

Installation and Operating Manual



Ultrasonic Non-Contact
Transmitters for Level,
Volume, or Open
Channel Flow



Read this Manual Before Installing

This manual provides information on the Echotel® Model 344/345 Ultrasonic Transmitter. It is important that all instructions are read carefully and followed in sequence. Detailed instructions are included in the *Unit Configuration* section of this manual.

Conventions Used in this Manual

Certain conventions are used in this manual to convey specific types of information. General technical material, support data, and safety information are presented in narrative form. The following styles are used for notes, cautions, and warnings.

NOTES

Notes contain information that augments or clarifies an operating step. Notes do not normally contain actions. They follow the procedural steps to which they refer.

Cautions

Cautions alert the technician to special conditions that could injure personnel, damage equipment, or reduce a component's mechanical integrity. Cautions are also used to alert the technician to unsafe practices or the need for special protective equipment or specific materials. In this manual, a caution box indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

WARNINGS

Warnings identify potentially dangerous situations or serious hazards. In this manual, a warning indicates an imminently hazardous situation which, if not avoided, could result in serious injury or death.

Safety Messages

Follow all standard industry procedures for servicing electrical and computer equipment when working with or around high voltage. Always shut off the power supply before touching any components. Although high voltage is not present in this system, it may be present in other systems.

Electrical components are sensitive to electrostatic discharge. To prevent equipment damage, observe safety procedures when working with electrostatic sensitive components.

Low Voltage Directive

For use in Installations Category II, Pollution Degree 2. If equipment is used in a manner not specified by the manufacturer, protection provided by equipment may be impaired.

WARNING Explosion hazard. Do not connect or disconnect designs rated Explosion-proof or Non-incendive unless power has been switched off and/or the area is known to be non-hazardous

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Performance specifications are effective with date of issue and are subject to change without notice. Magnetrol reserves the right to make changes to the product described in this manual at any time without notice. Magnetrol makes no warranty with respect to the accuracy of the information in this manual.

Warranty

All Magnetrol electronic level and flow controls are warranted free of defects in materials or workmanship for one full year from the date of original factory shipment.

If returned within the warranty period; and, upon factory inspection of the control, the cause of the claim is determined to be covered under the warranty; then, Magnetrol will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

Magnetrol shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of equipment. There are no other warranties expressed or implied, except special written warranties covering some Magnetrol products.

Quality Assurance

The quality assurance system in place at Magnetrol guarantees the highest level of quality throughout the company. Magnetrol is committed to providing full customer satisfaction both in quality products and quality service.

Magnetrol's quality assurance system is registered to ISO 9001 affirming its commitment to known international quality standards providing the strongest assurance of product/service quality available.





Echotel® Model 344/345 Ultrasonic Non-contact Transmitters

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1.0 Installation

Caution: Read entire section prior to starting installation.

1.1 Unpacking

Unpack the instrument carefully. Make sure all components have been removed from the packing material. Inspect all components for damage. Check the contents of the packing slip and report any discrepancies to the factory. Check the nameplate model number to be sure it agrees with the packing slip and purchase order. Check and record the serial number for future reference when ordering parts.

Model Number

Serial Number

1.2 Mounting

1.2.1 Transmitter Location

The transmitter enclosure should be securely fastened to an appropriate supporting structure, in a location that permits easy access for maintenance. Avoid locations that are exposed to direct sunlight, flooding, high levels of radiated electromagnetic interference, and excessive vibration or shock.

1.2.2 Transducer Location =

Model 384/385 transducers must be mounted directly over the material to be measured. Both floor and wall mount transducer brackets are available for use over open tanks or channels. Flange mounts are available for use with closed vessels. If mounted in a location where there is intense, extreme, direct sunlight, a sunshade is recommended.

Proper mounting and wiring of the ultrasonic transducer is of the utmost importance. Both the accuracy and the reliability of the Model 344/345 can be adversely affected if the transducer is mounted improperly.

NOTE: The 344/345 requires a blocking distance between the transducer and the maximum liquid level. The minimum blocking distance is 12 inches (305 mm) for Model 345 and 18 inches (460 mm) for Model 344. At temperatures above +140° F (+60° C) minimum, it is 18 inches for either model. Maximum blocking distance should be limited to approximately 10 feet (3 m) as this blocking distance is extended at the expense of the useful span over which the instrument operates.

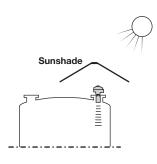
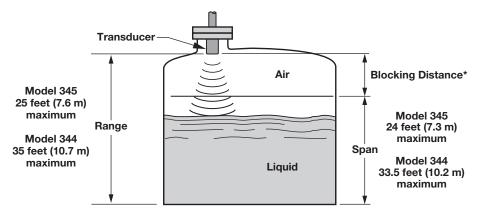


Figure 1
Transducer Sunshade



*Minimum Blocking Distance: 18 inches (460 mm) for the Model 344 12 inches (305 mm) for the Model 345

Figure 2
Transducer Mounting Location-Level/Volume

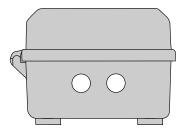


Figure 3
Predrilled Conduit Openings

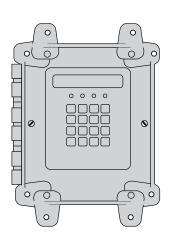


Figure 4
Transmitter Mounting Tabs

1.3 Transmitter Mounting Procedure

There are two predrilled openings in the enclosure for connecting ¾" NEMA 4X conduit. Refer to Figure 3.

- 1. Open the door of the unit.
- 2. Drill holes in the enclosure as required for additional wiring. Be careful not to damage the printed circuit boards. Be sure that the PC boards are not damaged or contaminated when removing filings and/or debris from the housing.
- 3. Provide watertight seals for all wiring entrances in the enclosure to maintain the NEMA 4X rating.
- 4. Mount the enclosure to a wall or flat surface using the appropriate screws or bolts. The mounting tabs on the back of the enclosure can be rotated to the sides, or top and bottom to facilitate mounting. Refer to Figure 4.
- 5. Install conduit for power and control wiring. Be sure all connections to the enclosure maintain a NEMA 4X rating.
- 6. Close the door until it is time to wire the transmitter. Secure the door by tightening the six screws. Proceed to Transducer Mounting on the next page.

NOTE: Do not overtighten the screws that hold the transmitter door closed. Do not use an electric or pneumatic drive on the screw. Overtightening can cause cracking of the housing, resulting in leakage into the housing.

1.4 Transducer Mounting Requirements

1. Whenever possible, locate the transducer to avoid obstructions between the transducer face and the surface of the level being tracked. The ultrasonic signal is emitted from the transducer with a beam spread of approximately 12 degrees. Objects that extend into the ultrasonic beam can produce echoes that mask the true level. The false target buffering feature allows for blocking out up to nine obstructions inside the tank.

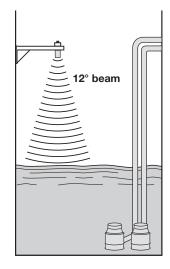
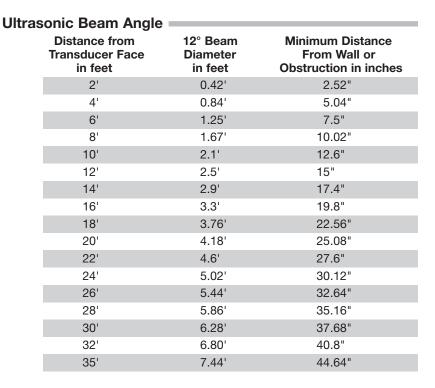


Figure 5
Ultrasonic Beam Angle



- 2. Position the transducer so that the radiating surface or transducer face is exactly parallel to the measurement surface. This will provide the strongest return signals and enhance the reliability of the Model 344/345.
- 3. In applications where the material level may come into the blocking distance or where the full tank height will be used, the transducer must be mounted in a short pipe stub (standpipe). The diameter of the standpipe should be at least 8 inches (200 mm) and its length should be limited to 11 inches (280 mm) from transducer face. Refer to Figure 6.

NOTE: When mounting in a standpipe, performance is enhanced by using as short of a pipe as possible.

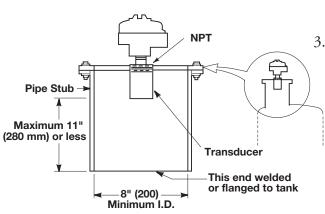


Figure 6
Transducer Mounting in Standpipe

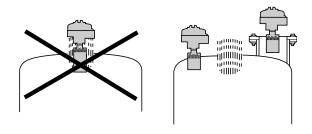


Figure 7
Transducer Mounting for Tanks With Exhaust

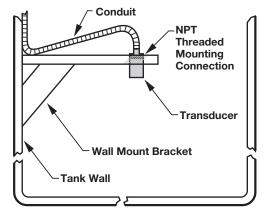


Figure 8

- 4. Avoid installing the transducer in tank top openings that exhaust heated air or vapors. The boundaries between the vapors and the outside air often represent acoustic impedance gradients that can cause troublesome sound reflections. In those installations, the transducer should be mounted well away from the opening inside the tank, or in a pipe stub. Refer to Figures 6 and 7.
- 5. To prevent electromagnetic noise from disrupting the normal operation of the Model 344/345, it is recommended that each transducer cable be run in its own conduit, separated from other power cables and wiring.
- 6. Locate the mounting procedure from the chart below and proceed to the appropriate instructions.

NPT	Mounting	Housing	Section
3/4" or 2"	bracket	without	1.4.1
2"	bracket	with	1.4.2
3/4", 1", or 2" flange		without	1.4.3
3/4" or 2"	flange	with	1.4.3

Caution: Do not install transducers in the center of domed roof tanks. Locate transducers 1' to 3' off center to minimize false/multiple echoes being reflected off the domed roof.

1.4.1 Mounting ¾" NPT or 2" NPT Transducer with Factory-Supplied Bracket, Without Transducer Housing

- Position the bracket such that the transducer mounting hole is positioned over the open tank or channel.
 Refer to Figure 8.
- 2. Secure the bracket to the wall, floor, or vessel as appropriate with four ¾" screws. Refer to the mounting hole pattern as shown in the dimensional drawings in Section 5.5.3.
- 3. Pull transducer cable through mounting bracket and hand-tighten transducer into fitting in mounting bracket.

Caution: HAND-TIGHTEN ONLY. DO NOT use a pipe wrench or other tools when tightening the transducer. Use Teflon® tape on thread for 316 stainless steel transducer. Avoid excessive twisting of the transducer cable.

4. Provide conduit from the transducer to the transmitter enclosure. Carefully pull the transducer cable through the conduit toward the transmitter enclosure. This cable will be connected as shown in Section 2.3.1, *Transducer Wiring Without Transducer Housing*.

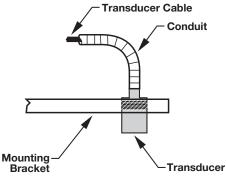


Figure 9

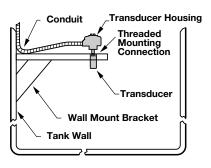
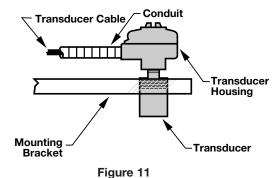


Figure 10



5. Tighten the conduit to the threads on the top of the transducer. Refer to Figure 9.

NOTE: In high humidity applications, it is recommended that the transducer wiring be completely immersed in an insulating compound where the conduit connects to the transducer (3M™ #4441 Gella™ Reenterable Encapsulant or equivalent).

