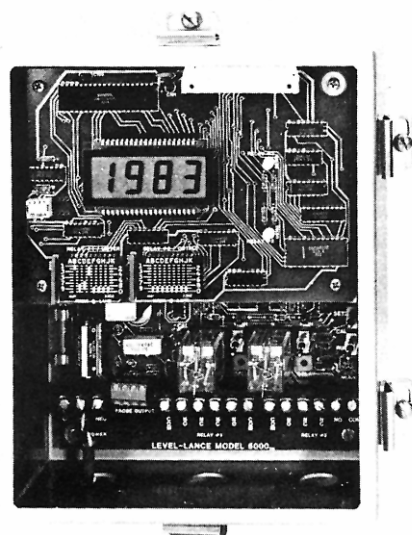


Model 5000A Microprocessor μP "Level Lance"



GENERAL DESCRIPTION

The Robertshaw Model 5000A Level-Lance is a microprocessor based indicator/controller employing a pulse frequency modulation (PFM) measuring system. Changing level conditions at the sensing probe cause a change in the pulse frequency output of the miniature transmitter that is normally mounted directly on the sensing probe. This pulse frequency is detected by the remote mounted indicator/controller and converted to a signal that is proportional to the level being measured. This resultant level signal can be:

- Displayed on the instrument door by means of 4 digit LCD display reading in percent or engineering units field selectable.
- Retransmitted via a 4-20 mADC output signal. This optional signal is compatible with all common receivers used for recording, indication, or control purposes.
- Used to communicate with a larger computer via 20 mA loop. The Model 5000A continuously sends product level information to the larger computer.

FEATURES AND BENEFITS

- **Microprocessor Based.**
- **Auto-Set** - Automatic calibration
- **Calibrate without completely emptying and filling vessel.**
- **Field Selectable Control Mode Programs.**
- **Duplex Alarm Relays.**
- **Digital Display** - Percent or engineering units.
- **Field Reversible Output.**
- **Uses Standard Two-Wire Cable** - Up 1 mile between probe system and the indicating controller.
- **NEMA-4, 4X, or Explosion-Proof Enclosures.**
- **Self-Diagnostic** - Indicates out of calibration, sensor failure, etc.
- **Calibration Retained via Battery Back-Up on Loss of Power.**
- **Linearization Optional for Level to Volume/Flow Conversion.**
- **UL/C-UL Listed Transmitter**

PRINCIPAL OF OPERATIONAL

The miniature pulse frequency modulation (PFM) transmitter is a two-wire unit that has the following features:

- **NO CALIBRATION ADJUSTMENTS**
- **NO MOVING PARTS**
- **NO SPECIAL CABLE - 2 PLAIN WIRES**
- **NO PRIMARY POWER REQUIRED**
- **LOW INSTALLATION COST**
- **LOW ENERGY - DESIGNATED EXPLOSION-PROOF**
- **INTRINSICALLY SAFE PFM & PROBE INPUT CIRCUIT.**

The Model 5000A has - as a standard feature - a "Control Mode Switch" which provides flexibility for the user. On one position of the switch, a diagnostic feature of the device is indicated.

This diagnostic position will show by means of a "CAL" light if the system is out of calibration. Also "SEN" light will indicate if the probe, PFM transmitter, or interconnecting wire is open or shorted. Other positions of the switch are used for calibration in "per-cent" or in "engineering units."

A parent "mother-board" contains all hook-up wiring, terminals, power supply and sockets for optional plug-in circuit boards. On this parent board are two (2) DPDT 10 amps relays for use as cyclic control relays and/or alarm functions.

The relays are completely independent and both may be set anywhere within the span, allowing an alarm/control combination. Calibration of the relays is accomplished by the "AUTOSSET" feature (digitally). Each relay has an adjustable differential (deadband), adjustable time delay, and can be set for High or Low Fail-Safe operations.

Calibration of the instrument is simplified by the use of the microprocessor - ie - if a known level is present on the probe, this level value may be entered and shown on the display by utilizing the appropriate calibration switches. By pressing the proper momentary contact switch, the microprocessor automatically calibrates the instrument to that point. Two such entries are all that is required for full calibration to the process. Calibration can be accomplished without completely emptying and filling vessel. Alarm conditions for both high and low alarm relay trip point settings are also switches and the digital display. Alarm points are set by simple data entry without the need to vary the process level.

Power supply options include DC voltages from 18 to 30; 120 volts AC or 240 volts AC. The AC voltages are field selectable.

