antenna Optional External Antenna and Antenna Mounting Kit Accessory (or customer supplied) External Female SMA Connector	
Antenna Connection:	External Female SMA Connector	
Transmitter Specifications		
Frequency	ReFLEX NBPCS Networks (901-902MHz)	
RF Power Output at Antenna Port	1.75 – 2.0 Watt	
Transmit Data Bit Rate	ReFLEX 25	9600
Frequency Stability	ReFLEX 50	9600
Receiver Specifications	1 ppm on transmit	
Frequency	929-942 MHz	
Receive Data Bit Rate	6400 bps	
Receiver Sensitivity	-115 dBm	
Serial Input Connection:		
Connector:	DB9-M	
Electrical:	RS-232 with power connection	
Protocol:	Motorola CLP – Communications Linking Protocol	
Power Consumption:		
Primary Voltage:	7-12 VDC	
Standby/Transmit Power:	6 VDV Sealed Battery	
Standby Operation	50 mA	
Receive	150 mA	
Transmit	1.5 A	
Battery	Rechargeable battery provided	
Reverse Polarity Protected		
Overcurrent Protected		
EMC filtered		
Environmental:		
Enclosure Rating:	NEMA-4X	
Dimensions:	3.5" x 4.75" x 8"	
Operating Temperature:	0 to +70C	
Storage Temperature:	-40 to +85C	
Humidity:	0-95% Non Condensing	
Approvals:	FCC	
Mounting Cautions and Hazards:	Mount antenna in a location where people will not come within 12" during use	

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.

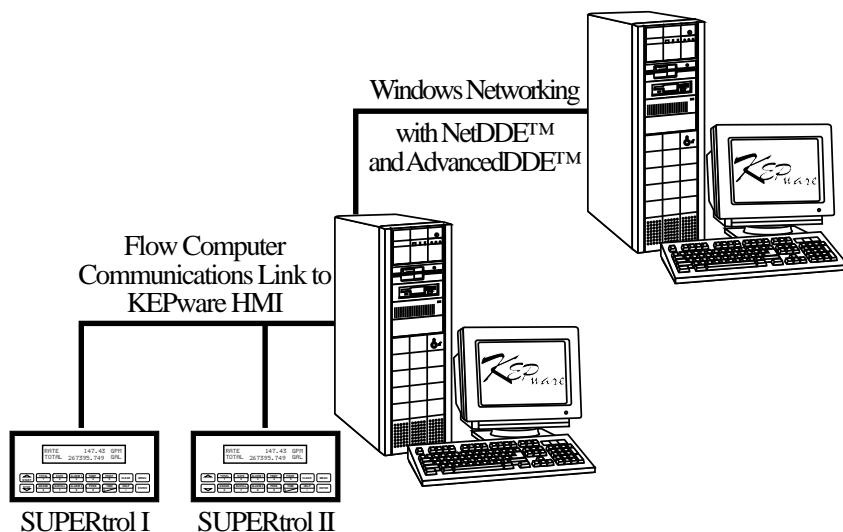
How do I select an Industrial PC? In most cases the hardware selection is done after you have decided on the software, on what you want this to do, and how it will be connected to the rest of the plant. Many experts agree that you should purchase a PC which is compatible with your software and with the 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. 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

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.

Features Added to the New Version of Infilink-HMI

- OPC Client Functionality
- E-mail and Web Enabled: Send e-mail and View tag data over the Internet
- Historical and Alarm Data Logging to MS Access (MDB) Files

Other Important Features of Infilink-HMI:

- Free Design Mode: Only pay to unlock run-mode copies
- Historical Trending, Alarming, Data Logging included in base price
- Email and Web Enabling included in base price
- No yearly "maintenance" or "support" fees
- Built In Scheduler
- OPC, DDE, NetDDE & AdvancedDDE Support

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.

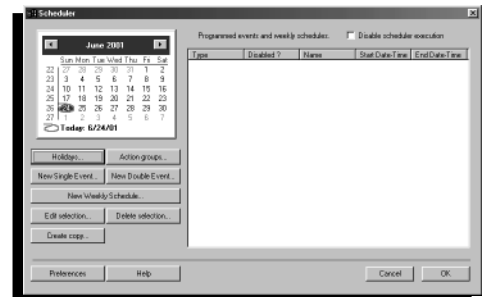


Scheduler

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 Inviewer 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.

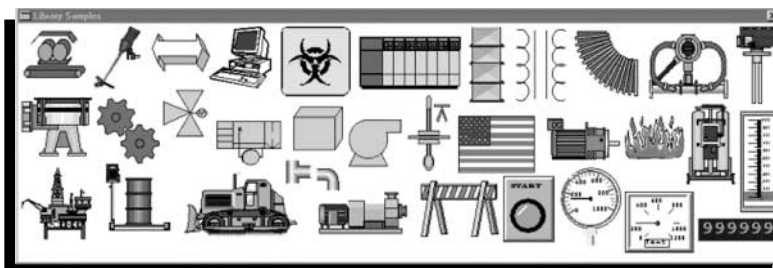


Graphic Objects and Editing Features

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 a name 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

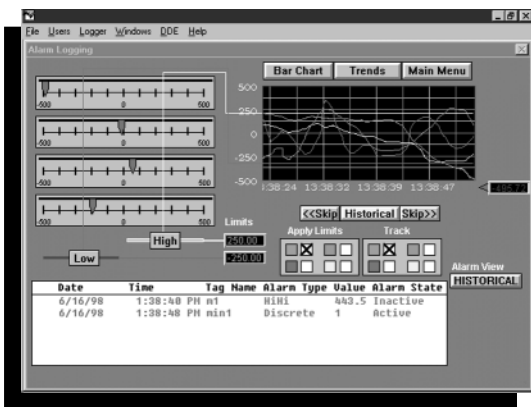
Key Animation

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

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

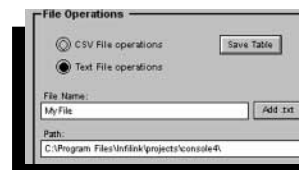
Any Tag in Infilink's tag database can be configured to log itself to disk. Crucial events can be stored and shared with any application via industry standard database formats.

Key Trend Functions Include:

- Multiple Plotting Modes
- Script Control
- Fast Display Speed
- 10 Pens / Trend
- Library Objects for Trend Control

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.



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.

	Date	Time	Value	Alarm State
ACK	12/31/97	12:00:00 pm	99999999	SSSSSSSSSS
ACK	12/31/97	12:00:00 pm	99999999	SSSSSSSSSS
ACK	12/31/97	12:00:00 pm	99999999	SSSSSSSSSS

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

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 KEPServer Extreme OPC servers, but you can use the OPC server product of your choice. Infilink also supports AdvancedDDE and NetDDE.

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.

Minimum System Requirements

Pentium 133MHz CPU
32 MB of RAM
50 MB of Free Disk Space
Display Resolution of 640x480 Run Mode, 800x600 Design Mode

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 (4.00 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.

Ordering Information

Runtime Packages with the following Real I/O Tag counts are available:

128 I/O Tag Runtime **Part # KEPRUN-128**

includes 1 KEPServer driver

256 I/O Tag Runtime **Part # KEPRUN-256**

includes 1 KEPServer driver

512 I/O Tag Runtime **Part # KEPRUN-512**

includes 1 KEPServer driver

Unlimited I/O Tag Runtime **Part # KEPRUN-0000**

includes 1 KEPServer driver

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

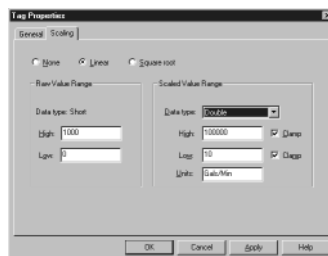
KEP ServerEX allows you to use a number of communications drivers concurrently.

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.

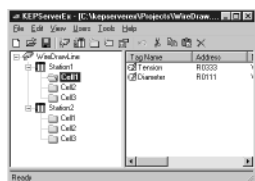
Data Scaling

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.

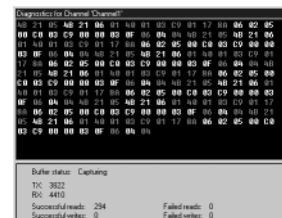
Automatic Tag Database Generation



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.

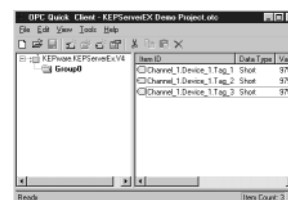


Modem Support

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 of 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

Operating System: Windows 98

Processor: Pentium 200Mhz

Ram: 32 MB

Disk Space: 10 MB

Recommended

Windows NT 4.0 SP5 or better

Pentium 400Mhz

64 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.

For More Information call KEPware, Inc.