6. Proceed to Section 2.0, Wiring.

1.4.2 Mounting 2" NPT Transducer with Factory-Supplied Bracket and Transducer Housing

- 1. Position the bracket such that the transducer mounting hole is positioned over the open tank or channel. Refer to Figure 10.
- 2. Secure the bracket to the wall, floor, or vessel as appropriate with four %" screws. Refer to the mounting hole pattern as shown in the dimensional drawings in Section 5.5.3.
- 3. Mount transducer into the 2" NPT hole in bracket and hand-tighten.

Caution: HAND-TIGHTEN ONLY. DO NOT use a pipe wrench or other tools when tightening the transducer. Use Teflon® tape on thread for 316 stainless steel transducer. Avoid excessive twisting of the transducer cable.

4. Provide conduit from the transducer to the transmitter enclosure. Carefully pull the transducer cable through the conduit toward the transmitter enclosure. Refer to Figure 11. This cable will be connected as shown in Section 2.3.2, *Transducer Wiring With Transducer Housing*.

NOTE: In high humidity applications, it is recommended that the transducer wiring be completely immersed in an insulating compound where the conduit connects to the transducer (3M™ #4441 Gella™ Reenterable Encapsulant or equivalent).

- 5. Tighten the conduit at the ¾"connection on the transducer housing.
- 6. Proceed to Section 2.0, Wiring.

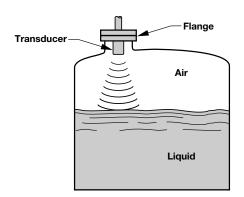


Figure 12

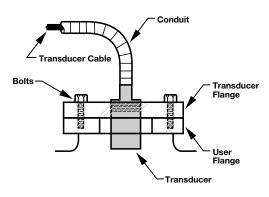


Figure 13

1.4.3 Mounting ¾", 1", or 2" NPT Transducer with Flange, With or Without Transducer Housing

- 1. Position transducer over the tank port. Bolt the transducer flange to the tank port flange. Refer to Figure 12.
- 2. Hand-tighten transducer into flange.

Caution: HAND-TIGHTEN ONLY. DO NOT use a pipe wrench or other tools when tightening the transducer. Use Teflon® tape on thread for 316 stainless steel transducer. Avoid excessive twisting of the transducer cable.

- 3. Install conduit from the ¾" NPT 316 SS nipple on transducer to the transmitter enclosure. For transducers with transducer housing, conduit is connected to the ¾" NPT housing conduit connection.
- 4. Carefully pull the connecting cable through the conduit to the transmitter. Refer to Figure 13. This cable will be connected as shown in the *Transducer Wiring* section.

NOTE: In high humidity applications, it is recommended that the transducer wiring be completely immersed in an insulating compound where the conduit connects to the transducer (3M™ #4441 Gella™ Reenterable Encapsulant or equivalent).

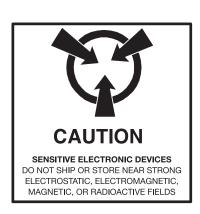
5. Proceed to Section 2.0, Wiring.

2.0 Wiring

2.1 Electrostatic Discharge (ESD) Handling Procedure

Magnetrol's electronic instruments are manufactured to the highest quality standards. These instruments utilize electronic components which may be damaged by static electricity present in most work environments. The following steps are recommended to reduce the risk of component failure due to electrostatic discharge:

- Ship and store circuit boards in anti-static bags. If an antistatic bag is not available, wrap board in aluminum foil. Do not place boards on foam packing materials.
- Use a grounding wrist strap when installing and removing circuit boards. A grounded workstation is also recommended.
- Handle printed circuit boards only by the edges. Do not touch components or connector pins.
- Make sure that all electrical connections are completely made and none are partial or floating. Ground all equipment to a good, earth ground.



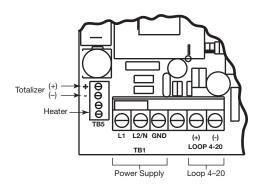


Figure 14
344/345 Motherboard
(shown with daughterboard removed)

Wiring Colors By Country/Continent

	U.S.	Europe	U.K.
Line 1 (Hot)	Black	Blue	Brown
Line 2 (Neutral)	White	Black	Blue
Ground	Green/Yellow	Green/Yellow	Green/Yellow

2.2 Transmitter Power Wiring

NOTE: Models 344 and 345 have the same motherboard (P/N 030-3564-00X), but have unique daughter boards. The 345 uses a daughter board (P/N 030-3565-001) that drives the 50 kHz Model 385-XXXX-XXX transducer, and the 344 uses a daughter board (P/N 030-3573-001) that drives the 38 kHz Model 384-XXXX-XXX transducer.

Caution: DO NOT attempt to operate this unit at voltages other than as specified from the Model Identification as it will damage the unit.

Caution: This instrument is grounded through the grounding connector of terminal block TB1. The power input must include a ground wire connected to a good earth ground. Failure to ground the instrument may allow a shock hazard to exist!

- 1. Open the cover of the transmitter enclosure by loosening the six screws.
- 2. The PC board is marked for 120/240 VAC (L1, L2/N, GND) and 24 VDC (+,-) power connections. Ensure proper connections are made on the six position terminal block TB1. Refer to Figure 14. Spade lugs should be used. For optimum operator safety, observe the wiring colors listed in the chart at left.
- 3. To prevent electromagnetic noise from disrupting the normal operation of the Model 344/345, the ground (GND) should be connected to a good earth ground with as short a length as possible of heavy wire or copper braid.
- 4. Proceed to the appropriate transducer wiring section.

NOTE: Stainless steel transducers are shipped with a protective rubber cap over the transducer face. Remove this cap after mounting is complete.

2.3 Transducer Wiring

Caution: Do not run transducer cable in the same conduit with power, signal, or other transducer cables.

The transducer cable consists of two twisted pairs of wire wrapped with a shield. Refer to Figure 15 for wire identification.

NOTE: It is imperative that Magnetrol cable part number 037-3176 (Belden Type 8102) be used. If connecting cable was not provided with unit, consult factory for specifications. Maximum total cable length is 500 feet (152 m). AVOID SPLICING CABLE. If a 316 stainless steel transducer is used, connect the green ground wire to an earth ground (i.e. conduit, tank, etc). If a junction box is used, connect earth ground to green terminal screw.

After running the transducer wiring in its own conduit from the transducer to the transmitter, separate the wires into two groups;

Group 1 - Ultrasonic signal wiring (orange/white pair)

Group 2 - Temperature compensation wiring (blue/white pair)

2.3.1 Transducer Wiring Without Transducer Housing

The following instructions are intended for use when the transducer is provided without a transducer housing. There will be 35 feet (10.7 meters) of potted cable coming out of the transducer. This cable can be shortened as desired to accommodate the installation.

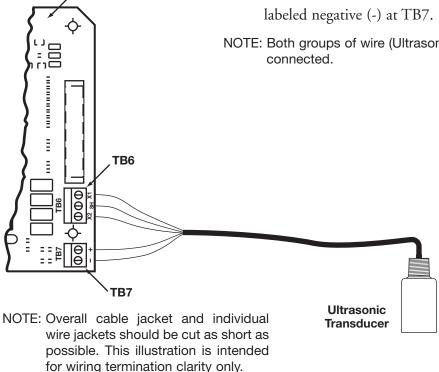
Group 1 (Ultrasonic Signal)

- 1. Connect the orange w/white stripe wire to the terminal marked (X1) at TB6.
- 2. Connect the shield wire to the middle terminal at TB6.
- 3. Connect the white w/orange stripe wire to the terminal marked (X2) at TB6.

Group 2 (Temperature Signal)

- 1. Connect the white w/blue stripe wire to the terminal labeled positive (+) at TB7.
- 2. Connect the blue w/white stripe wire to the terminal

NOTE: Both groups of wire (Ultrasonic and Temperature) must be connected.



Daughterboard

Figure 15 Wiring without Transducer Housing

2.3.2 Transducer Wiring with a Transducer Housing

The following instructions are intended for use when a transducer housing has been provided. This housing is threaded onto the top of the transducer via a 3/4" NPT 316 SS nipple. A board inside the housing is used to terminate the transducer cabling.

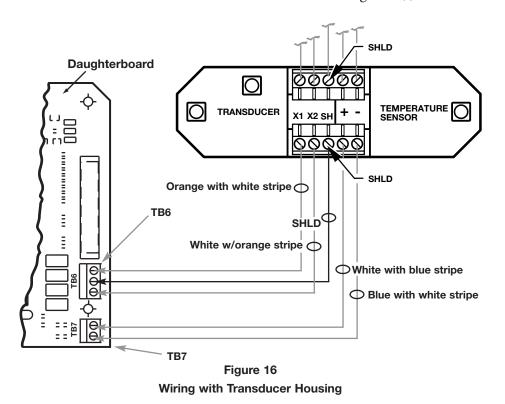
NOTE: If cable was not provided by Magnetrol, Beldon 8102 or equivalent must be used.

Group 1 (Ultrasonic Signal)

- 1. Connect the orange w/white stripe wire from the transducer housing terminal marked (X1) to the terminal inside the transmitter marked (X1) at TB6 on the daughterboard.
- 2. Connect the shield from the transducer housing terminal marked (SHLD) to the middle terminal at TB6 on the daughterboard.
- 3. Connect the white w/orange stripe wire from the transducer housing terminal marked X2 (GND) to the terminal marked (X2) at TB6 on the daughterboard.

Group 2 (Temperature Signal)

- 1. Connect the white w/blue stripe wire of the twisted pair from the transducer housing terminal marked (+) to the terminal labeled positive (+) at TB7 on the daughterboard.
- 2. Connect the blue w/white stripe wire of the twisted pair from the transducer housing terminal marked (-) to the terminal labeled negative (-) at TB7 on the daughterboard.



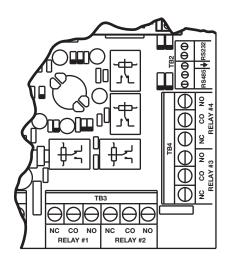


Figure 17 344/345 Motherboard

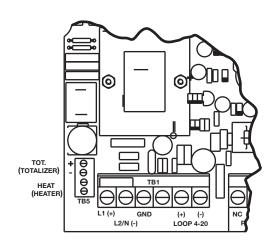


Figure 18 344/345 Motherboard

2.4 Relay Output Wiring

The 344/345 unit is supplied with 4 relays that can operate as normal independent contact closures or can be used as dedicated relays as follows:

- Relay 1 Normal
- Relay 2 Normal or Lead/Lag Pump Alternation (with Relay 1)
- Relay 3 Normal or Dedicated Fault
- Relay 4 Normal or Sampler Contact

Relay connections are supplied on the motherboard as shown in Figure 17.

- 1. Two-wire leads are connected to the desired relay terminal block. Connect one wire to the common terminal (labeled CO), and the other to the terminal for the desired contact function—(NC) for normally closed or (NO) for normally open. Repeat this step for each relay.
- 2. Refer to Relay Settings in the I/O Configuration section for information on configuring the relays.

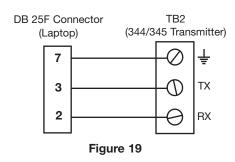
NOTE: If the device to be operated by the relay has an inductive load, a separate power supply should be used for the electronics.

2.5 Output Signal Wiring

The 4–20 mA DC output connections can be made at terminal block TB1, located inside the transmitter housing. Refer to Figure 18. The loop is optically isolated, has non-grounded outputs, and can drive a 1000-ohm load.