SPECIFICATIONS

Electrical/Electronics:

Supply Voltages	120 VAC, $\pm 10\%$, Std. 240 VAC, $\pm 10\%$, Opt. 18 to 30 VDC, Opt.
Supply Current	less than 100 ma
Ambient Temperature Effect	$\pm .005$ Pf/ $^{\circ}$ F or ± 0.01 %/ $^{\circ}$ F whichever is greater

Supply Variation Effect	None
Span	10 to 6000 Pf
Linearity	$\pm 0.5\%$
Alarms	Electro-mechanical relay contacts, DPDT, 10 amp 120 VAC/28 VDC non-inductive
Current Output (Optional)	4-20 mADC Isolated
Maximum distance between PFM transmitter and the Indicator/Controller	One mile
Type interconnection cable	Standard 2 wire

Physical:

Standard Enclosure 10.75" x 8" x 6" deep
(Environmental: Model 5000A and/or PFM Transmitter)

Operating or Storage Temperature Range
- 40 $^{\circ}$ F to +140 $^{\circ}$ F (-40 $^{\circ}$ C to +60 $^{\circ}$ C)

Intrinsic Safety:

UL/c-UL listed PFM & probe input circuit Intrinsically safe for Class I, Div. 1, Groups A, B, C & D; Class II, Div 1, Groups E, F & G (Requires safety barrier, wiring connections, and sensors per Robertshaw Dwg. #907GA811)

Enclosure:

PFM - Suitable for Class I, Div. 1, Groups C & D;
Class II, Div. 1, Groups E, F & G.

5000A -optional NEMA 4 or explosion proof;
UL Listed for Class I, Groups C & D;
Class II, Groups E, F, G;
Class III.
CSA certified for Class I, Group D;
Class II, Groups E, F, G;
Class III.

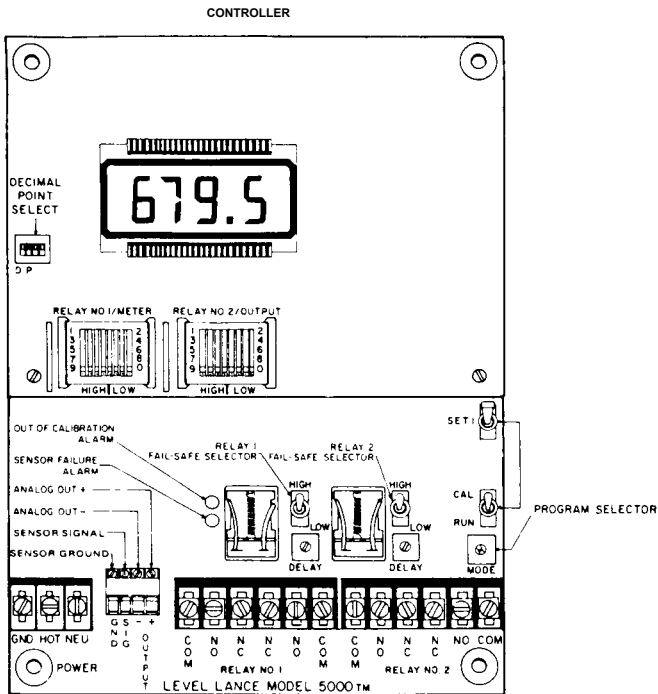
OPTIONAL FEATURES

Non-Linear Characterization

(for volume indication of horizontal cylindrical tanks, etc.)

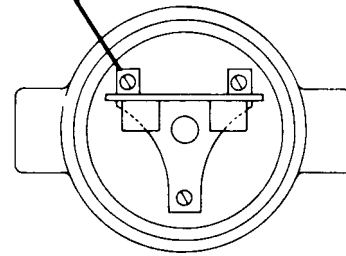
By utilization of this option using the "Smart Chip," characterization of the signal for non-linear applications is accomplished. After addition of the "Smart Chip" to the instrument, calibration is done as is normally done with standard Model 5000A and the signal is automatically characterized to indicate/control the actual volume in the vessel, or flow in the weir or flume.