KEPware • 81 Bridge Street • Yarmouth, Maine 04096
Phone: 207-846-5881 • Fax: 207-846-5947 • <http://www.OPCSource.com>

AMB-513

Industrial Panel PC with Flat-Panel Display

Features

- Heavy Duty Steel Chassis with NEMA 4/12 Plastic Front Panel
- 10.4" Color TFT LCD Display
- 4-Slot (2 available) ISA-Bus Passive Backplane
- Comes with an Internal 3.5" FDD, 4.3GB HDD & CD-ROM (optional)
- 30 CFM Cooling Fan
- Universal 70W Power Supply or Other Options (Refer to The Selection Table)
- Analog Resistive Touchscreen (option)



Introduction:

The AMB-513 series industrial panel PC's are IBM PC/AT compatible computers specially designed to meet all the requirements for a human-machine interface (HMI). They come equipped with a 10.4" color TFT LCD display. All are enclosed with a heavy duty steel chassis and a plastic front panel which meets NEMA 4 / 12 industrial and environmental protection standards.

Display Selection Table

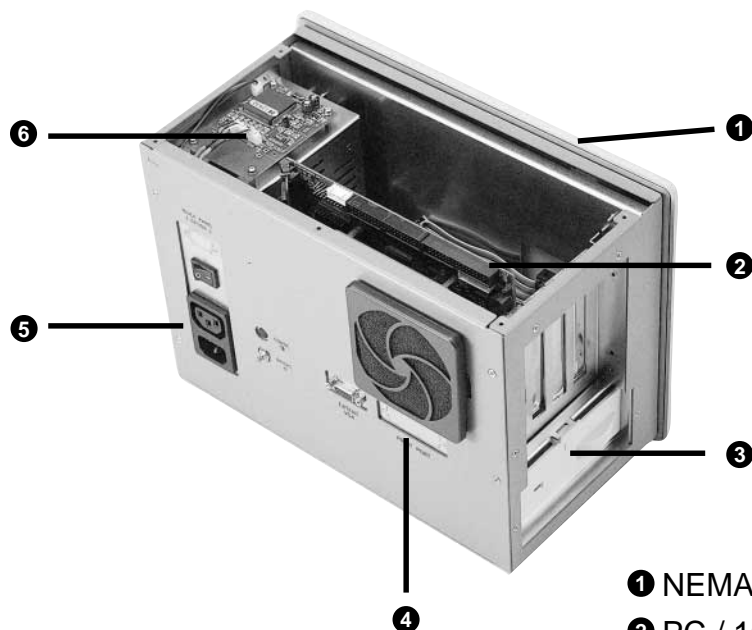
Item	Color TFT
Diagonal	10.4
Display	211.2 (H)
Area	x 158.4 V
Resolution	640 x 480
Color	64K colors
Display Life	25,000 Hrs.

Power Supply Selection Table

Model	Input Voltage	Max. Output Current			
		+5V	+12V	-5V	-12V
Universal/70W	90-260VAC	7A	2.5A	0.3A	0.3A
48VDC/70W	36 to 72VDC	7A	2.5A	0.3A	0.5A
24VDC/70W	19 to 30VDC	7A	2.5A	0.3A	0.5A
12VDC/65W	8.5 to 16VDC	6A	2A	0.3A	0.5A

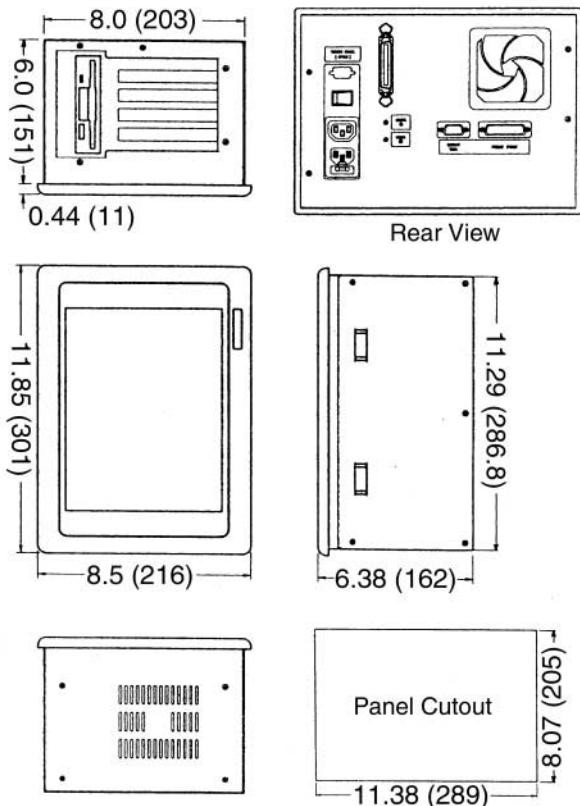
Specifications:

Construction:	Heavy Duty steel chassis & NEMA 4/12 plastic front panel
I/O Ports:	1 High speed serial port, 1 bi-directional parallel port
Ethernet:	10/100 BaseT, RTL8139 chipset
CPU:	Celeron 366MHz through 800MHz Pentium III
Disk drives:	Internal 3.5" FDD & Internal 3.5" 4.3 GB (or higher) HDD
Flash Disk:	Disk On Chip
Touch Screen:	Analog Resistive
Cooling system:	30 CFM cooling fan
Weight:	6Kgs
Power supply:	Universal (90-260 VAC) standard (refer to the selection table)
Passive backplane:	1 open PCI, 1 open ISA 1/2 length
Operating Temp:	0°C to 50°C
Storage Temp:	-20°C to 60°C
Relative humidity:	5 to 95%, non condensing
Altitude:	10,000 ft. (3000 meters)
Vibration:	5 to 17Hz, 0.1 " double-amplitude displacement 17 to 500 Hz, 1.5G peak to peak
Shock:	10G peak acceleration (11 msec. duration)
Safety:	CE
EMI:	meets FCC/VDE Class A
Operating system:	Windows 98SE, NT, 2000
RAM:	64MB STD; Expandable to 128MB
Cache:	512K
VGA controller:	C & T Chips 65535T LCD/CRT
System BIOS:	Award BIOS
I/O chipset:	ALI Alladin 4 + Chipset
IDE/PCI support:	Ultima PMA/33
Mouse connector:	PS/2
Keyboard connector:	PS/2



- ① NEMA 4 / 12 plastic front panel
- ② PC / 104 Flat-panel control module
- ③ FDD anti-dust door
- ④ Air flow filter
- ⑤ Power inlet & Power switch
- ⑥ Touchscreen control board (option)

Dimensions:



Dimensions are in inches (mm)

Ordering Information:

How To Order:

EXAMPLE AMB-513 HT T

Series

Display Type

HT = 10.4" high brightness color TFT LCD display

Options

T = Touchscreen option

-48VDC = -40 to -65 VDC input power supply

24VDC = 19 to 30 VDC input power supply

12VDC = 8.5 to 16 VDC input power supply

Accessories

EXTCD = External CD-ROM Drive

AMB-106 = 20 function key sealed membrane keyboard

AMB-107 = 56 data entry key sealed membrane keyboard

For additional RAM consult factory

AMB-541

Industrial Panel PC with 14" Flat-Panel Display

Features

- NEMA 4/12 Painted Aluminum Alloy Front Panel
- 14" XGA Color TFT LCD Display
- 5-Slot (4 available) ISA/PCI-Bus Passive Backplane
- PCI-Bus MBC-266B Graphic Card
- 3-Disk Drive Housing: a 3.5" FDD & HDD and a CD-ROM Drive (optional)
- Hold-Down Clamp Protects Cards from Vibration
- Universal 250W Power Supply (or DC options)
- Analog Resistive Touchscreen (option)

Introduction:

The compact size, painted metal steel chassis, bigger panel size and higher brightness makes the AMB-541 the ideal human-machine interface. The AMB-541 supports XGA (1024x768) resolution with a 14" XGA color TFT LCD display. The PC includes a PCI-Bus MBC-266B graphic card, 5-slot ISA/PCI-Bus passive backplane and also a 3-disk drive housing provided for a 3.5" FDD & HDD and a CD-ROM drive (optional). Other available optional items for this series are a touchscreen and DC input power supply.

Display Selection Table

Item	Color TFT
Diagonal	14" (XGA)
Display Area	279.5(H) x 209.6(V)
Resolution	1024 x 768
Color	64K colors
Display Life	25,000 Hrs.