- 1. Connect the positive (+) shielded twisted pair wire from the load to terminal LOOP (+).
- 2. Connect the negative (-) shielded twisted pair wire from the load to terminal LOOP (-).

NOTE: The shield should be connected to an earth ground at only one location.



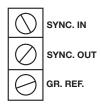


Figure 20 (344 Daughterboard) Synchronization Terminal Block – TB8

2.6 RS-232 Output

NOTE: The RS-232 output is only used for downloading information from the optional 31-day data logger.

RS-232 output connection is located at TB2 and labeled TX and RX. Refer to Figure 19.

This connection for the RS-232 is utilized for the hook-up of a laptop computer. In the laptop mode, one can download stored data if unit is equipped with the data logging option.

The cable to connect the laptop computer to the Model 344/345 must be supplied by the user. Configure this cable as shown in Figure 19. Downloading instructions are in the Laptop Section on page 39.

2.7 Transducer Synchronization

Transducer synchronization is only available with the Model 344 unit. It allows you to run the cabling from multiple Model 384 transducers in the same conduit. This prevents the possibility for crosstalk to occur from one Model 344 to another. The synchronization scheme involves the use of one 344 unit operating as a master, and one or more other units operating as slaves.

Multiple Model 344 units should be wired together utilizing TB8 (Figure 20) on the daughterboard as shown in Figure 21 below. The master unit synchronizes the ultrasonic signals such that all units transmit their ultrasonic signals at the same time. This eliminates the possibility of cross talk occurring. No calibration or configuration is necessary other than the wiring shown below.

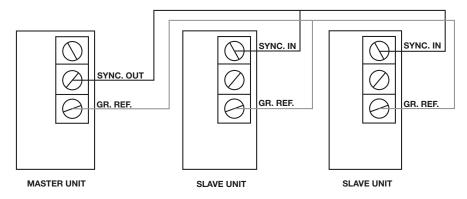


Figure 21
Synchronization Wiring Diagram

3.0 General Information

3.1 Menus

The Model 344/345 transmitter contains a microprocessorbased operator interface which allows for easy configuration of level, volume, or open channel flow applications. All configuration data is entered via a keypad located on the front of the unit.

User interface and configuration instructions are broken down into six main groups of menus:

MEASURED VALUES To view measured values

SYSTEM CONFIG Basic programming information required for system

operation.

I/O CONFIG Configure input/output functions

ADVANCED CONFIG Additional values that affect the performance and

functionality of the transmitter

DIAGNOSTICS Test functions and system diagnostic information

LAPTOP Download data logging to laptop computer (with

optional Data Logger only)

3.2 Passwords

Caution: The Model 344/345 is shipped from the factory with the password set at 0341. If the password is misplaced or forgotten, consult the factory for assistance.

The Model 344/345 has two types of passwords that can be used to protect configuration parameters. They are as follows:

3.2.1 General Password

The General Password (PRSSUDRD) is used for the System Config and the I/O Config portion of the Menu Structure. When a change is made to parameters in these menus (i.e., range, span, 4–20 mA, relays, etc.), the Model 344/345 will prompt the operator to enter a password. This password can be any one- to six-digit numeric combination.

3.2.2 Supervisory Password

The Supervisory Password (SUP PSUD) is used for the Advanced Config portion of the Menu Structure. This password is used to protect values that can affect the performance and/or accuracy of the device.

NOTE: Although the Supervisory Password is normally used in the Advanced Config menu, this password can also be used in any portion of the menu. The Supervisory Password overrides the General Password.

			The Passwords can be changed at any time via the Advanced Config mode.
Password			If an invalid password is entered, the display will read PASSUORD INVALID. By pressing twice, the unit will
SUP PRSS			continue to operate with the previously-programmed parameters.
		3.3	Operator Keypad
			All Unit Configuration instructions in this manual will show the local transmitter display exactly as it will appear to the operator.
			The operator interface to the 344/345 is via a keypad consisting of the following keys:
			For numeric entry of parameters.
			For decimal-point entries.

To exit any programming area and return to

For entering new parameter values into memory. Also used to exit the parameter entry mode, if pressed prior to entering

To sequentially access other parameters. Parameters may also be skipped over without affecting their stored values. The DOWN arrow also acts as a backspace for

Helpful when entering a new tag in the Enter Tag section of the Advanced

a measurement mode.

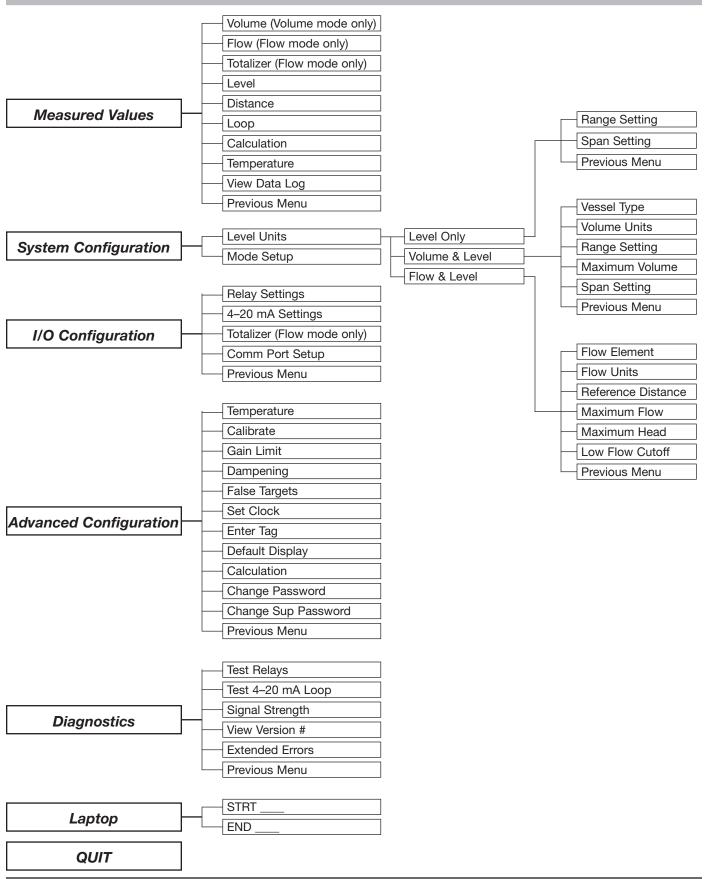
numeric parameter values.

correcting data entry errors.

Configuration menu.

4.0 Unit Configuration

4.1 Complete Menu Structure



4.2 Measured Values

The Measured Values Menu contains read-only data that is presently being measured by the Model 344/345 transmitter. Press from the default display to access the Measured Values menu. "Measured Values" along with the Up/Down arrows will be displayed.

To view the Measured Values, press at the Measured Values display. "Level" will be displayed if level mode has been selected. "Volume" will be displayed if volume mode has been selected. "Flow" will be displayed if flow mode has been selected.

To view the Present Measurement: Press . After reviewing, press to return to Level, Volume (Volume Mode Only) or Flow (Flow Mode Only). To scroll down to the next Measured Value: Press . Pressing the scrolls up the menu. Press at any measured value that you wish to review.

If you do not wish to view the measured values at this time, press once if in a main menu mode or twice if in a value read mode from anywhere in the display and the unit will return to the default display, or press at PREVIOUS MENU display, and the unit will return to MERSURED VALUES.

4.2.1 View Data Log

If the 344/345 transmitter was ordered with the Data Logger option, the View Data Log screen allows for storage of up to 31 days of the following measurement data.

Level

Minimum and maximum level and time of occurrence each day.

Volume and Level

Minimum and maximum volume and time of occurrence each day.

Flow and Level

Minimum and maximum flow and time of occurrence each day and total flow for that day.

4.3 System Configuration

This menu is used to configure the main control parameters of the Model 344/345. This is also used for first-time configuration of the unit.

Once in the System Configuration Menu, you may scroll through the selections by using or arrow. Once the desired selection is displayed, press of being configured in three different modes of operation.

- Level Only
- Volume & Level
- Flow & Level

4.3.1 Level Measurement

NOTE: The 344/345 has a default range setting of 144 inches programmed into the software. If the transducer is installed in the application and the distance from the transducer face is further away than 144 inches, the display will read LOSS OF ECHO. The range setting will have to be adjusted at this point in order to clear the loss of echo error.

- 1. Press to display MERSURED VALUES.
- 2. Press to display System Config.
- 3. Press to display LEVEL UNITS.
- 4. Press then or to make your units of measure selection.
- 5. Press to display NODE SETUP.

NOTE: If your selection is different from the previous selection, the display will ask for a password. At any point PRSSUDRD? is displayed, key in 0341, and press

- 6. Press to display LEVEL ONLY.
- WARNING Changing the Mode Setup WILL erase ALL settings if the 344/345 has been previously configured!

 Confirm change by pressing . Key in your password if PRSSWORD? is displayed.
 - 7. Press to display RANGE SETTING.

NOTE: Range setting is the measured distance from the transducer face to the lowest point of measurement or the zero level point in the vessel.

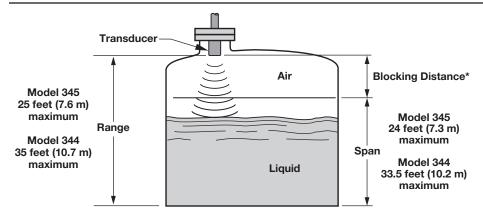


Figure 22

*Minimum Blocking Distance: 18 inches (460 mm) for the Model 344 12 inches (305 mm) for the Model 345

8. Press or toggles between MANUAL SET or AUTO SET.

NOTE: Manual Set is the preferred mode.

Manual Set Mode allows direct entry of the Range value. Enter the distance from the transduer face to the zero level point or bottom of the vessel. Auto Set Mode is only used if the vessel dimensions are unknown. Liquid level must be brought down to zero point in the vessel prior to pressing to automatically set the Range value.

- 9. Press , key in RNS value.
- 10. Press to display SPAN SETTING.

NOTE: The Span Setting is the distance from the lowest point or zero to the maximum anticipated distance that the level will rise in the tank, without entering the blocking distance of the transducer. Typically, Span is the difference between the Range and the blocking distance.

11. Press to display MANUAL SET.

NOTE: The user can toggle between TARNURL SET and RUTO SET like the range setting scheme. In the auto mode, be certain that the level is at its absolute maximum in the tank otherwise loss of echo may occur.

12. Press , key in SPN value.

Caution: If the actual level falls below the maximum range of the unit, the fail-safe selection must be set up so that the desired output is transmitted. When the level falls below the programmed range, the display will show Loss of Echo. If this condition occurs, the fail-safe actions will take place.

WARNING: If level exceeds the programmed span, false display or output/control errors will occur. Transducer should be installed and unit programmed to assure that this level cannot occur.

- 13. Press ent to display PREVIOUS MENU
- 14. Press to display System Config.
- 15. Press once to display I/O CONFIG.

System Configuration is now complete. Proceed to I/O Configuration, *Section 4.4*.

4.3.2 Volume and Level Measurement

This menu is used to configure the parameters of the Model 344/345 for Volume and Level Measurement.

Once in the SYSTEM CONFIG menu, you may scroll through the selections by using or . Once the desired selection is displayed, press . The unit is capable of being configured in three different modes of operation.