Electrical Connections



Direct Mounted Standard PFM Transmitter

TERM. 7 & 8

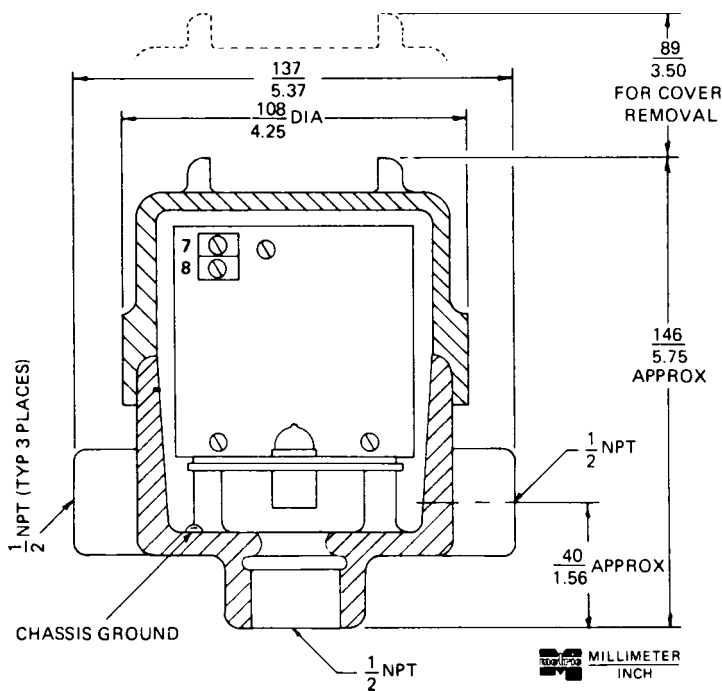


ELECTRICAL CONNECTIONS

TERM NO.	DESCRIPTION	
7	OUTPUT	GND
8		SIG

TO LEVEL LANCE

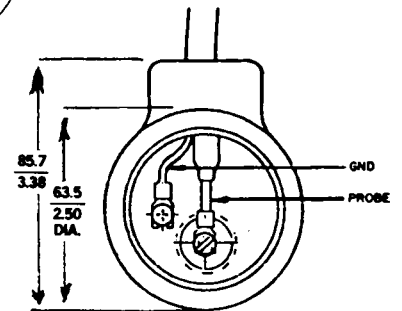
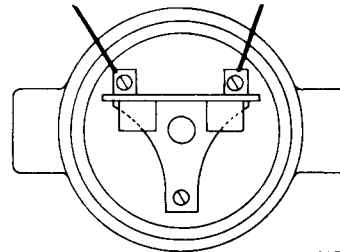
Outline Dimensions, PFM Transmitter



Remote Mounted Standard PFM Transmitter

TERM. 7 & 8

TERM. 5 & 6



CONDUIT
OUTLET BOX

ELECTRICAL CONNECTIONS		REF
TERM NO.	DESCRIPTION	
7	OUTPUT	GND
8		SIG
5	INPUT	GND
6		PROBE

TO
LEVEL LANCE

CO-AX
TO PROBE

ORDERING INFORMATION

KEY MODEL NUMBER

Model No.	Description
5000A	Microprocessor- based continuous level measurement system. Includes the digital display, 2 DPDT relays and the direct mounted PFM Transmitter that is in an explosion-proof enclosure.

TABLE 1-ENCLOSURE

Desig.	Description
A	NEMA 4 painted steel with window & NEMA 4 PFM Transmitter
F	NEMA 4 painted steel with window & NEMA 4X (Gray Epoxy) PFM Transmitter
B	Explosion Proof Blind (without window) & NEMA 4 PFM Transmitter
G	Explosion Proof Blind (without window) & NEMA 4X (Gray Epoxy) PFM Transmitter
C	Explosion Proof with window & NEMA 4 PFM Transmitter
H	Explosion Proof with window & NEMA 4X (Gray Epoxy) PFM Transmitter
D	NEMA 4X Stainless Steel with window & NEMA 4 PFM Transmitter
J	NEMA 4X Stainless Steel with window & NEMA 4X (Gray Epoxy) PFM Transmitter
E	NEMA 4X Glass reinforced polyester with window & NEMA 4 PFM Transmitter
K	NEMA 4X Glass reinforced polyester with window & NEMA 4X (Gray Epoxy) PFM Transmitter

TABLE 2 - SUPPLY POWER

Desig.	Description
1	18 to 30 VDC
2	120VAC, ±10%
3	240 VAC, ± 10%

TABLE 3 - OUTPUT SIGNAL

Desig.	Description
A	None
C	4 to 20 mADC Isolated

TABLE 4 - OPTIONS

Desig.	Description
1	None
2	Non-Linear Characterization (Smart Chip)
4*	Remote PFM transmitter 15 ft. max.)
6	Combination of 2 and 4 above

* Maximum distance between transmitter and probe is 15 feet. Includes nipple plug and floor flange 909GM174-01.