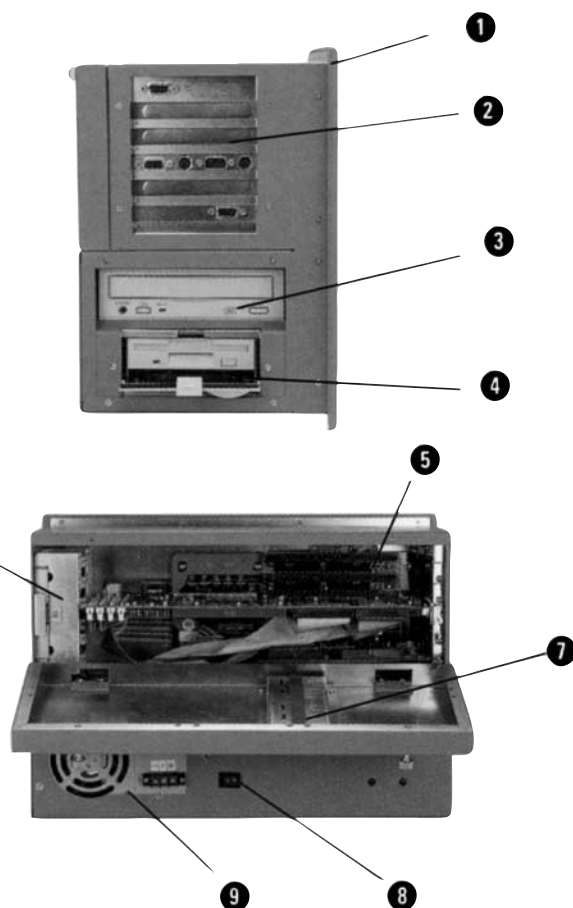
Power Supply Selection Table

Model	Input Voltage	Max. Output Current			
		+5V	+12V	-5V	-12V
Universal/250W	85-265VAC	22A	7A	0.5A	0.7A
-48VDC/250W	-40 to -65VDC	25A	8A	1A	2A
24VDC/250W	19 to 30VDC	25A	6A	1A	2A
12VDC/160W	8.5 to 16VDC	20A	4A	0.5A	0.5A



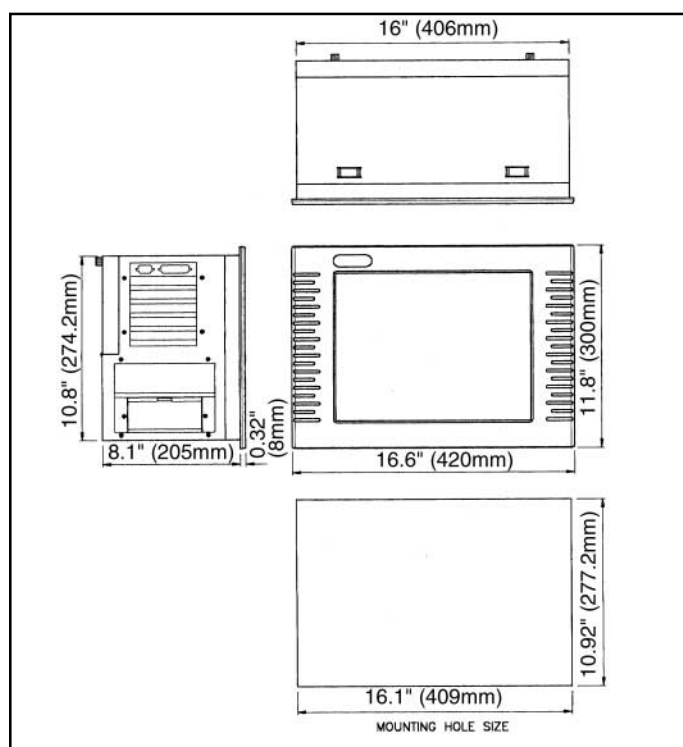
Specifications:

Construction:	Painted metal steel chassis & NEMA 4/12 aluminum alloy front panel
I/O Ports:	1 High speed serial port, 1 bi-directional parallel port
Ethernet:	10/100 BaseT, RTL8139 chipset
CPU:	Celeron 366MHz through 800MHz Pentium III
Disk drives:	Internal 3.5" FDD & Internal 3.5" 4.3 GB (min) HDD
Flash Disk:	Disk On Chip
Touch Screen:	Analog Resistive
Cooling system:	30 CFM cooling fan
Weight:	12.3Kgs
Power supply:	Universal (85-265 VAC) standard (refer to the selection table)
Passive backplane:	5-slot ISA/PCI-Bus, (1 used by CPU, 4 Available) 4-layer PCB with power plane for noise reduction and power supply impedance. LED power indicators for +5V, -5V, +12V, -12V
Operating Temp:	0°C to 50°C
Storage Temp:	-20°C to 60°C
Relative humidity:	5 to 95%, non condensing
Altitude:	10,000 ft. (3000 meters)
Vibration:	5 to 17Hz, 0.1 " double-amplitude displacement 17 to 500 Hz, 1.5G peak to peak
Shock:	10G peak acceleration (11 msec. duration)
EMI:	meets FCC/VDE Class A
Operating system:	Windows 98SE, NT, 2000
RAM:	64MB STD; Expandable to 128MB
Cache:	512K
VGA controller:	C & T Chips 65535T LCD/CRT
System BIOS:	Award BIOS
I/O chipset:	ALI Alladin 4 + Chipset
IDE/PCI support:	Ultima PMA/33
Mouse connector:	PS/2
Keyboard connector:	PS/2



- ① Sealed aluminum alloy front panel
- ② Rear bracket
- ③ 5.25" FDD or CD-ROM drive bay
- ④ 3.5" FDD & HDD drive bay
- ⑤ 5-slot ISA/PCI passive backplane
- ⑥ Cooling fan with removable filter
- ⑦ Hold-down clamp
- ⑧ Power switch
- ⑨ Universal 250W power supply

Dimensions:



Ordering Information:

How To Order:

EXAMPLE	AMB-5411	T	T
Series			
AMB-541 Series includes: 14" TFT Color LCD, Metal bezel 250W Universal 85-256 VAC power supply 4.3+ GB HDD 3.5" 1.44MB FDD 32 MB RAM 5 slot backplane ISA/PCI Accepts full size cards. 366 MHz Celeron CPU SBC VGA driver card Windows 98 installed			
Display Type			
T = 14" XGA color TFT LCD display			

Options

- T = Touchscreen
- 12V = 12 VDC, 160W power supply
- 24V = 24 VDC, 250W power supply
- 64M = Memory expanded to 64MB
- 128M = Memory expanded to 128MB
- INTCD = Internal CDROM drive
- 400MHZ = 400 MHz Celeron CPU
- NTW = Windows NT 4.0 Workstation installed
- NTS = Windows NT 4.0 Server (5 lic.) installed
- ILINK = Infilink Software installed as an option

AMB-655

Features

- 19" Rackmount
- NEMA 4/12 Aluminum Alloy Front Panel
- MBC-266 Graphic Card
- 13.8" or 15" XGA Color TFT LCD Display
- 10-Slot (9 available) ISA-Bus Passive Backplane or Mother board
- Comes with an Internal 3.5" FDD, 4.3GB HDD & CD-ROM (optional)
- Universal 250W Power Supply
- Analog Resistive Touchscreen (option)

Introduction:

The MMI-655 series with 15" XGA color TFT LCD display industrial workstations are much lighter and slimmer than traditional 14" and 15" CRT workstations. They are supplied with a 3.5" FDD and 4.3GB HDD (CD-ROM drive optional). Both have two sealed membrane keypads on the front panel providing 24 function keys and 59 data entry keys. The MMI-650/655 series includes a 10-slot (9 available) ISA/PCI-Bus passive backplane, a PCI-bus MBC-266B and a universal 250W power supply. Available optional items for this series are a touchscreen and DC input power supply.

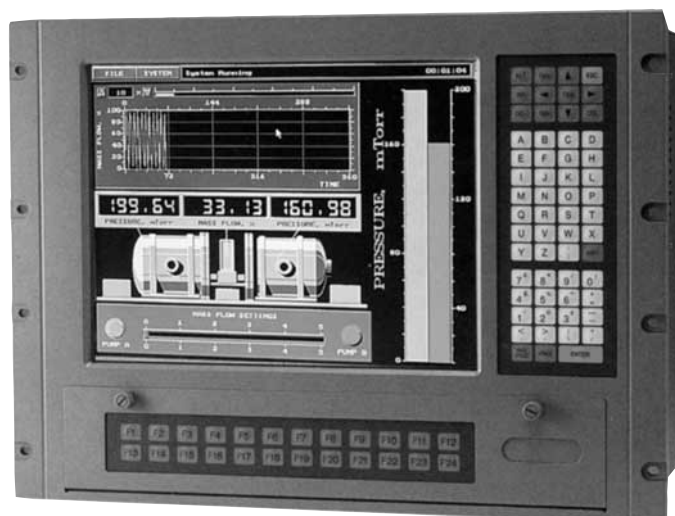
Display Selection Table

Item	Color TFT
Diagonal	15" (XGA)
Display Area	304.1(H) x 228.1(V)
Resolution	1024 x 768
Color	64K Colors
Display Life	25,000 Hrs.

