

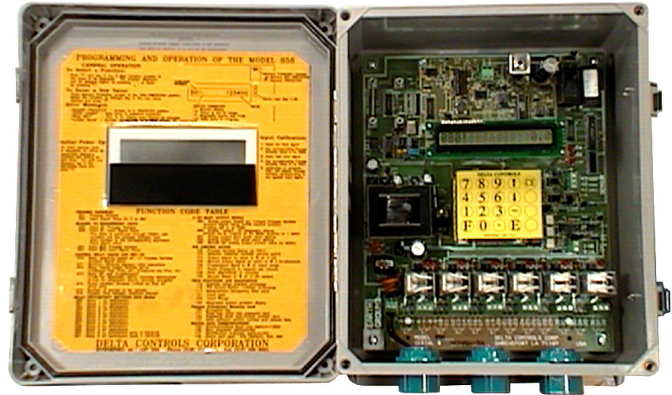
MODEL 858 TRANSMITTER USING ULTRASONIC TECHNIQUES

FEATURES

- Non-Contacting Measurement
- Measurement Ranges up to 160 Feet
- Microprocessor Based Electronics
- Automatic "Smart" Compensation for Varying Tank Conditions
- 20 Key Keypad for Easy Entry of Calibration Data by User
- Output Characterization for Volume, Weight or Open Channel Flow
- User Selectable Inage or Outage Output Signal
- Precise Automatic Temperature Compensation Using an Integrated Two-Wire Transmitter
- Isolated 4-20 mADC Output Standard
- Optional RS-232C, RS-422 or RS-485 Communications Port
- Selectable Baud Rate for Digital Communication Outputs (300 to 9600)
- Remote Calibration and Interrogation Capability by Host or Telemetry
- 16 Character Alpha-Numeric LCD Display
- Six 10 Amp, SPDT Relays for Alarm and/or Control Purposes
- Relay #6 Programmable as Echo Lost Relay
- Complete Pump Control Software
- All Factory Settings Adjustable in the Field Using the Integral Keypad
- Memory Protection w/o Batteries (More Than 5 Years Following Power Loss)
- Sound Velocity Correction Software
- Self-Checking and Diagnostics
- Programmable Anti-Tamper Feature
- Industrial Grade Electronics
- 4X Epoxy/Glass SS Trimmed Enclosure
- Submersible Sender/Receivers Built By Delta. Unaffected by Condensation or Corrosion

APPLICATION

Ultrasonic level transmitters are widely used in the various process industries and in municipal water and wastewater facilities to measure products which are gummy, abrasive, dirty, viscous or corrosive. The sensor, or sender/receiver, mounts above the product to be measured and normally does not come in contact with it. In many cases an existing process fitting can be used, so installation cost is minimal. No routine maintenance is required.



SPECIFICATIONS

GENERAL TYPE: Microprocessor based, digital.

POWER REQUIREMENTS: 120 or 240 VAC, 12 watts.

AMBIENT TEMPERATURE RANGE: -20 to 160°F

ANALOG OUTPUT: 4-20 mADC isolated, 1,000 ohms maximum better than 0.001 (12-bit) resolution.

DIGITAL OUTPUTS: RS-232C, RS-422A or RS-485.

CALIBRATION ENTRY: Sealed 20-key keypad

CALIBRATION PARAMETERS: Zero, span, blanking, dampening, level, volume or distance output, inage or outage measurement mode, tank characterization for volume or weight output, flow, or 20 point strapping table characterization, various engineering units for display readout, sound velocity correction, relay set points, pump control rotation (lead/lag or alternate for up to 6 pumps if echo lost relay not included), baud rate for digital output, and lock-out code to prevent tampering by unauthorized personnel.

INDICATION: Board mounted 16 character, alphanumeric LCD. Can be programmed to display level, volume or weight, distance to product surface, any entered calibration parameter, and self-diagnostic fault data. Menu driven programming; Function and parameters are displayed; An error code is displayed if any figure entered exceeds upper or lower limits for that parameter.

MEMORY PROTECTION: Non-volatile RAM, no battery.

TEMPERATURE COMPENSATION: Standard and automatic. 2-wire temperature transmitter: direct reading in °F or °C. 4-20mA output optional

ACCURACY: 0.50% of sender/receiver range.