NOTE:

Remote mounted PFM Transmitter requires 032KC Series coaxial cable and 909SD029 Series conduit Outlet box. Order separately. See Table 5 for available cables.

Table 5 - Accessories

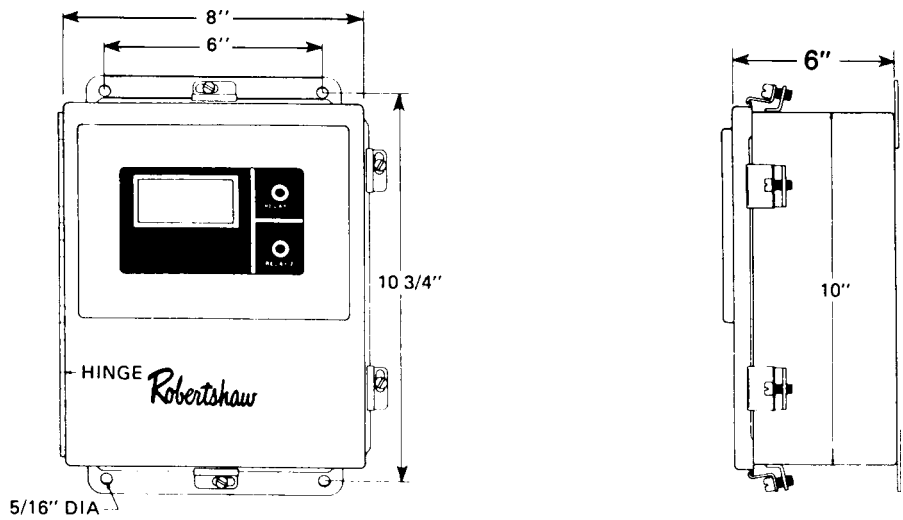
Part Number	Description
032KC190-XX*	Conduit with 1/2" NPT connections, flexible, liquid tight, general purpose
032KC600-XX*	Coax cable
032KC650-XX*	Coax cable with general purpose conduit
032KC700-XX*	Coax cable with NEMA 4 conduit outlet box
032KC710-XX*	Coax cable with general purpose conduit and NEMA 4 conduit outlet box
032KC720-02	Coax cable, 2 ft. long, with explosion proof conduit and NEMA 4 conduit outlet box**
032KC720-05	Coax cable, 5 ft. long, with explosion proof conduit and NEMA 4 conduit outlet box**
032KC720-08	Coax cable, 8 ft. long, with explosion proof conduit and NEMA 4 conduit outlet box**
032KC720-10	Coax cable, 10 ft. long, with explosion proof conduit and NEMA 4 conduit outlet box**
032KC800-XX*	Coax cable with NEMA 4X epoxy painted conduit outlet box
032KC810-XX*	Coax cable with general purpose conduit and NEMA 4X epoxy painted conduit outlet box
032KC820-02	Coax cable, 2 ft. long, with explosion proof conduit and NEMA 4X epoxy painted conduit outlet box**
032KC820-05	Coax cable, 5 ft. long, with explosion proof conduit and NEMA 4X epoxy painted conduit outlet box**
032KC820-08	Coax cable, 8 ft. long, with explosion proof conduit and NEMA 4X epoxy painted conduit outlet box**
032KC820-10	Coax cable, 10 ft. long, with explosion proof conduit and NEMA 4X epoxy painted conduit outlet box**
032KC900-XX*	Coax cable with NEMA 4X stainless steel conduit outlet box
032KC910-XX*	Coax cable with general purpose conduit and NEMA 4X stainless steel conduit outlet box
032KC920-02	Coax cable, 2 ft. long, with explosion proof conduit and NEMA 4X stainless steel conduit outlet box**
032KC920-05	Coax cable, 5 ft. long, with explosion proof conduit and NEMA 4X stainless steel conduit outlet box**
032KC920-08	Coax cable, 8 ft. long, with explosion proof conduit and NEMA 4X stainless steel conduit outlet box**
032KC920-10	Coax cable, 10 ft. long, with explosion proof conduit and NEMA 4X stainless steel conduit outlet box**
909SD029**	Conduit outlet box, NEMA 4
909SD029-50**	Conduit outlet box, NEMA 4X, epoxy painted
909SD029-51**	Conduit outlet box, NEMA 4X, stainless steel

* Substitute the desired cable length, in feet, for "XX" to complete the Cable Assembly Part Number.
Maximum Allowable Coax Cable Length is 15 feet.
outlet box**Coax cable is Teflon insulated, maximum temperature 350°F, with terminations for attachment to probe and PFM Transmitter.