- Level Only
- Volume & Level
- Flow & Level
- 1. Press to display MERSURED VALUES.
- 2. Press to display SYSTEM CONFIG.
- 3. Press to display LEVEL UNITS.
- 4. Press then or to make your units of measure selection.
- 5. Press to display \$1008 SETUP.

NOTE: If your selection is different from the previous selection, the display will ask for a password. At any point if PASSUBROP is displayed, key in 0341, and press the key.

6. Press then or until VOLUME & LEVEL is displayed.

WARNING Changing the Mode Setup WILL erase ALL settings if the 344/345 has been previously configured!

Confirm change by pressing
■. Key in your password if PRSSWORD? is displayed.

- 7. Press to display VESSEL TYPE.
- 8. Press then or to scroll through vessel type selections.

Hogy/Frat

HORIZ/ELIPP.

HORIZ/SPHERE

VERTI/FLAT

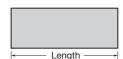
VERTI/CONICAL

SPHERICAL

CUSTOM TABLE (refer to Section 4.3.2.1)

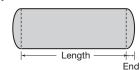
Horizontal/Flat





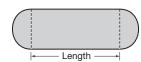
Horizontal/Elliptical





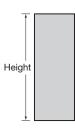
Horizontal/Spherical





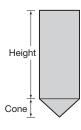
Vertical/Flat





Vertical/Conical





Spherical



Figure 23 Vessel Types

- 9. Press to select your vessel type.
- 10. Press then key in prompted values.

Rab . Radius

End Radius (enter value of one end of vessel)

LEN___. Length

HT___. Height

Cone . Cone

- 11. Press to display PRSSUORD?. Key in password.
- 12. Press The display reads PROCESSING.... and then VOLUME UNITS.
- 13. Press then or to scroll through volume units selections.

CUBIC FEET

GALLONS

MILLION GALLONS

CUBIC METERS

LITERS

MILLION LITERS

PETROLEUM BARREL

- 14. Press to select units.
- 15. Press to display RANGE SETTING.

NOTE: Range setting is the measured distance from the transducer face to the lowest point of measurement or zero.

16. Press then or to toggle between MANUAL SET or AUTO SET.

NOTE: Manual Set is the preferred mode.

Manual Set Mode allows direct entry of the Range value. Enter the distance from the transduer face to the zero level point or bottom of the vessel. Auto Set Mode is only used if the vessel dimensions are unknown. Liquid level must be brought down to zero point in the vessel prior to pressing to automatically set the Range value.

- 17. Press , key in RNG value.
- 18. Press to display MAXIMUN VOLUME.
- 19. Press key in Sax value.
- 20. Press to display SPAN SETTING

NOTE: The Span Setting is the distance from the lowest point or zero to the maximum anticipated distance that the level will rise in the tank, without entering the blocking distance of the transducer. Typically, Span is the difference between the Range and the blocking distance.

21. Press to display MANUAL SET.

NOTE: The user can toggle between TRNURL SET and RUTO SET. In the Auto Set mode, be certain that the level is at its absolute maximum in the tank otherwise loss of echo may occur.

22. Press , key in SPN value.

Caution: If the actual level falls below the maximum range of the unit, the fail-safe selection must be set up so that the desired output is transmitted. When the level falls below the programmed range, the display will show Loss of Echo. If this condition occurs, the fail-safe actions will take place.

WARNING: If level exceeds the programmed span, false display or output/control errors will occur. Transducer should be installed and unit programmed to assure that this level cannot occur.

- 23. Press to display PREVIOUS MENU
- 24. Press to display System Config.
- 25. Press once to display I/O CONFIG.

System Configuration is now complete. Proceed to I/O Configuration, *Section 4.4*.

Points	Level %	% of Volume
0	0	0.00
1	2	3.60
2	4	5.58
3	6	7.55
4	8	9.51
5	10	11.48
6	12	13.44
7	14	15.41
8	16	17.37
9	18	19.34
10	20	21.31
11	22	23.28
12	24	25.25
13	26	27.21
14	28	29.18
15	30	31.15
16	32	33.11
17	34	35.08
18	36	37.05
19	38	39.02
20	40	40.98
21	42	42.95
22	44	44.92
23	46	46.89
24	48	48.85
25	50	50.82
26	52	52.79
27	54	54.75
28	56	56.72
29	58	58.69
30	60	60.66
31	62	62.62
32	64	64.58
33	66	66.56
34	68	68.51
35	70	70.49
36	72	72.44
37	74	74.42
38	76	76.39
39	78	78.36
40	80	80.33
41	82	82.30
42	84	84.26
43	86	86.23
44	88	88.20
45	90	90.16
46	92	92.13
47	94	94.10
48	96	96.06
49	98	98.03
50	100	100.00
	100	.55.56

Figure 24
Custom Table Example

4.3.2.1 Custom Table Entry

- 1. If CUSTON TABLE is selected at step 8, Press to display TABLE NAME.
- 2. Press to designate a Table Name. Press to start the first character scrolling. If a faster scrolling speed is desired, press again. Press to stop at a character. Use or to single-step to a desired character.
- 3. Press once again to proceed to the next character. For the balance of the Table Name, perform the same steps as stated above. A maximum of 13 characters can be used.
- 4. When completed, press to display first TABLE SPAN.
- 5. Press and key in Sax value in the chosen level units.
- 6. Press to display TAX TABLE VALUE. Key in the maximum value in the chosen volume units. (For example: if the value for 100% of volume in the table was 5,500 gallons, enter 5500.)
- 7. Press to display TABLE UNITS. These are the table volume units. Press to start the first character scrolling. If a faster scrolling speed is desired, press again. Press to stop at a character. Use or to single step to a desired character.
- 8. Press once again to proceed to the next character. For the balance of the table units, perform the same steps as stated above. A maximum of 3 characters can be used.
- 9. When completed, press to display ENTER TABLE PTS.
- 10. Press to display □□%; 0.
- 11. Enter percent of volume for each percent of level displayed in 2% steps. Table is complete after all 51 points are entered. See Figure 24 at left for an example.
- 12. Press to display PREVIOUS MENU.
- 13. Press to display VOLUME UNITS. Press and OPERATION DENIED will display because volume units have already been entered.
- 14. Press o or ■ to display Range Setting.
- 15. Proceed with step 16, Section 4.3.2 on page 23.

Flow Element Menu

ow Element	Menu
Unotek	22.5°
Unotek	30°
Unotch	45°
Unotch	60°
Vnotch	90°
Unotch	120°
Parshall]"
Parshall	2"
Parshall	3"
Parshall	6"
Parshall	9"
Parshall	12"
Parshall	18"
Parshall	24"
Parshall	36"
Parshall	48"
Parshall	60"
Parshall	72"
Parshall	96"
Parshall	120"
Parshall	144"

RCT/CNTR (Rectangular w/End Contractions) RECTANGULAR (Without End Contractions) CIPOLLETTI

Palmer-Bowlus)

PALMER-B 6"

Palmer-B 8"

PALMER-B 10"

Palmer-B 12"

PALMER-B 15"

Palmer-8 18"

Palmer-B 21"

Paumar-B 24"

Palmer-B 27"

Paumer-B 30"

H-Flune

H-Flune 9"

12" H-Flune H-FLUME 18"

24"

H-FLUME

H-Flune 30"

H-FLUME 36"

H-FLUME

112 Z (I-Flume)

130 Z

140 Z

150 Z

160 Z

180 Z

110 H

113 H

116 H

CUSTON TABLE

4.3.3 Flow and Level Measurement

This menu is used to configure the main control parameters of the Model 344/345 for the Flow and Level Measurement.

Once in the System Confis menu, you may scroll through the selections by using or . Once the desired selection is displayed, press . The unit is capable of being configured in three different modes of operation.

- Level Only
- Volume & Level
- Flow & Level
- 1. Press to display MERSURED VALUES.
- 2. Press to display System Config.
- 3. Press to display LEVEL UNITS.
- 4. Press then or to make your units of measure selection.
- 5. Press to display \$1008 SETUP.

NOTE: If your selection is different from the previous selection, the display will ask for a password. If at any point PASSUORD? is displayed, key in 0341 and press the wey.

6. Press then or until FLOW & LEVEL is displayed.

WARNING Changing the Mode Setup WILL erase ALL settings if the 344/345 has been previously configured! Confirm change by pressing . Key in your password if PASSWORD? is displayed.

- 7. Press to display FLOW ELEMENT.
- 8. Press then for to scroll through flow element selections shown at left.
- 9. Press to select your flow element.
- 10. Press **t** o display Password? Key in password.
- 11. Press The display reads PROCESSING.... and then FLOW UNITS.

12. Press then or to scroll through flow units selections.

Cubic Feet/Sec

CUBIC FEET/DIN

CUBIC FEET/HR

GALLONS PER MIN

GALLONS PER HOUR

MILLION GALS/DAY

CUBIC METERS/SEC

CUBIC METERS/MIN

Cubic Meters/Hr

LITERS/MIN

LITERS/HOUR

MEGALITERS/DAY

- 13. Press to select units.
- 14. Press to display REFERENCE DIST.

NOTE: Reference distance is the measured distance from the transducer face to the lowest point of measurement or zero flow.

15. Press then or to toggle between ¶ANUAL or Auto SET.

NOTE: Manual Set is the preferred mode.

Manual Set Mode allows direct entry of the Reference Distance. Enter the distance from the transduer face to the point of zero flow in the flume or weir. Auto Set Mode is only used if the flume or weir dimensions are unknown. Liquid Head must be brought down exactly to the zero flow point prior to pressing to automatically set the Reference Distance value.

- 16. Press , key in REFERENCE DISTRNCE value.
- 17. Press to display PRXIMUN FLOW.
- 18. Press key in TAX value.
- 19. Press to display MAXIMUM HEAD
- 20. Press then or to toggle between ¶anual or auto set.
- 21. Press key in HEAD value.
- 22. Press to display LOW FLOW CUTOFF.
- 23. Press , key in EUT value.
- 24. Press to display PREVIOUS MENU.
- 24. Press to display SYSTEM CONFIG.
- 25. Press once to display I/O CONFIG.

System Configuration is now complete. Proceed to I/O Configuration, *Section 4.4*.

Points	Head %	% of Flow
0	0	0.00
1	2	3.60
2	4	5.58
3	6	7.55
4	8	9.51
5	10	11.48
6	12	13.44
7	14	15.41
8	16	17.37
9	18	19.34
10	20	21.31
11	22	23.28
12	24	25.25
13	26	27.21
14	28	29.18
15	30	31.15
16	32	33.11
17	34	35.08
18	36	37.05
19	38	39.02
20	40	40.98
21	42	42.95
22	44	44.92
23	46	46.89
24	48	48.85
25	50	50.82
26	52	52.79
27	54	54.75
28	56	56.72
29	58	58.69
30	60	60.66
31	62	62.62
32	64	64.58
33	66	66.56
34	68	68.51
35	70	70.49
36	70	70.49
37	74	74.42
38	74	74.42
39	78	78.36
40	80	80.33
41	82	82.30
41	84	84.26
43	86	86.23
43	88	88.20
44	90	90.16
45	90	90.16
46	92	92.13
47	94	
		96.06
49	98	98.03
50	100	100.00

Figure 25
Custom Table Example

4.3.3.1 Custom Table Entry

- 1. If EUSTON TABLE is selected at step 8, Press to display TABLE NAME.
- 2. Press to designate a Table Name. Press to start the first character scrolling. If a faster scrolling speed is desired, press again. Press to stop at a character. Use or to single step to a desired character.
- 3. Press once again to proceed to the next character. For the balance of the Table Name, perform the same steps as stated above. A maximum of 13 characters can be used.
- 4. When completed, press to display TIAX TABLE SPAN.
- 5. Press and key in TAX value in the chosen level units.
- 6. Press to display TAX TABLE VALUE. Key in the maximum value in the chosen flow units. (For example: if the value for 100% of flow in the table was 5,500 GPM, enter 5500.)
- 7. Press to display IRBLE UNITS. These are the table flow units. Press to start the first character scrolling. If a faster scrolling speed is desired, press again. Press to stop at a character. Use or to single step to a desired character.
- 8. Press once again to proceed to the next character. For the balance of the table units, perform the same steps as stated above. A maximum of 3 characters can be used.
- 9. Press to display Timebase. Use or to choose Seconds, Minutes, Hours, or Days. This selection enables the totalizer to function properly.
- 10. When completed, press to display Enter TABLE Pts.
- 11. Press to display 00%: 0.
- 12. Enter percent of flow for each percent of head displayed in 2% steps. Table is complete after all 51 points are entered. See Figure 25 at left for an example.
- 13. Press to display PREVIOUS MENU.
- 14. Press to display FLOW UNITS. Press and Operation Denied will display because flow units have already been entered.
- 15. Press or to display REFERENCE DISTANCE.
- 16. Proceed with step 14, Section 4.3.3 on page 27.