Power Supply Selection Table

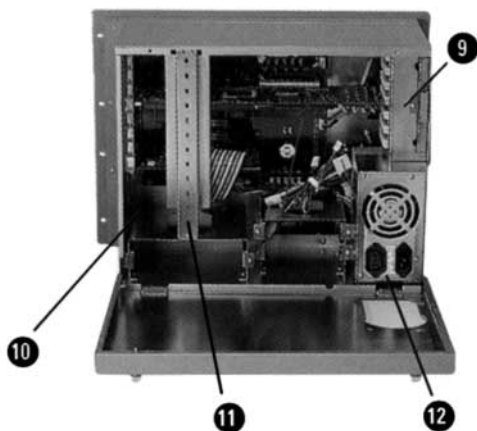
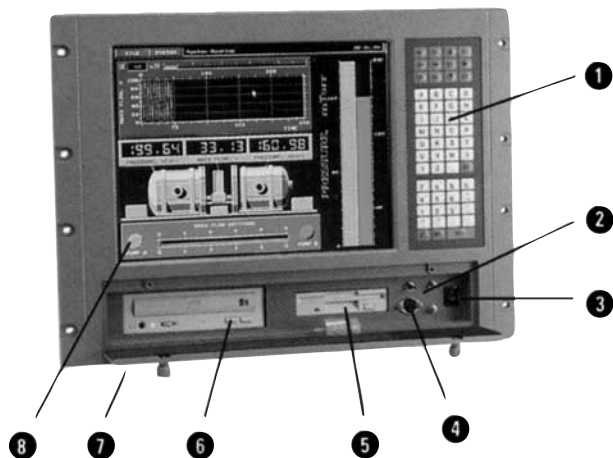
Model	Input Voltage	Max. Output Current			
		+5V	+12V	-5V	-12V
Universal/250W	85-265VAC	24A	10A	0.5A	0.7A
-48VDC/250W	-40 to -65VDC	25A	8A	1A	2A
24VDC/250W	18 to 30VDC	25A	6A	1A	2A
12VDC/160W	8.5 to 16VDC	20A	4A	0.5A	0.5A

Industrial Workstation with 14" or 15" Flat-Panel Display



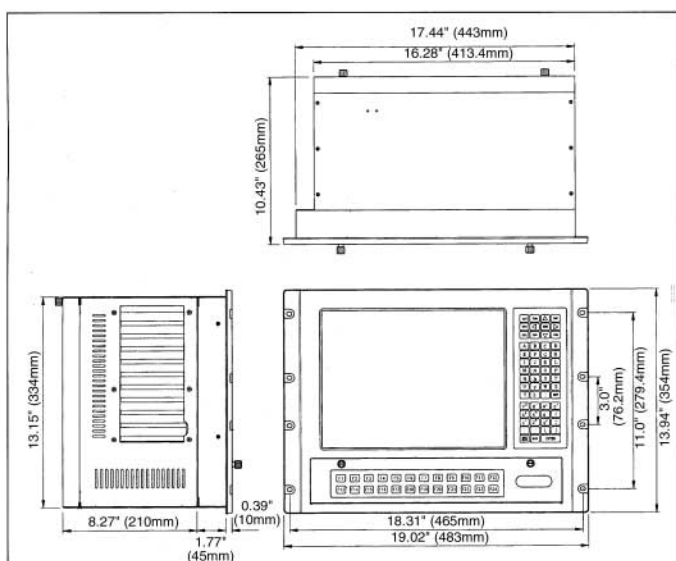
Specifications:

Construction:	Painted metal steel chassis & aluminum alloy front panel
I/O Ports:	1 High speed serial port, 1 bi-directional parallel port
Ethernet:	10/100 BaseT, RTL8139 chipset
CPU:	Celeron 366MHz through 800MHz Pentium III
Disk drives:	Internal 3.5" FDD & Internal 3.5" 4.3 GB (min) HDD
Flash Disk:	Disk On Chip
Touch Screen:	Analog Resistive
Cooling system:	64 CFM cooling fan
Weight:	16Kgs
Keypad:	59 data-entry keys and 24 function-key Two-screw-on door on the front panel covering the brightness and contrast controllers, power switch, drive bays and keyboard connector
Power supply:	Universal (85-265 VAC) standard (refer to the selection table)
Passive backplane:	10-slot ISA/PCI-Bus (1 used by CPU, 9 Available) 4-layer PCB with ground/power-plane for noise reduction and power supply impedance LED power indicators for +5V, -5V, +12V, -12V
Operating Temp:	0°C to 50°C
Storage Temp:	-20°C to 60°C
Relative humidity:	5 to 95%, non condensing
Altitude:	10,000 ft. (3000 meters)
Vibration:	5 to 17Hz, 0.1 " double-amplitude displacement 17 to 500 Hz, 1.5G peak to peak
Shock:	10G peak acceleration (11 msec. duration)
Safety:	CE
EMI:	meets FCC/VDE Class A
Operating system:	Windows 98, NT, 2000
RAM:	64MB STD; Expandable to 128MB
Cache:	512k
VGA controller:	C & T Chips 65535T LCD/CRT
System BIOS:	Award BIOS
I/O chipset:	ALI Alladin 4 + Chipset
IDE/PCI support:	Ultima PMA/33
Mouse connector:	PS/2
Keyboard connector:	AT



- ① Data-entry membrane keypad
- ② Brightness & contrast controllers
- ③ Power switch
- ④ External keyboard connector
- ⑤ 3.5" FDD & HDD drive bay
- ⑥ CD-ROM drive bay
- ⑦ Front antidust door
- ⑧ 14" Flat panel display
- ⑨ Cooling fan
- ⑩ 10-slot ISA/PCI backplane (Full length)
- ⑪ Hold-down clamp
- ⑫ Universal 250W power supply

Dimensions:



Ordering Information:

How To Order:

EXAMPLE AMB-6501

Series

655 = AMB-655 Series includes:
15" color display, PCI-Bus MBC-266B graphic card,
a 10-slot ISA/PCI-Bus passive backplane and a
universal 250W switching power supply

Display Type

T = XGA color TFT LCD display

Options

T = Touchscreen option

-48VDC = -40 to -65 VDC input power supply

24VDC = 18 to 30 VDC input power supply

12VDC = 8.5 to 16 VDC input power supply

CD = 40X CD-ROM Drive

For additional RAM consult factory

AMB-2000/2020

Industrial HMI Panel PC with Flat-Panel Display

Features

- 10.4" or 12.1" VGA color TFT LCD display
- Heavy-duty steel chassis and NEMA 4/12 compliant plastic front panel
- All-in-one SBC, MediaGX 233MHz
- Brightness and LCD power on/off controller on the aluminum alloy front panel (aluminum front panel optional)
- Four 16C550 RS-232C ports, one RS-232C port can also be set as RS-422/485
- Disk Driver Space for CD-ROM, FDD and HDD
- DiskOnChip flash disk socket
- PC/104 expansion connector

Introduction

The AMB-2000/2020 series panel PC's are industrial computers that are designed for industrial environments.. They are a full function PC-base system with a 10.4" VGA (640 x 480) color TFT hi-brightness, long-life time LCD display. The compact dimensions are ideal for automation applications where the installation space is critical. These PC's are characterized by their space saving feature and flexible selection of hardware. The AMB-2000/2020 series panel PC's feature a heavy-duty steel chassis with a sealed plastic front panel that meets the toughest industrial and environmental standards.



Specifications for AMB-2000

Construction: Heavy-duty steel chassis & NEMA 4/12 plastic front panel.

CPU: MediaGX 233MHz

Memory: 64M DRAM

Display: 10.4" VGA (640 x 480) TFT color LCD

LCD/CRT controller: NS Cx5530 Chipset UMA supports up to 4MB display memory

Network (LAN): Realtek RTL8139B 10/100Base-T Ethernet controller

I/O ports: 4 serial ports: three RS-232, one RS-232/422/485, 1 parallel port (support ECP/EPP), 1 keyboard port, 1 PS/2 mouse interface

Disk Drives: HDD and FDD or HDD and CD-ROM

USB connector: Dual USB ports onboard

Expansion: PC/104 connector

Mounting: Panel mount

Power supply: Universal 70W switching power supply

Dimension: (W x H x D) 306 x 228 x 95 mm

Gross Weight: 6.0 Kg

Specifications for AMB-2020

Construction: Heavy-duty steel chassis & NEMA 4/12 plastic front panel.

CPU: MediaGX 233MHz

Memory: 64M DRAM

Display: 12.1" SVGA (800 x 600) TFT color LCD

LCD/CRT controller: NS Cx5530 Chipset UMA supports up to 4MB display memory

Network (LAN): Realtek RTL8139B 10/100Base-T Ethernet controller

I/O ports: 4 serial ports: three RS-232, one RS-232/422/485, 1 parallel port (support ECP/EPP), 1 keyboard port, 1 PS/2 mouse interface

Disk Drives: HDD and FDD or HDD and CD-ROM

USB connector: Dual USB ports onboard

Expansion: PC/104 connector

Mounting: Panel mount

Power supply: Universal 70W switching power supply

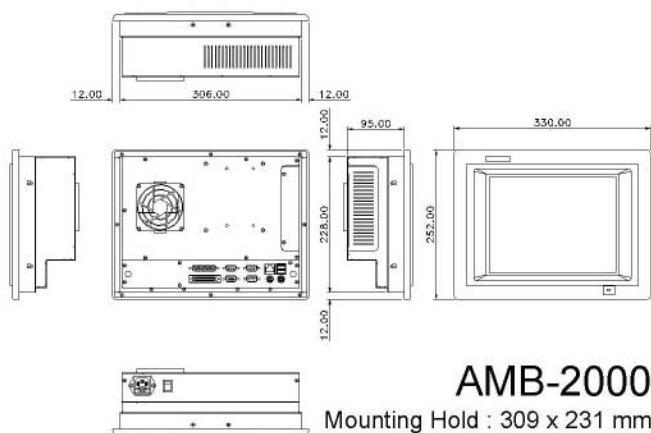
Dimension: (W x H x D) 330 x 255 x 93 mm