ALARMS: Six 10 amp, SPDT Number 6 can be programmed for echo lost or self-checked alarm.

WIRING CONNECTIONS: Clamp type terminal strips provided for wire sizes up to 12 gage.

MULTIFUNCTION NONCONTACT LEVEL INSTRUMENT

OPERATING PRINCIPLE

A high frequency sound pulse is transmitted to the surface of the product to be measured by the sender/receiver. The sound pulse strikes the surface of the product and is reflected back to the sender/receiver as an echo. Transit time to and from the surface is measured and divided by two to yield the actual distance that the sound pulse has traveled. Distance is then subtracted from "zero" which is normally the height of the tank or vessel. The resulting number is product level. A microprocessor controls the transmit and receive cycles and evaluates each echo to verify its validity. The microprocessor also monitors vessel conditions for changes in conditions that may require adjustment of transmit power, gain and timing.

THIRD GENERATION

The Model 858 is Delta Control's third generation microprocessor based ultrasonic level system. Its design reflects experience gained in essentially all of the industrial and municipal process industries. Its software includes many refinements, which simplify startup and provide reliable, trouble free operation.

STANDARD OUTPUTS

An isolated 4-20 mADC analog output signal is standard as are six 10 amp, SPDT relays which can be used for alarm and/or control purposes. Relay # 6 can be user selected as a lost echo relay or self-diagnosed alarm. A sixteen character alphanumeric LCD display provides a visual readout of level as well as many other parameters measured or stored by the 858 data system.

DIGITAL COMMUNICATIONS PORT

RS-232, RS-422 and RS-485 are offered as options with the 858. When a communications port is included, the transmitter can be interrogated or even recalibrated with a hand-held calibrator, remote computer, PLC, or through a telemetering system.

SOUND VELOCITY CORRECTION

If the gas layer above the product being measured is not air, the velocity of sound through that gas will be different than the velocity figure set at the Factory. If no correction is made, the measured level will be in error by a percentage equal to the difference in the two velocity figures. Since published sound velocity tables are limited to a small number of pure gases velocity must usually be measured and calculated in place. The 858 uses a level reference taken manually to calculate velocity and then automatically stores that figure in memory.

TEMPERATURE COMPENSATION

Changing temperatures have a significant effect on sound velocity and therefore overall instrument accuracy. Delta uses a precise two-wire temperature transmitter installed close to the inner face of the sender/receiver rather than a relatively inaccurate resistor or diode.

OUTPUT CHARACTERIZATION

The level signal, once derived, can be characterized for volume, weight or open channel flow units. A curve with as many as 20 points can be programmed in the field and easily changed at any time. The 4-20 mADC output signal can be programmed to be proportional to either level or the characterized equivalent. Relay set points can also be based on either level or the characterized output.

SMART FUNCTIONALITY

Conditions inside a vessel often change, even when the vessel is used for storage only. A light layer of foam may result from periodic agitation. Heavy vapors or steam may develop occasionally. Dust may accompany vessel loading. Any condition that attenuates the return echo can cause an echo lost response from some commercial grade transmitters. Each time the 858 makes a level measurement, it checks echo strength and increases or decreases transmit power and gain, as necessary. The 858 may be installed on small stilling without creating problems. Full keyboard control of related functions makes stilling well applications easy with the 858.

LOCKOUT FEATURE

The 858 can be programmed with a password to prevent changes in calibration by unauthorized personnel. Loss of power does not defeat the password lock. It is not necessary to remove part of the instrument and carry it around to get protection.

SELF-DIAGNOSTICS

Diagnostic routines are included in the 858's software to permit computer testing and proving at the factory before shipment. Those same diagnostic functions are available to the user through the keypad. Many parts of the instrument system are continuously monitored and checked to insure that the whole instrument is operating properly. The coax, temperature transmitter, cable & microprocessor are among the parts checked. The instrument may be programmed to produce various actions when a failure is detected.