4.4 I/O Configuration

This menu is used to configure relay settings, output, totalization, and communications parameters of the Model 344/345.

Once in the I/O Configuration menu, scroll through the selections by using or arrow. Once the desired selection is displayed, press .

4.4.1 Relay Settings

All relays can be configured for normal mode of action (i.e., pump control, high or low alarm) or for dedicated relays as follows:

- Relay 1- Normal
- Relay 2- Normal or Lead/Lag Pump Alternation (with Relay 1)
- Relay 3- Normal or Dedicated Fault
- Relay 4- Normal or Sampler Contact

4.4.1.1 Relay #1 – normal operation

- 1. Press to display MERSURED VALUES.
- 2. Press to display SYSTEM COMPIG.
- 3. Press to display I/O CONFIG.
- 4. Press to display RELAY SETTINGS.
- 5. Press 🖭 to display RELAY #.
- 6. Key in 1, press . The operating status of the relay will be displayed.

NOTE: If relay number is entered in error, press to return to Relay Settings.

7. Press or to toggle between DISABLED and EMABLED. With Enabled displayed, press to display SETPOINT.

NOTE: If in Flow or Volume mode, the unit will prompt to set relays in Level or either Flow or Volume mode.

- 8. Press , key in On value.
- 9. Press , key in OFF value.

NOTE: If keyed in On and Off values are identical, ⊕ >= 5ετροιητ will be displayed. Press or to toggle between < and >=.

- 10. Press , key in ON DELAY value.
- 11. Press , key in OFF DELAY value.

NOTE: Delay is the number of seconds before activating or deactivating the relay contact closure. This value is adjustable from 1 to 120 seconds.

12. Press to display FAILSAFE. Press or to toggle between ON, OFF, or HOLD.

NOTE: With loss of power, all relays, regardless of fail-safe setting, will de-energize.

NOTE: Fail-safe is the state the relay will assume if a fault is detected or echo loss occurs. OFF means the relay is de-energized. On means the relay is energized and HOLD means the relay is left in the state the relay was in when the fault occurred.

13. Press to display RELAY SETTINGS.

NOTE: If all relays are set, press to proceed to Section 4.4.2, 4–20 mA Settings.

4.4.1.2 Relay #2 – normal operation or lead/lag pump control

NOTE: Lead/lag pump control provides for an exchange of the role or function of two pumps in order to provide for even pump wear. The relay action is identical to the Auto Empty Mode or the Auto Fill Mode; however, following each pump shutdown, the lead/lag role of each pump is exchanged.

- 1. Press to display RELAY #.
- 2. Key in , press to display NODE: NORMAL.

NOTE: If relay number is entered in error, press to return to Relay Settings.

3. Press or to toggle between NORMAL and LEADLAG1/2, press . The operating status of the relay will be displayed.

NOTE: If lead/lag is selected, relays 1 and 2 will alternate. When using lead/lag pump control, set points cannot be identical; they must operate in the same direction. Refer to Figure 26.

4. Proceed to Step 7 in Section 4.4.1.1 Relay #1.

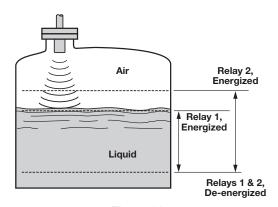


Figure 26

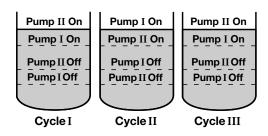


Figure 27

- 4.4.1.3 Relay #3 normal operation or fault detection
 - 1. Press to display Relay #.
 - 2. Key in , press ot display NODE: FAULT.

NOTE: If relay number is entered in error, press to return to Relay Settings.

- 3. Press or to toggle between FAULT and NORMAL.
- 4. If Normal, press and proceed to Step 7 in Section 4.4.1.1 Relay #1.
- 5. If Fault, press to display T'DUCER.

NOTE: Each of the following menu items may be selected to operate with Relay 3. Using or , toggle between ENRBLED and DISABLED. Press to continue to next item.

The unit was not able to detect a transducer connected or was not able to determine the

transducer's frequency.

NO ECHO The unit is not able to detect a return signal

from the transducer.

RINGDOWN The transducer is ringing long enough to ring

beyond the blocking distance and into the span.

LOOP FLT The calculated value for the loop output is less

than 4 mA or greater than 20 mA. The loop out-

put will be in its fail-safe mode.

Temp. The signal from the temperature sensor in the

transducer is out of range. Either a short or

open lead is detected.

System This error is generated when there is an error

writing configured values to non-volatile memory.

FAULT ACTION

Energized

DE-ENERGIZED

- 7. Press to display PREVIOUS MENU, press to display RELAY SETTINGS.

NOTE: If all relays are set, press to proceed to Section 4.4.2, 4-20 mA Settings.

- 4.4.1.4 Relay #4 normal operation or sampler
 - 1. Press to display Relay #.
 - 2. Key in , press to display MODE: NORMAL.

NOTE: If relay number is entered in error, press et to return to Relay Settings.

- 3. Press or to toggle between NORMAL and SAMPLER.
- 4. If Normal, press and proceed to Step 7 in Section 4.4.1.1 Relay #1.
- 5. If Sampler, press .

NOTE: The pulse duration is 90 milliseconds for the contact closure.

6. Press or ● to toggle between SAMPLE BY TIME or SAMPLE BY FLOW, press ■. If Sample By Flow is chosen, proceed to step 10.

NOTE: Sample By Time is only allowed with units ordered with data logging option.

- 7. INTERURL 0000 is displayed. Key in contact closure time in minutes, press .
- 8. Press to display PASSUORD?. Key in password.
- 9. Press The display reads PROCESSING.... and then RELAY SETTINGS.

NOTE: If all relays are set, press to proceed to Section 4.4.2, 4–20 mA Settings.

10. FLW _____. is displayed. Key in contact closure rate, press ...

NOTE: Sample By Flow is a momentary (90 millisecond) contact closure. Example: If 1000 gallons is entered, relay 4 will energize once for every 1000 gallons.

11. Press to display RELAY SETTINGS.

NOTE: If all relays are set, press 10 to proceed with 4–20 mA Settings.

4.4.2 4-20 mA Settings

NOTE: 4–20 mA settings is dependent on the choice of Mode Setup designated in Section 4.3, System Configuration.

- 1. Press to display 4: _____, SETPOINT LEVEL, SETPOINT FLOW or SETPOINT VOLUME, depending on the mode that the unit is in.
- 2. Press or to toggle between LEVEL, FLOW and VOLUME.
- 3. Press to display 4: ___. Key in value.
- 4. Press **t** to display 20: ___. Key in value.
- 5. Press to display FAILSAFE. Press or to toggle between 4AA, 20AA, 22AA and HOLD.
- 6. Press to display PRSSWORD?. Key in password.
- 7. Press The display reads PROCESSING.... and then 4–20 RELBY SETTINGS.

NOTE: If all 4–20 mA Settings are complete, press to proceed with Section 4.4.3, Totalizer (Flow Mode only).

4.4.3 Totalizer (Flow Mode only)

NOTE: The selected display units will determine the totalizer units. Example: if units are gallons and multiplier is 100, for every 100 gallons the totalizer will advance once. This is the weight of each count of flow increment shown on the multiplier totalizer.

- 1. Press In then or to toggle between HARDWARE and SOFTWARE.
- 2. Press . Key in multiplier value.
- 3. Press to display PASSUORDP. Key in password.
- 4. Press to display TOTALIZER.

NOTE: Repeat this procedure for the remaining option (hardware or software).

NOTE: The hardware/software totalizing multiplier should be chosen so that at maximum value, the advance rate should not exceed once per minute. Minimum multiplier is 0.01.

NOTE: If power to the unit is removed, Software Totalizer will reset to zero, unless data logger option was ordered.

4.5 Advanced Configuration

This menu is used to calibrate non-control parameters of the Model 344/345. Each menu item will prompt for Sup Pswd? as a protection against unauthorized changes.

WARNING: These values are factory set and should not be changed without consulting the factory.

- 1. Press to display MERSURED VALUES.
- 2. Press to display System Config.
- 3. Press to display I/O CONFIG.
- 4. Press to display ADVANCED CONFIG.
- 5. Press then or to scroll through Advanced Configuration selections.

TEMPERATURE

CALIBRATE

Gain Linit

DAMPENING

FALSE TARGETS

SET CLOCK

ENTER TAG

DEFRULT DISPLAY

ERLCULATION

CHANGE PASSWORD

CHANGE SUP PASSWORD

PREVIOUS MENU

TEMPERATURE

- 1. Press to display the temperature sensed inside the transducer in degrees °F (°C if metric level units are chosen).
- 2. If the transducer is changed or the value seems to be in error, enter the correct value and press.
- 3. Display will read SUP PASSWORD?, your chosen password must be entered at this time. Press .

CALIBRATE

- 1. Press to display the measured distance in the present units of level.
- 2. If the process is other than air and/or a known distance is available, enter the correct value and press .

NOTE: This feature allows the instrument to be used with inert gas blankets where the speed of sound differs significantly from atmospheric pressure.

NOTE: If calibrate mode is not properly used, this may cause false level readings. Consult factory for reset procedures.

3. Display will read SUP PASSUORD?; your chosen password must be entered at this time. Press ...

Gain Linit

- 1. Press to display the value of Maximum gain that the unit will use. This value is from 1–32 and the unit steps up in single gain increments until a suitable signal is received. Limiting the Max Gain to a lower value may help limit noise problems.
- 2. Enter any value between 1 and 32. Press .
- 3. Display will read SUP PASSWORD?, your chosen password must be entered at this time. Press ...

NOTE: The Model 344/345 adapts its gain to suit the conditions of the application. There are 32 gain steps. The higher the number, the higher gain/drive required to detect an acceptable signal.

Danpening

- 1. Press to display the value dampening. This factor is a smoothing or averaging factor for the Model 344/345 output. The higher the number, the more smoothing to improve performance during rapid changes. The value may be between 1 and 16.
- 2. Enter any value between 1 and 16. Press .
- 3. Display will read SUP PASSWORD?; your chosen password must be entered at this time. Press ...