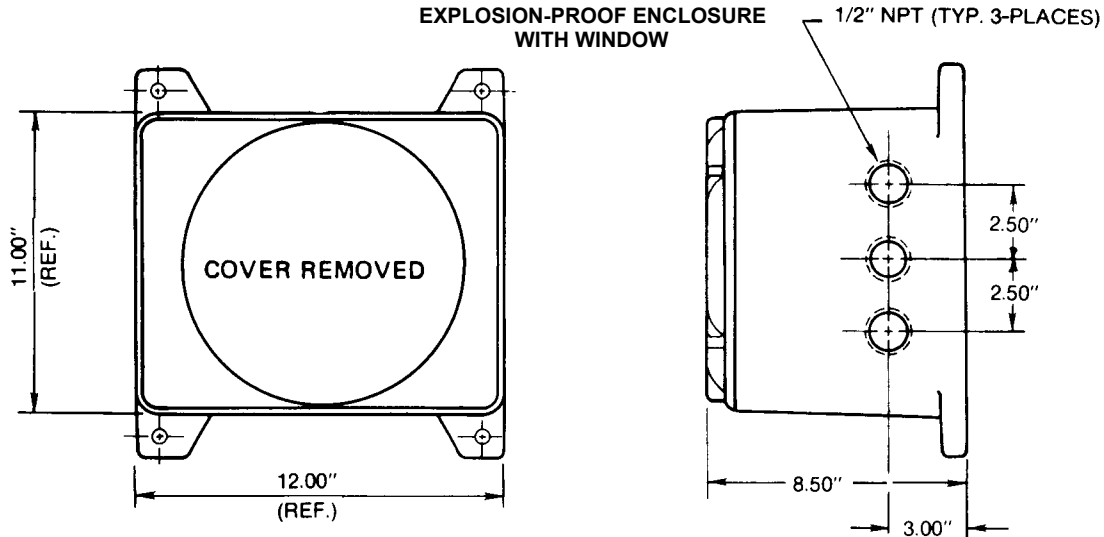
** Conduit outlet boxes are explosion proof.

Outline Dimensions

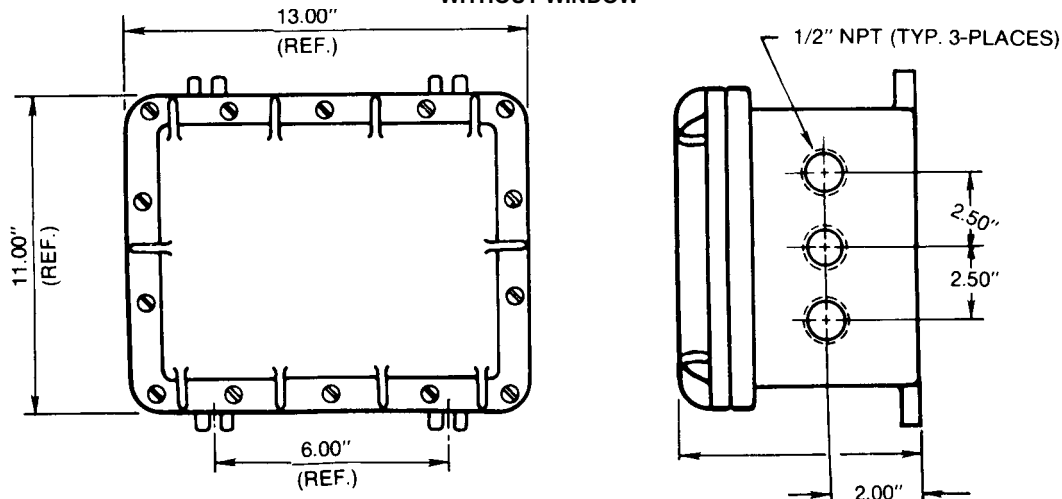
WEATHER-TIGHT ENCLOSURE



EXPLOSION-PROOF ENCLOSURE WITH WINDOW



EXPLOSION-PROOF ENCLOSURE WITHOUT WINDOW



Robertshaw

U.S.A. and CANADA

Robertshaw Industrial Products Division
1602 Mustang Drive
Maryville, TN 37801
Phone: (865) 981-3100 Fax: (865) 981-3168
<http://www.robertshawindustrial.com>

Exports

Invensys Appliance Controls
2809 Emerywood Parkway
P.O. Box 26544
Richmond, Virginia 23261-6544
Phone: (804) 756-6500 Fax: (804) 756-6561

Q-4104 (1/01)