Gross Weight: 5.0 Kg

LCD Specifications

Model:	AMB-2000	2020
Display type:	10.4" TFT color LCD	12.1" TFT color LCD
Max. resolution:	640 x 480	800 x 600
Max. colors:	256K	256K
Dot size (mm):	0.33 x 0.33	0.308 x 0.308
Luminance (cd/m2):	200	200
Viewing angle:	90° (h) 50° (v)	110°
Temperature:	0° ~50° C	0° ~50° C
VR Controller:	Yes	Yes
LCD MTBF (Hrs):	50,000	50,000
Back Light MTBF (Hrs):	25,000	25,000

Dimensions



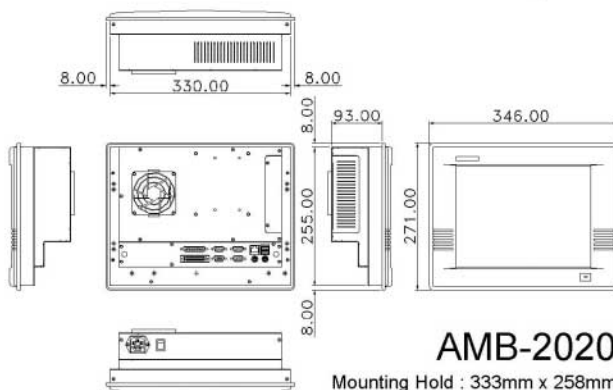
Ordering Information

AMB 2000

Part Number	Description
2000HT	10.4" Bright TFT Color LCD, (200 cd/m) Cyrex MediaGX 233MHz CPU
Options (add to end of Part Number)	
T	Touchscreen
24V	24V power instead of 120VAC power
12V	12V power instead of 120VAC power
128M	Memory expanded to 128MB
NTW	Windows NT 4.0 Workstation Installed
NTS	Windows NT 4.0 Server (5 lic.) Installed
ILINK	Infilink Software Installed.
	Unlimited Tags, Any Driver
INTCD	Internal Slim CDROM REPLACING internal FDD. With this option, no internal FDD will be present. There is no external FDD connector, so a USB floppy drive should be purchased if needed.
USBFDD	External USB Floppy Disk Drive
EXTCD	External CDROM Drive

AMB 2020

Part Number	Description
2000HT	12.1" Bright TFT Color LCD, (250 cd/m) Cyrex MediaGX 233MHz CPU
Options (add to end of Part Number)	
T	Touchscreen
24V	24V power instead of 120VAC power
12V	12V power instead of 120VAC power
128M	Memory expanded to 128MB
NTW	Windows NT 4.0 Workstation Installed
NTS	Windows NT 4.0 Server (5 lic.) Installed
ILINK	Infilink Software Installed.
	Unlimited Tags, Any Driver
INTCD	Internal Slim CDROM REPLACING internal FDD. With this option, no internal FDD will be present. There is no external FDD connector, so a USB floppy drive should be purchased if needed.
USBFDD	External USB Floppy Disk Drive
EXTCD	External CDROM Drive

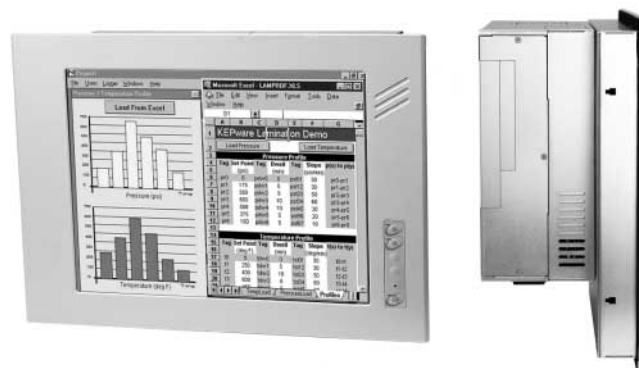


AMB-2053 Series

15" Modular System Industrial Panel PC

Features

- 15" XGA color TFT LCD display
- Heavy-duty steel chassis and NEMA 4/12 compliant plastic front panel
- All-in-one Celeron 366MHz SBC
- Brightness and LCD power on/off controller on the aluminum alloy front panel
- Disk Driver Space for CD-ROM, FDD & HDD
- DiskOnChip flash disk socket
- Two Free Slots for ISA/PCI or ISA
- PC/104 expansion connector



Introduction

The AMB-2053 series panel PC's are industrial computers that are designed for industrial environments.. They are a full function PC-base system with a 15" XGA (1024x 768) color TFT hi-brightness, long-life time LCD display. The compact dimensions are ideal for automation applications where the installation space is critical. These PC's are characterized by their space saving feature and flexible selection of hardware. The AMB-2053 series panel PC's feature a heavy-duty steel chassis with a sealed plastic front panel that meets the toughest industrial and environmental standards.

Specifications for AMB-2053

(15" LCD+ACS-2303)

Construction: Heavy-duty steel chassis & NEMA 4/12 plastic front panel.

CPU: Celeron 366MHz through 800MHz Pentium III

Memory: 64M DRAM

Display: 15" XGA (1024x 768) TFT color LCD

LCD/CRT controller: Chips 69000 VGA controller 2MB SDRAM embedded. CRT & LCD panel support.

I/O ports: 2 serial ports: one RS-232, one RS-232/422/485, 1 parallel port (support ECP/EPP), 1 keyboard port, 1 PS/2 mouse interface

HDD: 2.5" HDD space or 3.5" HDD

FDD: Slim-type FDD space

CD-ROM: Slim-type CD-ROM space

USB connector: Pin head for Dual USB port

Expansion: One PCI and one ISA (1/2 length)

Mounting: Panel mount

Power supply: Universal 70W switching power supply

Dimension: (W x H x D) 395 x 277.4 x 134.2 mm

Gross Weight: 6.5 Kg

LCD Specifications

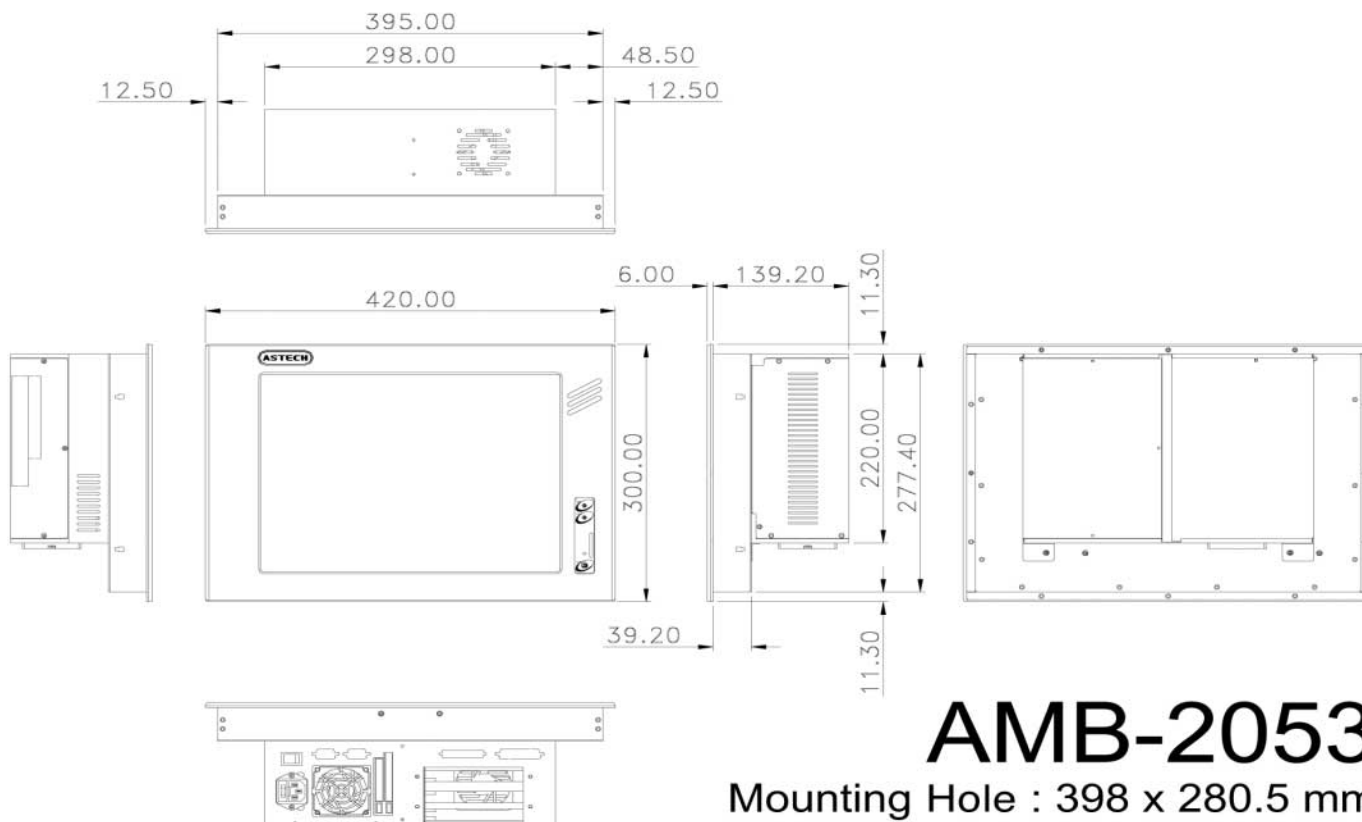
Model:	AMB-2053
Display type:	15" TFT color LCD
Max. resolution:	1024x 768
Max. colors:	256K
Dot size (mm):	0.313 x 0.329
Luminance (cd/m2):	250
Viewing angle:	160°
Temperature:	0° ~50° C
VR Controller:	Yes
LCD MTBF (Hrs):	50,000
Back Light MTBF (Hrs):	25,000