NOTE: The dampening factor is a smoothing or averaging term. The 344/345 averages echo values over a number of previous measurement cycles. The dampening factor instructs the number of cycles over which the unit should perform this average. Thus, the higher the dampening factor, the more averaging and the slower it reacts to a step change in level.

FALSE TARGETS

NOTE: Contact the factory prior to using the False Targets feature.

The false target rejection feature allows for semi-automatic programming as follows. The tank must be empty or the level below any false targets that will be rejected. The 344/345 will proceed to find the first target which provides a detectable echo. The display will prompt the user to identify each echo as either a false target or the true distance to the process material.

1. If the echo results from a false target, press . The 344/345 will store gain and distance parameters about each target that will allow it to discern true levels from false target echoes.

The 344/345 will suppress this target and increase gain until the next target is obtained. This procedure can be repeated until all false targets have been acknowledged.

- 2. After the true distance is displayed, press
- 3. The 344/345 will prompt "Press vo save all new false targets.
- 4. Press to continue.
- 5. Display will read SUP PRSSUORD?, your chosen password must be entered at this time. Press .

NOTE: Entering this menu again will restart the false target selection and clear the old targets.

WARNING: Make sure that all false targets are cleared or deleted from the software. Press when TRR □: ____IN is displayed. Press and input Supervisory Password code.

SET CLOCK

This allows for setting or changing of the date and time. This is only available with the Data Logging option. Unit prompts for:

> Nonth? Date? Sear? Hour? (24-hour format) Nonte?

After entering these values, the unit prompts to set and then requests password.

ENTER TAG

This menu shows the present Tag - Magnetrol.

- 1. If desired, this tag can be changed by using ① or ② to scan through characters.
- 2. Press to use the character at that location in the Tag.

 Pressing the key will start scrolling of the available characters. When close to the desired character, press and use arrows to reach desired character.

Defrult Display

This menu allows the operator to select the items to be displayed during normal operation. The following items may be toggled Enabled/Disabled using or ...

LEVEL

VOL/FLOW (Only when Volume or Flow mode is chosen)

TAG

CLOCK

CALCULATION

TOTALIZER

The last menu item is Previous Menu. If any change was made in the default display, pressing at this point will cause the unit to prompt for the Sup Pswd.

CALCULATION

- 1. Press to display EXISTING TEXT IS.
- 2. Press again to display TEXT:.
- 3. Enter Text by using or and press at each entry.

Display will then read flutt. This is the multiplier used to show up in calculation. This value is multiplied by your level, flow or volume reading.

NOTE: The calculation is intended for display purposes only. It does not affect the control relays or loop current output.

CHANGE PASSWORD

Allows for a change of password. Requires the Sup Pswd.

CHANGE SUP PASSUORD

Allows for a change of Sup Pswd. Requires the Sup Pswd.

PREVIOUS MENU

- 1. Press to return to the previous menu, ADVANCED CONFIG.
- 2. Press 🗗 arrow to proceed to Diagnostics.

4.6 Diagnostics Menu

This menu is used to provide the user with testing the functionality and providing useful information for troubleshooting of the unit.

- 1. Press to display MERSURED VALUES.
- 2. Press to display System Config.
- 3. Press to display I/O CONFIG.
- 4. Press to display ROVANCED CONFIG.
- 5. Press to display DIRGNOSTICS.
- 6. Press then or to scroll through Diagnostic selections.

TEST RELAYS

Test 4-20 Loop

SIGNAL STRENGTH

VIEW VERSION#

EXTENDED ERRORS

PREVIOUS MENU

TEST RELAYS

This menu allows the operator to cycle individual control relays on or off.

Test 4-20 nR Loop

By entering different values into the system, the actual loop current output can be adjusted to test dependent devices and/or control loops. The entered mA value will remain until the key is pressed.

SIGNAL STRENGTH

This menu provides the user with a gain value from 1 to 32 (1=low gain/sensitivity, 32=high gain/sensitivity) and a percent received signal strength from 0 to 100%. The 344/345 processor controls the signal strength at 60–70%. This is a variable gain circuit which self-adjusts for an optimum signal return.

VIEW VERSION

This is the software version number in the 344/345.

EXTENDED ERRORS

This information may be requested during troubleshooting of the unit.

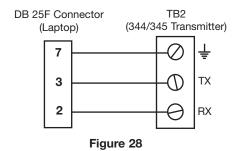
4.7 Laptop Menu

This menu is used to enter the start and end day range for downloading of stored data log for the Model 344/345 with optional data logging feature.

- 1. Press to display MERSURED VALUES.
- 2. Press to display SYSTEM CONFIG.
- 3. Press to display I/O CONFIG.
- 4. Press to display ADVANCED CONFIG.
- 5. Press to display DIAGNOSTICS.
- 6. Press to display LAPTOP.
- 7. Press to display STRT. Enter the number of the day (the most recent day) to begin downloading. The present day is always day 1. Data up to 31 days prior to the current day can be downloaded.
- 8. Press and END will appear. Key in the ending day.
- 9. Press , PROCESSING... will be displayed. If the laptop is connected for RS-232 and the baud rate is compatible as set in the I/O Config, the unit will begin to download the start/end day range. See Figure 28 at left.

NOTE: This is an updating 31-day format. It will download the minimum, maximum (at times of occurrence), and total flow data for selected days. When the transmission of data is complete, the display will return to Laptop.

Any PC communication program may be used to capture this data. Start the communications program. Set up as 8 bit, 9600 Baud, 1 stop bit. Select download file (usually page DOWN key), select ASCII file type. Refer to your communications program documentation if needed.



5.0 Reference Information

5.1 Description

Model 344/345 transmitters perform level, volume, or open channel flow measurements of liquids and slurries.

5.2 Theory of Operation

Pulses generated by the electronics are transmitted to the ultrasonic transducer. The transducer directs an ultrasonic pulse to the liquid surface. The returning echo/signal is detected by the transducer. The electronics convert the signal into a digital representation of the level, flow or volume measurement.

5.3 Troubleshooting

Following these five steps will assist in troubleshooting application difficulties with Model 344/345:

Step 1: Application Checklist – review fundamental

application parameters

Step 2:

Installation Checklist – review typical installation problems

Step 3: Troubleshooting Table – explains diagnostic error conditions shown on the LCD display and some typical electronic problems.

2. What is the media being measured?_____

Step 4: Troubleshooting Flowchart – step-by-step

procedure

Step 5: Contact factory.

APPLICATION CHECKLIST Check for the following application sensitivities before proceeding to the next section: INVISIBLE (may alter speed of sound)_ VISIBLE (may cause false reflections or attenuation) _____ FOAM_ SURFACE AGITATION.... ANGLE OF REPOSE ___ TEMPERATURE_ PRESSURE_ OBSTRUCTIONS_ If any of the above sensitivities are present, consult the factory for recommendations. INSTALLATION CHECKLIST **CABLE** PROCESS cont. Was Belden 8102 used? If not, improper opera-Does the tank have a mixing blade? Could it be providing false level readings or creating a tion may occur. vortex resulting in echo loss. 2. ___ Is transducer wiring run in a dedicated conduit? Is there an angle of repose? (Solids) Is shield connected at both ends? NOTE: Refer to Section 5.7, Measurement Range Calculations, if any of the points in the PROCESS **TRANSDUCER** section have been checked. Check transducer alignment (vertical) Is transducer mounted hand tight? Over tight-**TRANSMITTER** ening may cause ringing, some installations Enter the specified menu and obtain the following informamay require use of a "shock" absorber. tion before consulting the factory. Minimum nozzle diameter 8 inches. 3. _____ MEASURED VALUES MENU Maximum nozzle height 11 inches. 4. _____ LEVEL Check beam path for obstructions, including DISTANCE tank wall. Refer to Section 1.4 for Sonic Beam SYSTEM CONFIGURATION Dispersion chart. RANGE Check transducer housing for moisture. SPAN ___ What is the distance from the transducer face to ADVANCED CONFIGURATION current level? TEMPERATURE ____ DIAGNOSTICS MENU **PROCESS** GAIN__ 1. What is the temperature? SIGNAL STRENGTH _____% a. At transmitter 1. Transmitter is indoors outdoors? b. At transducer ____

2. What is the transmitter serial number?

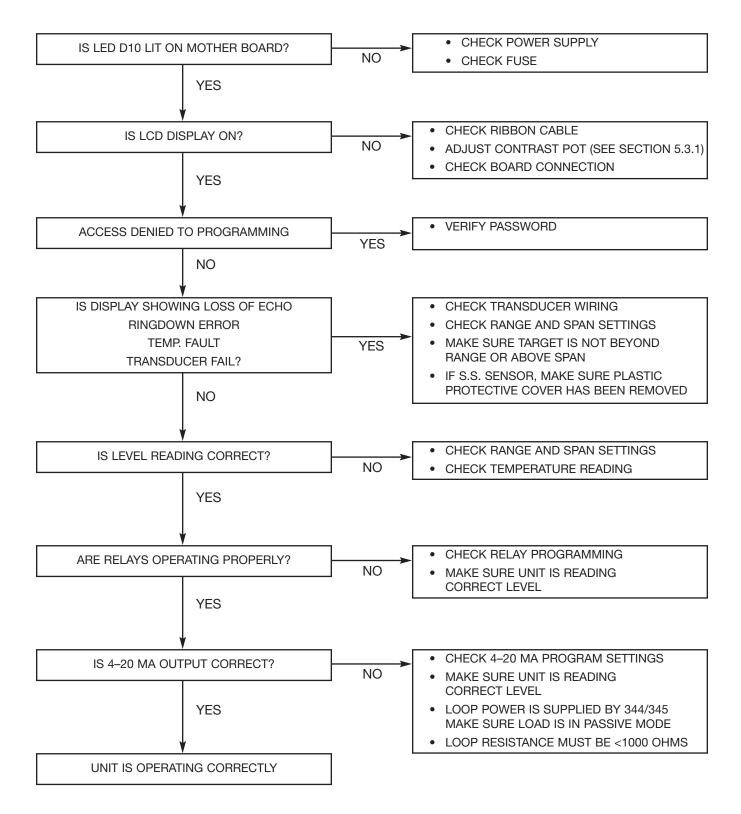
5.3.1 Troubleshooting System Problems =

Display	Problem	Solution
COMM PARAM FAIL	The configuration parameters for the communications port are corrupt.	Press ENT to continue. This loads default values for the communication parameters. The configuration parameters should be checked to make sure that they match your application.
MAIN PARAM FAIL	The main parameters which store range/reference and span/headroom are corrupt.	Press ENT to continue. This will load default values for the main parameters. All of the items in the System Config menu need to be verified.
STRAP TABLE FAIL	There is an error in the custom strapping table entry.	Press ENT to continue; the table is cleared. If a custom table is not being used, then this error can be ignored. If you are using a custom table, the table has to be re-entered.
RLY1 PARAM FAIL	The parameters for Relay 1 are corrupt.	Press ENT to continue. The relay is disabled and the settings are set to default values. Reconfigure the relay from the I/O Config menu.
RLY2 PARAM FAIL	The parameters for Relay 2 are corrupt.	Press ENT to continue. The relay is disabled and the settings are set to default values. Reconfigure the relay from the I/O Config menu.
RLY3 PARAM FAIL	The parameters for Relay 3 are corrupt.	Press ENT to continue. The relay is disabled and the settings are set to default values. Reconfigure the relay from the I/O Config menu.
RLY4 PARAM FAIL	The parameters for Relay 4 are corrupt.	Press ENT to continue. The relay is disabled and the settings are set to default values. Reconfigure the relay from the I/O Config menu.
LOOP PARAM FAIL	The 4–20 mA loop parameters are corrupt.	Press ENT to continue. The loop is disabled and the settings are set to default values. Reconfigure the relay from the I/O Config menu.
CALC PARAM FAIL	The calculation parameters are corrupt.	Press ENT to continue. New values need to be entered for the calculation. This is done from the Calibration menu.
PASSWORD LOST	The passwords are corrupt.	Press ENT to continue. Enter new passwords from the Calibration menu.
DATA LOG LOST	The data log is corrupt.	Press ENT to continue. The data log is cleared.
P.O.S.T. FAILED	Power on self test failed. Microprocessor internal register was not set correctly on power up. The software will attempt to set the register to the proper value	Turn unit off and apply power again. If the error clears, it was able to set the register to the proper value and will function properly.
TRANSDUCER FAIL	The unit was not able to detect	Ensure that the transducer is connected properly to the unit.
	a transducer connected or was not able to determine the transducer's frequency.	If the transducer wiring is properly connected, contact factory for replacement transducer.
LOSS OF ECHO	The unit is not able to detect a return signal from the transducer.	Ensure that the level to be detected is within the range and span of the unit. Check the application for foam, obstructions, or heavy vapors.