MADE IN THE USA BY DELTA CONTROLS CORPORATION

INSTRUMENT ALGORITHM IS CONTROLLED BY THE USER ALLOWS TAILORING TO WORK IN VERY DIFFICULT SERVICES

GENERAL OPERATING DETAIL

All calibration, display and diagnostic functions of the 858 can be accessed with the integral 20 key keyboard. The sixteen character alphanumeric indicator displays the function number on the left and the actual value on the right. All calibration data can be protected from unauthorized or accidental change with the use of a lockout code. In the event of a power loss, calibration data remains safely stored in non-volatile RAM memory for over five years following power loss. There is no scheduled maintenance required to change out batteries.

During normal operation, the LCD indicator displays measured level, a characterized output the user has programmed into memory or distance from the sender/receiver to the surface of the product being measured. Displayed value can be changed at any time quickly and easily through the use of the built-in keyboard. Temperature sensed at the sender/receiver can also be displayed locally or remotely.

MULTIPLE PUMP CONTROL

The Model 858 includes software for control and rotation of up to six pumps (if Relay #6 is not used for lost echo contacts). Timed overrides and delays between pump starts and stops can be programmed as well as the rotation sequence.

STILLING WELLS

A small stilling well can be used to accommodate a heavy foam layer, wind interference, or an object that would otherwise be in the sound pulse path, the 858 allows adjustment of gain and transmit power limits for the particular stilling well in use.

INDUSTRIAL GRADE PARTS

The quality of an instrument is only as good as the quality of the components used in it. Delta uses industrial grade rather than commercial grade electronic components in the 858, as it does in all of its instrument products. Industrial grade components operate reliably over a much broader temperature range than their less expensive counterparts. A good example of that difference is the LCD display, which continues to function reliably in outdoor winter or summer temperatures.

FACTORY TEST AND CALIBRATION

Each 858 circuit board is subjected to continuous cycling at elevated temperatures for a minimum of seven days before being tested and calibrated. After

the boards are mated to their enclosures they are tested and calibrated by a computer. The test procedure is rigorous and includes several checks of logic and memory functions as well as standard voltage and current tests. If no specific calibration parameters have been requested by the purchaser, maximum range and default calibration values based on the sender/receiver selected are then programmed into the instrument.

FIELD CALIBRATION

Field calibration of the 858 is simplified with the use of an integral 20 key keypad. The keypad includes scroll keys to permit quick review of all stored data. A "demand mode" routine automatically guides the user through the list of calibration parameters that must be entered. The default value in memory is displayed, and the user can either accept it or enter another value. The function number for that parameter appears on the left side of the display, while the value itself appears on the right side of the display.

All calibration settings including those normally made at the factory are accessible through the keypad. For example, response time can be dampened to correct for turbulence. Blanking, usually a fixed setting based on the range of the sender/receiver, can be increased to eliminate the effects of an object in the sound path. The transmitter can be tuned to accommodate long or varying cable lengths without the use of an oscilloscope. The 4-20 mADC signal can be programmed to hold the last valid reading, drive to 2MA, or to drive 22 MA in the event of an echo lost diagnosed failure condition. One of the relays can also be programmed to energize or de-energize in the event of an echo lost or failure condition. The 4-20 mADC signal can be programmed for reverse output, so that 4mA represents a full rather than an empty vessel.

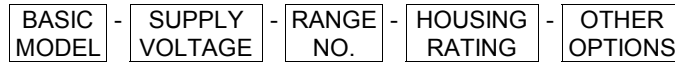
SENDER/RECEIVERS

Delta Controls designs and manufactures its own sender/receivers. All are completely sealed and submersible. All operate in pressurized vessels up to 50 psig. Units are available for operation from -40 to +300°F (40 to +150°C). Liquid condensation on the face of a sender/receiver will not impair normal operation.

Sender/receivers are available in two basic mounting configurations: stem mount and flanged flush mount. Stem mount S/R's can be provided with NPT fittings at the process end or with flanges supporting the stem neck. Extension necks may be up to 8 feet (2.5 M) long.