Ordering Information

AMB 2053

Part Number	Description
2003HT	15" TFT Color LCD (250 cd/m) Intel Celeron 366MHz CPU
Options (add to end of Part Number)	
T	Touchscreen
24V	24V power instead of 120VAC power
12V	12V power instead of 120VAC power
64M	Memory expanded to 64MB
128M	Memory expanded to 128MB
256M	Memory expanded to 256MB
NTW	Windows NT 4.0 Workstation Installed
NTS	Windows NT 4.0 Server (5 lic.) Installed
INTCD	Internal Slim CDROM
EXTCD	External CDROM Drive
ILINK	Infilink Software Installed. Unlimited Tags, Any Driver

Dimensions



AMB-2053

Mounting Hole : 398 x 280.5 mm

MMI-3000

Industrial PC with 15" TFT Display & Keyboard

Features

- 15" TFT LCD display
- Heavy-duty Stainless Steel Case and NEMA 4/12 Compliant Front Panel
- 700MHz Intel Pentium III CPU
- NEMA 4 Rubber Keyboard
- 45GB Hard Drive, CD-ROM, FDD
- 100 Base T Ethernet
- 128MB RAM, Expandable to 384MB

Introduction

The MMI-3000 Industrial PC is designed for harsh, industrial environments. It is a full function PC-based system with a 15" (1024x 768) color TFT hi-brightness, long-life time LCD display. The MMI-3000 is equipped with a rubber keyboard that meets NEMA 4 requirements.

Specifications

Computer:

TMC Single Board Computer
Chips & Technologies 69000 Video Chipset
4 Serial ports
Parallel port
Socket 370 CPU Socket
700MHz Intel Pentium PIII CPU, upgradable to 800MHz
100 BaseT Ethernet
128MB RAM, expandable to 384MB
45 GB Hard Disk Drive
Kingston Removable HDD Chassis
CD ROM
Floppy Disk Drive
250W Power Supply
Circuit Breaker

Expansion Slots:

Three PCI and one ISA (Full length)

Case:

304 Stainless Steel
Grade 4 Finish. No welds are visible.
NEMA 12 (Face of unit is NEMA 4, but there are louvered vents on the sides).
Approximate Dimensions in inches: 23H x 20W x 20.3D



Keyboard:

NEMA 4 Rubber Keyboard with Pointing Device

Display:

15" High Brightness TFT Display
1024 X 768 Resolution
Scaling Allows Full-Screen Display at Lower Resolutions
ELO Touchscreen

Testing Standards:

CE
FCC Class A

Operating Specifications

Operating Temperature: 0 to 50 degrees C
Storage Temperature: -10 to 0 degrees C
Relative Humidity: 10 to 90%, non-condensing
Input Voltage: 115 or 230Vac(switch selectable), +- 10%

Mounting:

Pedestal Mount Standard.
Wall and Top Mounting Options Available.

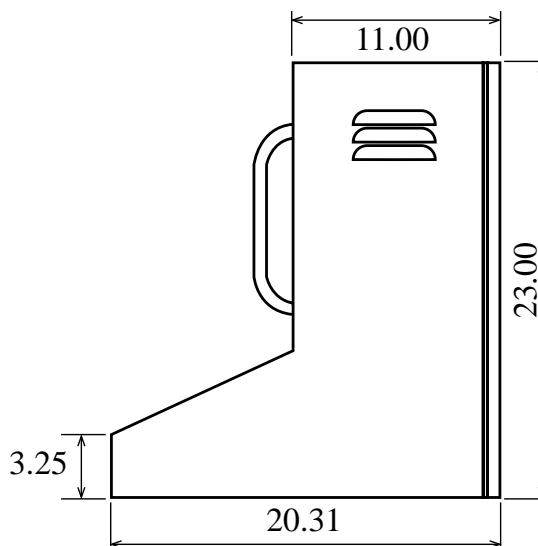
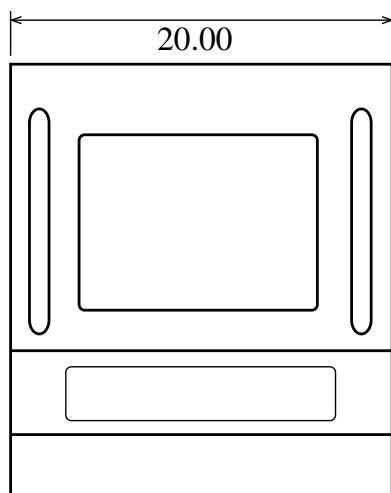
Cooling:

One 85CFM Exhaust Fan
Louvered Vent on Each Side of Enclosure.
CPU Fan
85CFM Fan on Card Cage



The MMI-3000 features a hinged back panel which allows easy access to the interior for quick upgrades and maintenance.

Dimensions:



Ordering Information:

<u>Part Number</u>	<u>Description</u>
MMI-3000	MMI-3000 Industrial Computer Includes: 700MHz Intel Pentium PIII CPU, 128MB RAM, 4 Serial ports, Parallel port, 100 BaseT Ethernet, 45 GB Hard Disk Drive, Kingston Removable HDD Chassis, CD ROM, Floppy Disk Drive, 250W Power Supply

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 $\pm 15\%$ or 12 to 27 VDC
- B) 230 VAC $\pm 15\%$ or 12 to 27 VDC

Current: 280 mA DC max. or 5.3 VA 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 $\pm 5\%$ worst case.

Input: (count/start/stop/reset)

High: 3 to 30 VDC

Low: open or <1 VDC

Impedance: 10 k Ω

Frequency: 20 kHz max.

Inputs: Positive edge triggered, 3 μ sec/61 μ sec/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 $\pm 15\%$ or 12 to 27 VDC

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

Options: _____

1: RS232 Serial Interface

2: RS422 Serial Interface

Accessories:

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

XTROL7/4- Explosion proof housing

P1000 Printer (see Accessories)

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 $\pm 15\%$ or 12 to 27 VDC

B) 230 VAC $\pm 15\%$ or 12 to 27 VDC

Current: 280 mA DC max. or 5.3 VA 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 $\pm 5\%$ worst case.

The DC Outputs are supplied with resettable fuses.

Pulse Inputs:

Thresholds: High: 3 to 30 VDC; Low: open or <1 VDC

Impedance: 10 k Ω

Frequency: 10 kHz max. (min. on/off 100 μ sec.)

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 13

KEPtrol F/C _____

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

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:

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

XTROL7/4- Explosion proof housing

P1000 Printer (see Accessories)

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
- Two Way RS232/422 Communications
- Scalable 4-20mA Output of Rate/Total

Description:

Featuring 8 digits of bright, .55", alpha-numeric 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 electro-mechanical 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 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 resettable 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:

NEMATROL 4X1 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 1 TROL Series unit.

NEMATROL 4X2 - NEMA 4X/IP 65 Enclosure for wall mounting accommodating 2 TROL Series unit.

FLEXCOVER #36120

XTROL7/4- Explosion proof housing

P1000 Printer (see Accessories)

XTROL 7/4

Explosion Proof Housing for 'trol Products

Features:

- Compatible with all Standard Size "trol" and "SUPERtrol" Family of Products
- 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
- FM, CSA Approved
- 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. It 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 neoprene 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.