5.3.1 Troubleshooting System Problems

Display	Problem	Solution
RINGDOWN ERROR	The transducer is ringing long enough to ring into the span of the unit.	Decrease the span to increase the blocking distance (range minus span) of the unit.
	the difft.	Replace the transducer (the current transducer may have a problem that causes it to ring too long.
TEMPERATURE FAULT	The signal from the temperature sensor in the transducer is out of range. Either a short or open lead detected.	Check to see that the sensor wires are connected properly. Ensure that the sensor wires are not shorted or open.
OPERATION DENIED	The current operation is not allowed because the proper password was not entered.	Retry the proper password.
"OUT OF RANGE"	The value that was entered was not in an acceptable range.	Re-enter a value within the proper limits.
CANNOT BE EQUAL	The value for the 4 mA point and the 20 mA point cannot be equal.	Choose the values that are not the same and re-enter.
INVALID LEAD/LAG	Setting relay 1 and 2 for lead/lag is not allowed.	Check that both relays are enabled and that the set points are proper for lead/lag operation.
PASSWORD INVALID	The password entered is not valid.	Retry the previous operation and enter the proper password.
NO CLOCK PRESENT	The real time clock was not found on the board. No data logging or time sampling is allowed.	If you need the real time functions, contact the factory to see if your unit was ordered with the data logging option.
LOOP > 20 mA	The calculated value for the loop output is greater than 20 mA. The loop output will be in its fail-safe mode.	If the level is within a normal operating range, adjust the loop parameters to allow proper tracking of the level. If the level is out of the normal 4–20 mA range then correct the problem with the level.
LOOP < 4 mA	The calculated value for the loop output is less than 4 mA. The loop output will be in its fail-safe mode.	If the level is within a normal operating range, adjust the loop parameters to allow proper tracking of the level. If the level is out of the normal 4–20 mA range then correct the problem with the level.
Faint display	Display is too dim or too light	Turn the CONTRAST adjustment potentiometer clockwise to darken the display or counterclockwise to lighten the display, until the desired contrast is obtained. The CONTRAST pot is located on the top left of the motherboard above the ribbon cable connection.
1/2 display lit	Only half of display is lit	If a new PC board was recently purchased, it may be incompatible with the other boards. In this case, the JP9 jumper on the motherboard (underneath daughterboard) should be moved to the other position.

5.3.2 Troubleshooting Flow Chart



CONTACT FACTORY

If it becomes necessary to contact the factory for technical assistance, please have all of the information gathered in Steps 1-4 readily available. This will help us in resolving the problem.

5.4 Agency Approvals

AGENCY	MODEL APPROVED	APPROVAL CATEGORY	APPROVAL CLASSES
FM	34X-X442-10X	Non-hazardous	NEMA 4X, IP65
⟨FM⟩		Non-incendive	Class I, II, III, Div. 2; Groups A, B, C, D, F, & G, T4A
APPROVED	384-XKXX-0XX	Non-hazardous	NEMA 4X, IP65
		Explosion proof	Class I, II, III, Div. 1; Groups B, C, D, E, F, & G, T6
	385-XXXX-XXX	Non-hazardous	NEMA 4X, IP65
	385-XEXX-006 385-XEXX-010	Explosion proof	Class I, II, III, Div. 1; Groups B, C, D, E, F, & G, T6
	385-XEXX-003	Explosion proof	Class I, II, III, Div. 1; Groups A, B, C, D, E, F, & G, T6
CSA	34X-X442-10X	Non-hazardous	Type 4X enclosure
	344-X442-10X	Non-incendive	Class I, II, III, Div. 2; Groups A, B, C, D, E, F, & G, T4A
	384-XKXX-0XX	Non-hazardous	Type 4X enclosure
	384-XK0X-0XX	Explosion proof	Class I, II, III, Div. 1; Groups B, C, D, E, F, & G
	384-XK1X-0XX 384-XKYX-0XX	Explosion proof	Class I, II, III, Div. 1; Groups C, D, E, F, & G
	385-XXXX-XXX	Non-hazardous	Type 4X enclosure
	385-XE1X-0XX 385-XEYX-0XX	Explosion proof	Class I, II, III, Div. 1; Groups C, D, E, F, & G
	385-XE0X-0XX	Explosion proof	Class I, II, III, Div. 1; Groups A, B, C, D, E, F, & G



These units have been tested to EN 50081-2 and EN 50082-2 and are in compliance with the EMC Directive 89/336/EEC.

5.5 Specifications

5.5.1 Transmitter —

Supply voltage	120 VAC +10%/-15%, 50-60 Hz
	240 VAC +10%/-15%, 50-60 Hz
	24 VDC, ±20%
Power consumption	12 watts (without heater)
Fuse size	¼ amp replaceable, 250 VAC Slo-Blo® for AC units
	2 amp replaceable, 250 VDC Slo-Blo for DC units
Output signal	4–20 mA isolated (1,000 Ω load), RS-232
Relays	Four 10 amp resistive, SPDT
Fail-safe	User selectable for analog and relay outputs
Display	Sixteen (16) character alphanumeric LCD
Keypad	Sixteen (16) button integral to front panel
Enclosure material	High-impact polycarbonate
Weight	8 pounds (3.6 kg)
Response time	2 seconds typical
Accuracy	± 0.25% of calibrated span
Humidity	95% Non-condensing
Ambient temperature	
without heater & thermostat*	-4° to +160° F (-20° to +70° C)
with heater & thermostat	-40° to +160° F (-40° to +70° C)

 $^{^{*}}$ The 31-day data logger has a +32° F (0° C) minimum when used without the heater and thermostat.

5.5.2 Transducer

Model 385	
50 kHz	
) 25 feet (7.6 meters)	
s) 24 feet (7.3 meters)	
om 12 inches (305 mm) from	
73° C) -40° to + 140° F (-40° to +60° C)	
18 inches (460 mm) from	
+140° to +200° F (+60° to +93° C)	
73° C) -40° to +200° F (-40° to +93° C)	
-10 to +50 psig (-0.69 to +3.45 bar)	
Automatic, over the operating temperature range of the transducer	
12° conical	
naximum between transducer and transmitter	

5.5.3 Physical

Inches (mm)

Model 344/345 Transmitter

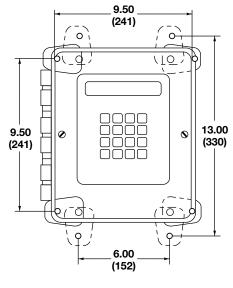


Figure 29
Front View

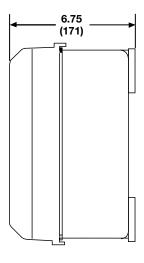


Figure 30 Side View

Model 385 Transducers

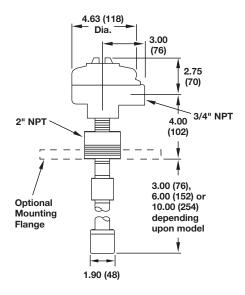


Figure 31
2" NPT Transducer with Housing

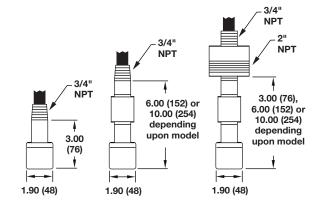


Figure 32 %" and 2" NPT Transducer without Housing

5.5.3 Physical

Inches (mm)

Model 384 Transducers

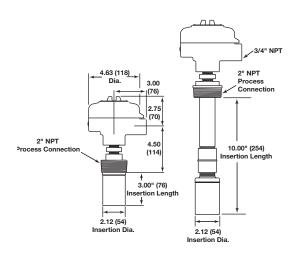


Figure 34
2" NPT Transducer with Housing

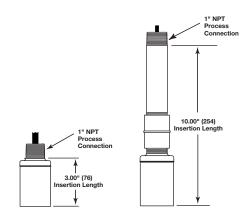


Figure 33
1" NPT Transducer without Housing

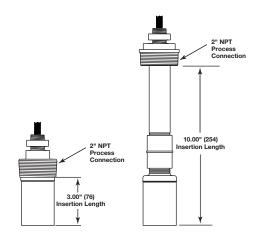


Figure 35
2" NPT Transducer without Housing

Optional Mounting Brackets

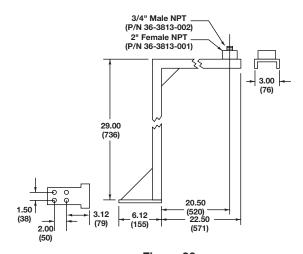


Figure 36
Floor Mount Bracket

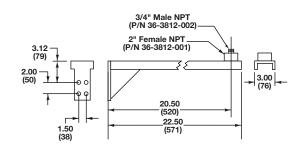


Figure 37
Wall Mount Bracket

5.6 Replacement Parts

Item	Description	Part Number
1	NEMA 4X enclosure, LCD display, keypad with hardware	Consult Factory
2	Enclosure gasket	012-1606-001
3	Main P.C. board	
	120 VAC	Z30-3564-001
	120 VAC with data logger	Z30-3564-007
	240 VAC	Z30-3564-002
	240 VAC with data logger	Z30-3564-008
	24 VDC	Z30-3564-003
	24 VDC with data logger	Z30-3564-009
4	Daughter P.C. board	
	Model 344	Z30-3573-001
	Model 345	Z30-3565-001
5	Display P.C. board	Z30-3539-002
6	Transducer housing base	
	NEMA 4X, aluminum	004-9104-001
	NEMA 4X, stainless steel	004-9140-001
7	Transducer housing cover	
	NEMA 4X, aluminum	004-9105-001
	NEMA 4X, stainless steel	004-9142-001
8	O-ring	012-2101-345
9	Transducer P.C. board	030-3515-001
10	Bracket	005-6634-001
11	Transducer	Refer to Section 5.8, Model Numbers
	Transducer mount bracket	
	Wall mount, ¾" male NPT	036-3812-002
	Wall mount, 2" female NPT	036-3812-001
	Floor mount, ¾" male NPT	036-3813-002
	Floor mount, 2" female NPT	036-3813-001

5.6 Replacement Parts

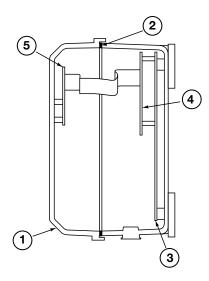


Figure 38
Transmitter

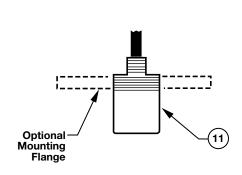


Figure 39
Model 384 Transducer without housing

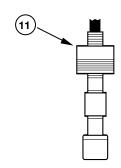


Figure 40 Model 385 Transducer without housing

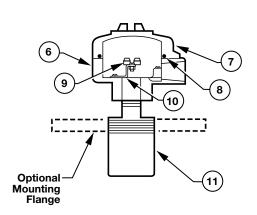


Figure 41
Model 384 Transducer with Housing

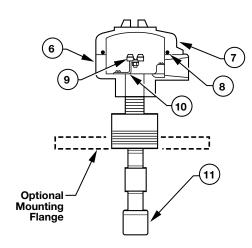


Figure 42
Model 385 Transducer with Housing

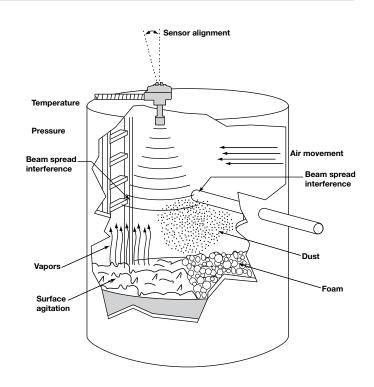
5.7 Measurement Range Calculations

Ultrasonic non-contact devices are typically rated for a maximum range in ideal conditions. Experience has shown that maximum range must be reduced for certain factors. Although the maximum range rating is somewhat conservative, each application must be evaluated for specific conditions in the tank.