See the S/R specification sheet for details

MODEL NUMBERING SYSTEM



EXAMPLE 858 - 1 - D - 4X - ID-RS232

M/N	DESCRIPTION
858	BASIC UNIT
860	4 S/R UNIT INPUT, 4 LINE DISPLAY OTHERWISE, SAME AS SINGLE INPUT 858

M/N	SINGLE PHASE
1	120 VAC, 50/60 Hz
2	240 VAC, 50/60 Hz

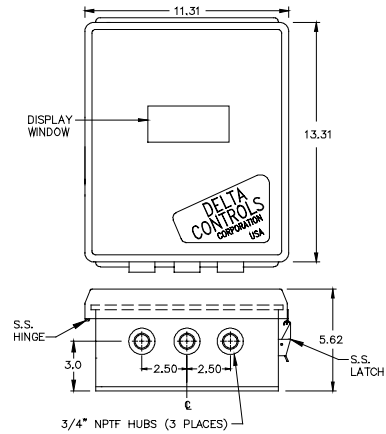
RANGE	S/R	MINIMUM RANGE		MAXIMUM RANGE	
		INCH	MM	FEET	METERS
A	14	6	150	5	1.5
B	17	8	130	6	1.8
H	19	9	230	12	3.7
C	22	12	305	17	5.5
D	26	16	405	25	7.6
E	30	24	610	55	17.2
F	35	36	915	80	25.0
G	38	48	1220	120	38.0

REFER TO THE S/R SPEC SHEETS FOR SENSOR DETAILS & SELECTION.

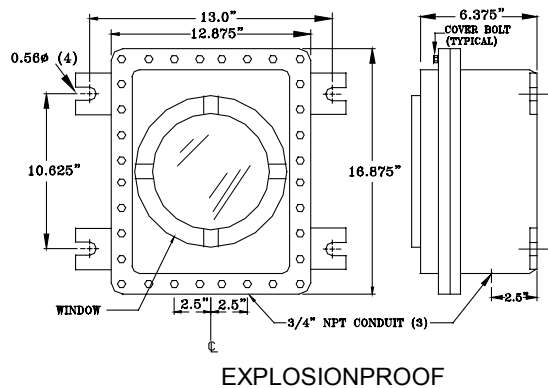
M/N	DESCRIPTION
ID	ILLUMINATED LCD DISPLAY
RS232	RS-232 DIGITAL COMM PORT
RS422	RS-422 DIGITAL COMM PORT
RS485	RS-485 DIGITAL COMM PORT
PSM	2" PIPESTAND MOUNT BKT

M/N	HOUSING (U.L. & CSA LISTED)
4X	HOSEPROOF, SS TRIMMED FIBERGLASS, CORROSION RESISTANT
7C	EXPLOSION PROOF; CLASS 1, DIVISION 1 GROUPS C,D; ALSO 4X; ALUMINUM
7B	SAME; EXCEPT ALSO GROUP B

OUTLINE DIMENSIONS

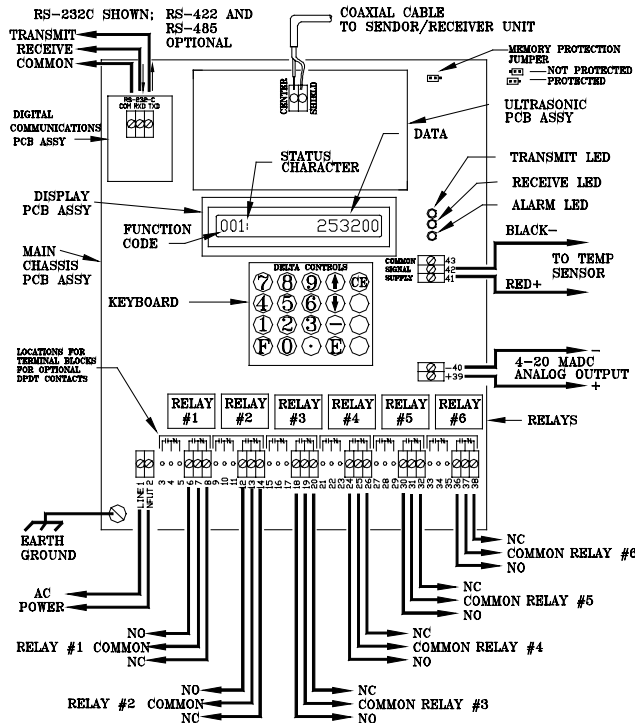


4X HOSEPROOF



EXPLOSIONPROOF

INSTRUMENT LAYOUT AND WIRING DIAGRAM



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