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

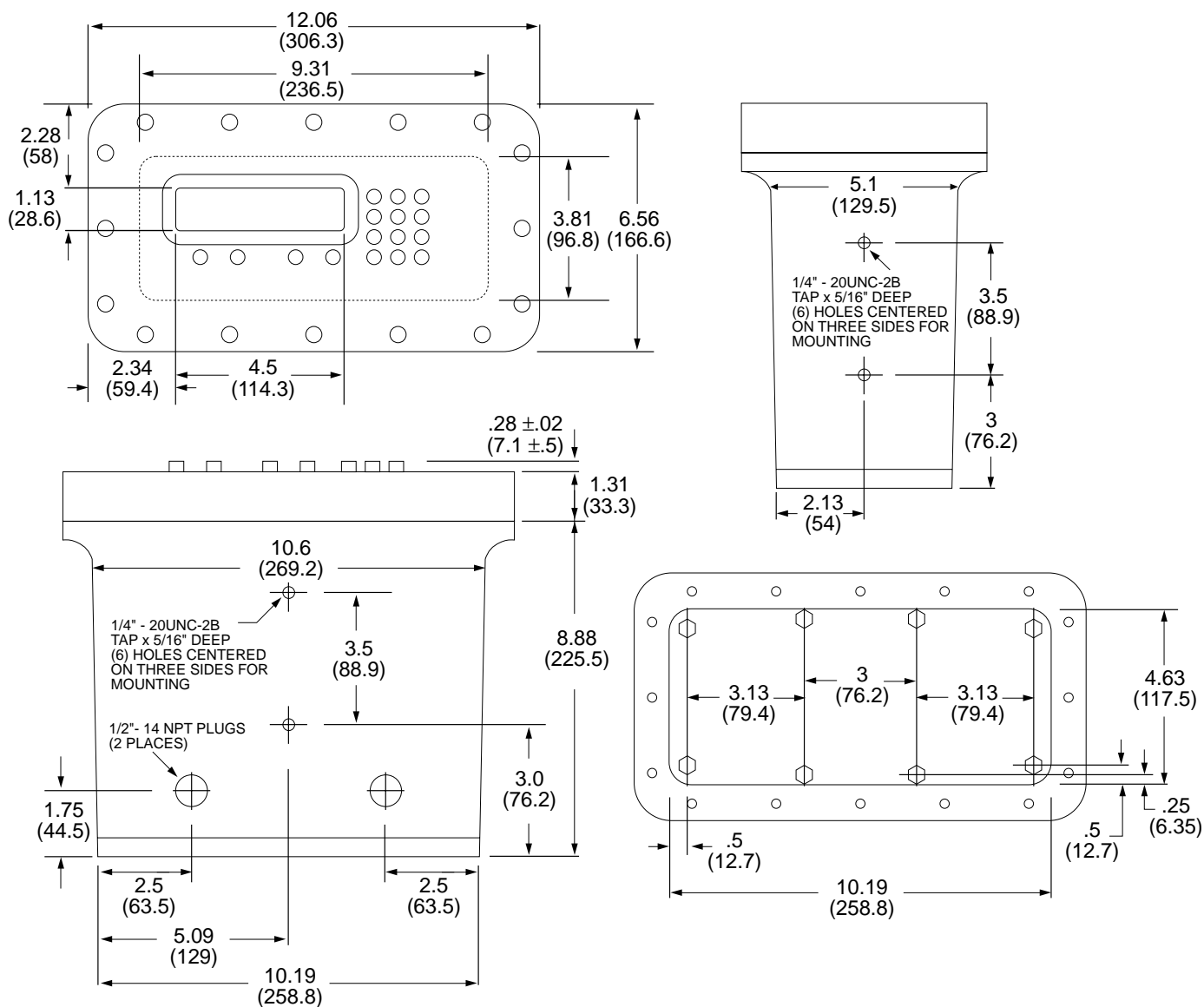
X = No Assembly

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.

Flow Instruments
ACCESSORIES

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:

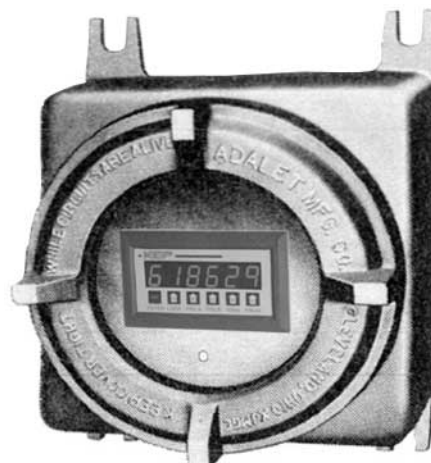
ADALET
UL (file# E81696)

The housing is made from cast aluminum and sealed to meet NEMA 7 and 4 specifications.

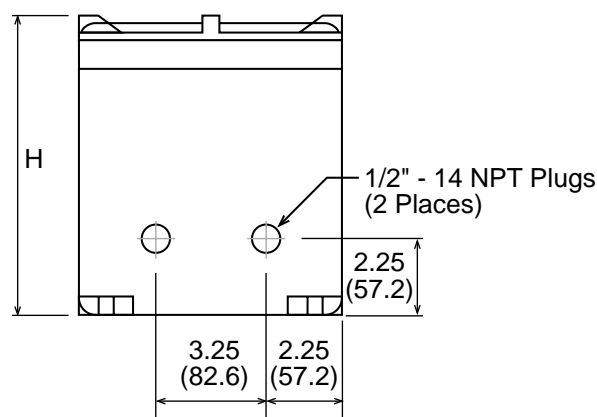
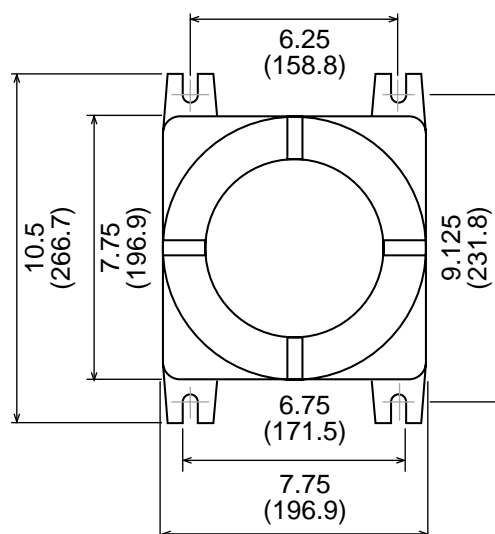
To install a unit, the cover must be removed and the KEP unit mounted in the sub panel provided.

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)

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:

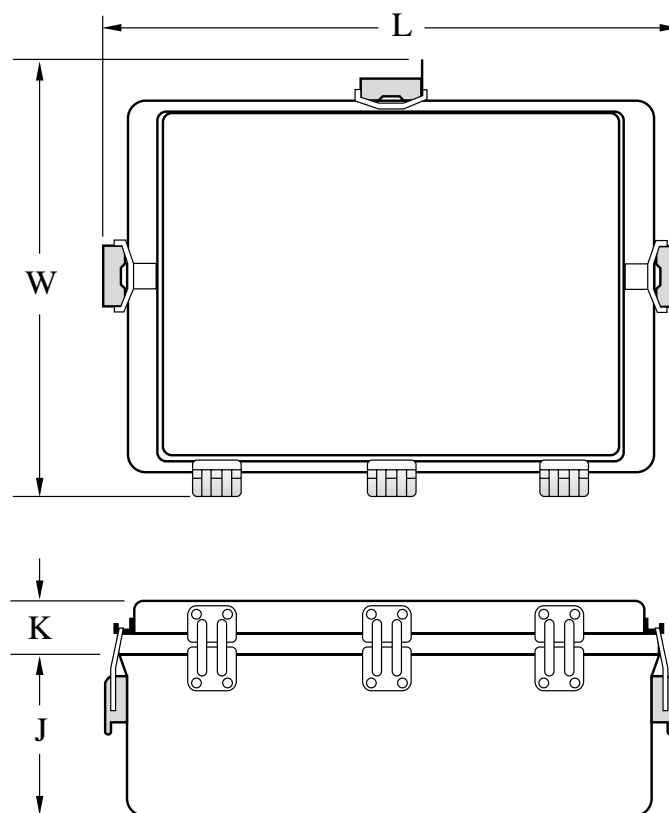
Ideal for use in most petro-chemical plants, sewage plants, food processing areas, packing plants, electro-plating plants, etc.

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.



Dimensions:



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	UL94
Dielectric Strength	400 V.P.M	D-149
Arc Resistance	180 Sec.	D-495

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 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)

Part Number	W	L	K	J
NEMA-1/8DIN	7.86 (200)	8.97 (228)	1.00 (25)	4.38 (111)
NEMAtrol4X & NEMAST4X	9.86 (250)	12.97 (329)	1.75 (44)	5.13 (130)

P1000

Desktop / Handheld Serial Printer

Features

- Dot Matrix Printer
- 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

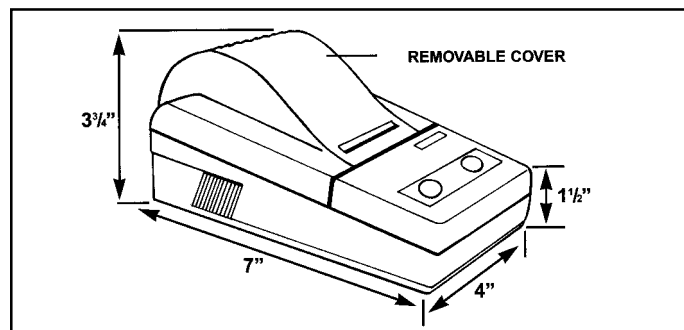
Applications:

- Logging data from KEP instruments
- Remote messages printing
- Real-time-clock (optional) for time and date stamp
- 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.

Dimensions:



Ordering Information

EXAMPLE P1000 1 C

Series _____
P1000 Printer

Operating Voltage _____
1 = 110V AC adaptor
2 = 230V AC adaptor
3 = 12V DC power cord

Options _____
C = Real Time Clock
(not required for ST1, ST1LE, ST2, LT2)

Accessories

P1AR = Ink Ribbon
P1AA230 = 230V Adapter
P1AA110 = 110V Adapter
P1AC25M9MC = 6', Printer cable for ST1 & ST2
P1AC25M9FC = 6', Printer cable for MRT & INT69
P1AC25M25MS = 6', Printer cable for all 'trolls



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

compositions:

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:

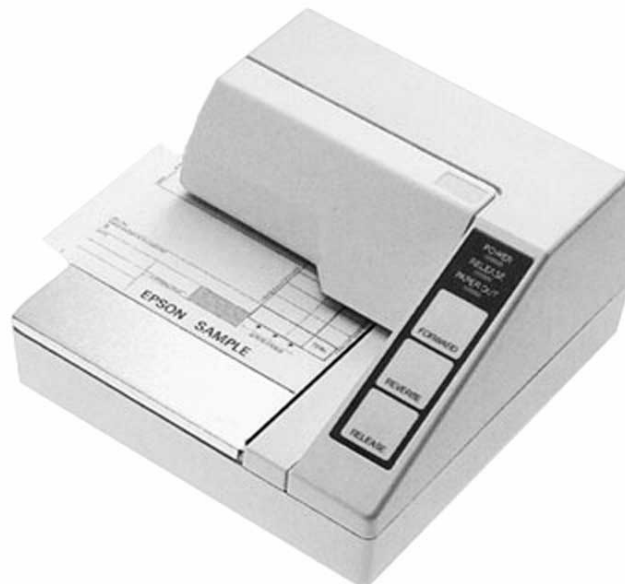
220V AC/DC adapter
12VDC adapter
Real Time Clock for time and date stamp at command

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



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.

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 to 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 DVC \pm 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

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

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:

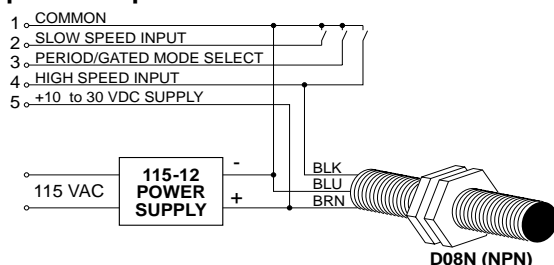
A compact supply to power various DC operated peripherals and inputs/output modules on PLC's, or transmitters in process control.

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

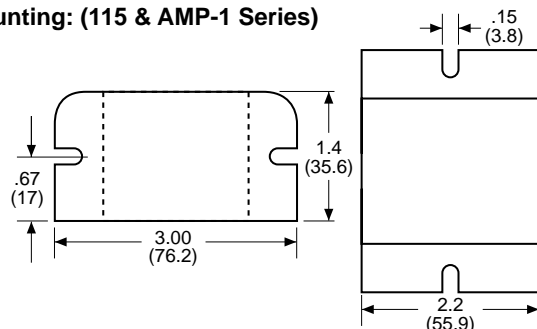
Part Number

- 115-5** 115VAC to 5VDC for all 5 Volt applications
115-12 115VAC to 5VDC for all 12 Volt applications
115-24 115VAC to 5VDC for all 24 volt applications
230-24 230VAC to 5VDC 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:

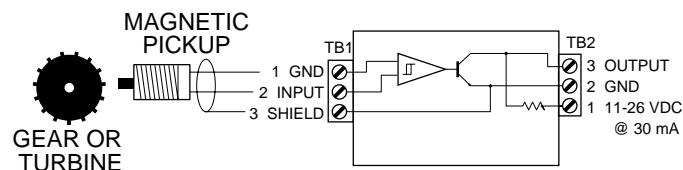
The KEP AMP 1 amplifies the low level signals from a magnetic pickup or flow transmitter by a factor of more than a hundred times to drive any ratemeter, counter or controller. The unit uses only 30 mA and operates from 11 to 26 VDC. It has a 2.7K pullup resistor attached to the open collector output 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)

SPARE PARTS

Spare Parts

ORDER NO.	DESCRIPTION
Model 36120	Flex Cover
KRTBEZEL	Front panel bezel for KEPtrol R/T
BT2BEZEL	Front panel bezel for BT2
KEPTROLBEZEL	Front panel bezel for KEPtrol
MFCBEZEL	Front panel bezel for MASStrol
FLOWBEZEL	Front panel bezel for FLOWtrol
DPFCBEZEL	Front panel bezel for DPFC
MBBEZEL	Front panel bezel for MASSbatch
LVTBEZEL	Front panel bezel for LEVELtrol
KFCBEZEL	Front panel bezel for KEPtrol F/C
ST1LELCDFRONT	LCD Front panel assembly for SUPERtrol ILE
ST1LEVDFRONT	VFD Front panel assembly for SUPERtrol ILE
ST1LCDFRONT	LCD Front panel assembly for SUPERtrol I
ST1VDFRONT	VFD Front panel assembly for SUPERtrol I
ST2LCDFRONT	LCD Front panel assembly for SUPERtrol II
ST2VDFRONT	VFD Front panel assembly for SUPERtrol II
LT2LCDFRONT	LCD Front panel assembly for LEVELtrol II
LT2VDFRONT	VFD Front panel assembly for LEVELtrol II
KP8CASE	Case for KEPtrol
KRTCASE	Case for KEPtrol R/T
BT2CASE	Case for BT2
FIOCASE	Case for Flowtrol
MASSCASE	Case for MASStrol
DPFCCASE	Case for DPFC
ST1LEREAR	Rear Case for SUPERtrol ILE
ST1REAR	Rear Case for SUPERtrol I
ST2REAR	Rear Case for SUPERtrol II
LT2REAR	Rear Case for LEVELtrol II
Model 34503	Mounting Kit for: MRT series, INT69 series, BEACON series
STMOUNT	Mounting Kit for: ST1series, ST2 series, LT2 series
TROLCLAMP	Mounting Kit (4 clamps & gasket)
*BATCHEMAINRT3L	KP8, KRT, BT2 Mainboard
*FLOWTROLMAIN	FLOWtrol Mainboard
*MASSMAINAC	MASStrol Mainboard, AC Power
*MASSMAINDC	MASStrol Mainboard, DC Power **
*DPFCMAINAC	DPFC Mainboard, AC Powered
*DPFCMAINDC	DPFC Mainboard, DC Powered **
*ST1LEMAINDC2	SUPERtrol ILE Mainboard, DC Powered, 2 Relays
*ST1LEMAINDC4	SUPERtrol ILE Mainboard, ** DC Powered, 4 Relays
*ST1LEMAINAC2	SUPERtrol ILE Mainboard, AC Powered, 2 Relays
*ST1LEMAINAC4	SUPERtrol ILE Mainboard, ** AC Powered, 4 Relays
*ST1MAINDC2	SUPERtrol I Mainboard, ** DC Powered, 2 Relays
*ST1MAINDC4	SUPERtrol I Mainboard, ** DC Powered, 4 Relays
*ST1MAINAC2	SUPERtrol I Mainboard, ** AC Powered, 2 Relays
*ST1MAINAC4	SUPERtrol I Mainboard, ** AC Powered, 4 Relays
*ST2MAINDC2	SUPERtrol II Mainboard, DC Powered, 2 Relays
*ST2MAINDC3	SUPERtrol II Mainboard, DC Powered, 3 Relays
*ST2MAINAC2	SUPERtrol II Mainboard, AC Powered, 2 Relays
*ST2MAINAC3	SUPERtrol II Mainboard, AC Powered, 3 Relays
*LT2MAINDC2	LEVELtrol II Mainboard, ** DC Powered, 2 Relays
*LT2MAINDC4	LEVELtrol II Mainboard, ** DC Powered, 4 Relays
*LT2MAINAC2	LEVELtrol II Mainboard, ** AC Powered, 2 Relays
*LT2MAINAC4	LEVELtrol II Mainboard, ** AC Powered, 4 Relays
KEPTROLDISP	KP8, KRT, BT2, FLO8 Display Board
MASSTROLDISP	MASStrol & DPFC Display Board

*PROM sold separately (see _Trol Program Chips at right)

**Specify voltage when ordering

MINITROL Input Chips

ORDER NO.	DESCRIPTION
EPLDMRTIN3	High Impedance input chip for Minitrol
EPLDMRTIN5	Up/down control input chip for Minitrol
EPLDMRTIN9	Quadrature input chip for Minitrol

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)	

MASStrol & DPFC Retrofit Boards

ORDER NO.	DESCRIPTION
MASSRS232	RS 232 Interface Kit

_TROL Program Chips

ORDER NO.	DESCRIPTION
PROMBT2	PROM for BATCHtrol II
PROMBT216PT	PROM for BT2 w/16Pt
PROMFLO	PROM for FLOWtrol
PROMKFC	PROM for KEPtrol F/C
PROMKP8	PROM for KEPtrol
PROMKRT	PROM for KEPtrol R/T
PROMKRT16PT	PROM for KRT w/16Pt
PROMMFC	PROM for MASStrol(2 chips)
PROMRS	PROM for Trol RS422 & RS232
PROMRS422M	PROM for Trol RS422M
PROMMB	PROM for MASSbatch
PROMMB16PT	PROM for MASSbatch w/ 16Pt
PROMDPFC	PROM for DPFC (2 chips)
PROMLTR	PROM for LEVELtrol
PROMMS627	PROM for MS627 (2 chips)
PROMST1LE	PROM for SUPERtrol-ILE
PROMST1	PROM for SUPERtrol-I
PROMST2	PROM for SUPERtrol-II
PROMLT2	PROM for LEVELtrol-II
PROMST485	PROM for RS-485 option card for SUPERtrol
PROMPEELST2	PEEL PROM for SUPERtrol-II