HOW TO CALCULATE

To evaluate the performance of a 344 or 345 in a particular application, use the chart on the next page and follow the steps below:

- 1. Select one condition from each of the operating parameters that best describes your application.
- 2. Enter the corresponding performance multiplier value in the application column.
- 3. Multiply all of the selected values together.
- 4. Multiply step 3 by the maximum potential range of the unit. This yields a value that is the maximum allowable measurement range for the application.



EXAMPLE

The vessel is a closed-top tank, 26-feet tall and is filled from the top.

Surface agitation Expect slight agitation from fill line. Performance multiplier 0.9.

Vapor and steam The process temperature is +130° F, slight vapor is expected.

Performance multiplier 0.9.

Beam interference No interference exists. Performance multiplier 1.0.

Transducer alignment The transducer will be perpendicular to the liquid surface.

Performance multiplier 1.0.

Foam None. Performance multiplier 1.0.

Dust None. Performance multiplier 1.0.

Air movement None. Performance multiplier 1.0.

Ambient temperature 0 to +120° F. Performance multiplier 1.0.

Pressure Atmospheric pressure. Performance multiplier 1.0.

Will the Model 344 work for this application?

CALCULATION

Multiply all values in the application column:

0.9 x 0.9 x 1.0 x 35 feet (maximum) = 28.35 feet

The calculation yields 28.35 feet as the new maximum range. Since the tank is 26 feet tall, this application will give satisfactory results with the Model 344.

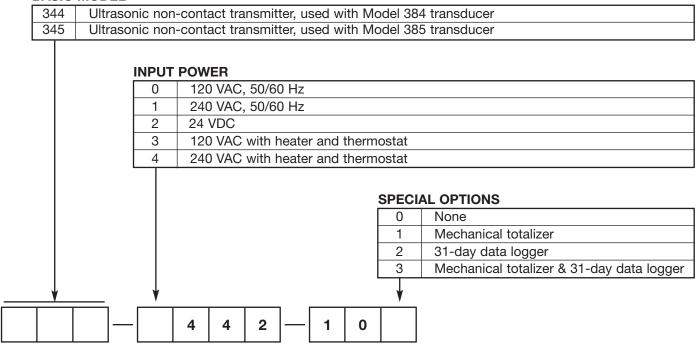
NOTE: The performance multipliers provided are conservative estimates. Since these factors are subjective, the values have been designed to provide very high confidence of system success. Contact the factory if there are any questions concerning the interpretation of any of these performance multipliers.

Operating Parameter	Condition	Performance Multiplier	Application
	Smooth, glasslike surface	1.0	
SURFACE AGITATION: Surface agitation or waves can degrade the performance. Moderate agitation results in only slight degradation	Slight agitation, choppiness	0.9	
of performance. The worst case is when the surface is a good	Heavy agitation	0.8	
reflector, but in the wrong direction. (See also transducer alignment.)	Slight vortex (6°)	0.7	
VAPORS AND STEAM: Vapors in the air space, above the process, become apparent, and cause problems when the liquid process temperature is well above the temperature of the airspace. The	No condensation	1.0	
greater the difference, the more expected vapor problems. The problems result from condensation or layering in the sound path, both of which attenuate the sound signal, degrading performance	Little condensation	0.9	
To avoid these problems, ensure that the vessel is insulated so that vapors are less likely to condense. If a vent is used, be sure that the vent, which is where condensation will form, is well away from the transducer.	Much condensation/ foggy appearance	0.8	
BEAM SPREAD INTERFERENCE: It is strongly recommended that nothing be allowed within the transducer's beam, except the liquid	No interference	1.0	
which is being monitored. Often, the signal from the liquid will be strong, compared to the signal from other sources, such as ladder	Agitator at speed less than 60 RPM	1.0	
rungs, filling process material, support struts, etc. For that reason, some applications may provide satisfactory results, even with interference. Interference from agitator blades is only an intermittent	Agitator at speed greater than 60 RPM	Consult Factory	
interference that usually has little effect on performance. It is recommended there be no interference within the 6° half angle of	Interference outside 4°, far from transducer (in bottom third of range)	0.8	
the transducer beam. If interference is unavoidable, make the inter- ference as far as possible from the transducer so that the real signal at the longest distance is stronger than the interference signal.	Interference outside 4°, near to transducer (in top third of range)	0.5	
TRANSDUCER ALIGNMENT: Optimum performance is obtained when the transducer is perfectly aligned. If the process is not perpendicular	Beam perpendicular to liquid surface	1.0	
to the sound beam, the sound will not reflect properly back to the transducer. The effect is significant.	Beam 4° off from perpendicular	0.5	
FOAM: Even small thicknesses of foam can attenuate the ultra-	No foam	1.0	
sound and render the system inoperative. If possible, moving the transducer to an area in the tank where there is less foam will improve	Light froth, less than 0.25" thick	0.8	
the performance. Thick, heavy-density foams can sometimes produce	Light foam, less than 0.5" thick	0.5	
a reflection from the top of the foam. The multipliers shown at right are general guidelines. For further assistance consult the factory.	Light foam, more than 1" thick	0.1	
,	No dust	1.0	
DUST: Dust attenuates the sound and results in poor performance.	Haze, barely perceptible	0.7	
Even barely perceptible haze in the air can cause significant attenuation.	Slight dust	0.4	
attoriadion.	Heavy dust	0.1	
AIR MOVEMENT: The movement of air, as possible in an open top	No air movement	1.0	
vessel, can create a layer from which the sound will reflect. This will	Open vessel, but transducer below rim	0.8	
be most noticeable in applications where vapors or steam tend to form.	Open air movement in sound path	0.7	
AMBIENT TEMPERATURE: The ambient temperature can have a	-20° to +140° F (-29° to +50° C)	1.0	
significant effect on the sound and on the transducer's capability to	-40° to -20° F (-40° to -29° C)	0.9	
transmit and receive sound. The most noticeable effect on the transducer is at the temperature extremes.	+140° to +160° F (+50 to +70° C)	0.9	
PRESSURE: Sound requires air molecules to be able to travel. Sound will not travel in a vacuum. Likewise, higher pressures will allow the	-10 to +50 PSIG (0.689 to +3.45 Bar)	1.0	
sound to continue without decay, which can cause problems with multiple echoes.	Pressures outside above rating	Consult Factory	
Mult	iply all values together in the applicati	on column	
Multiply by maximum potential range	(35 feet for Model 344 or 25 feet for M	Model 345)	X
Maximum a	llowable measurement range for this a	application	=

Model Numbers 5.8

5.8.1 Transmitter

BASIC MODEL



5.8.2 Model 384 38 kHz Transducer

PROCESS CONNECTION

2		1" NPT, not available with transducer housing code 1 or Y	
5		2" NPT	
	TR	ANSDUCER MATERIAL K	_

TRANSDUCER HOUSING

0	No housing, 35' (10.7 m) of cable potted into transducer
1	Cast aluminum, NEMA 4X/7/9 housing with ¾" NPT single conduit, connecting cable ordered separately
Υ	316 stainless steel, NEMA 4X/7/9 housing with ¾" NPT single conduit connecting cable ordered separately

TRANSDUCER MOUNTING BRACKET

003

0	No mounting bracket	
3	Wall mount bracket for 2" NPT process connection only	
4	Floor mount bracket for 2" NPT process connection only	

TRANSDUCER INSERTION LENGTH 3" (76 mm) length

010	10'	(254 mm) length
V		

3

5.8.3 Model 385 50 kHz Transducer

PROCESS CONNECTION

1	¾" NPT, not available with transducer housing code 1 or Y
5	2" NPT

TRANSDUCER MATERIAL

K	Kynar
E	316 stainless steel (for use in hazardous environments, refer to agency approvals)

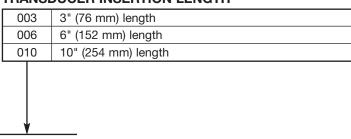
TRANSDUCER HOUSING

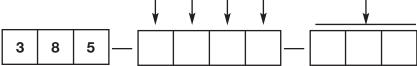
0	No housing, 35' (10.7 m) of cable potted into transducer
1	Cast aluminum, NEMA 4X/7/9 housing with ¾" NPT single conduit, connecting cable ordered separately
Y	316 stainless steel, NEMA 4X/7/9 housing with ¾" NPT single conduit connecting cable ordered separately

TRANSDUCER MOUNTING BRACKET

0	No mounting bracket
1	Wall mount bracket for ¾" NPT process connection only
2	Floor mount bracket for ¾" NPT process connection only
3	Wall mount bracket for 2" NPT process connection only
4	Floor mount bracket for 2" NPT process connection only

TRANSDUCER INSERTION LENGTH





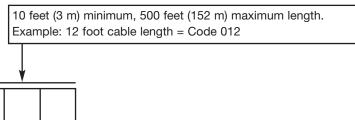
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6

5.8.4 Connecting Cable

3

CABLE LENGTH IN FEET



Notes		

Notes	

ASSURED QUALITY & SERVICE COST LESS

Service Policy

Owners of Magnetrol controls may request the return of a control or any part of a control for complete rebuilding or replacement. They will be rebuilt or replaced promptly. Controls returned under our service policy must be returned by Prepaid transportation. Magnetrol will repair or replace the control at no cost to the purchaser (or owner) other than transportation if:

- 1. Returned within the warranty period; and
- 2. The factory inspection finds the cause of the claim to be covered under the warranty.

If the trouble is the result of conditions beyond our control; or, is NOT covered by the warranty, there will be charges for labor and the parts required to rebuild or replace the equipment.

In some cases it may be expedient to ship replacement parts; or, in extreme cases a complete new control, to replace the original equipment before it is returned. If this is desired, notify the factory of both the model and serial numbers of the control to be replaced. In such cases, credit for the materials returned will be determined on the basis of the applicability of our warranty.

No claims for misapplication, labor, direct or consequential damage will be allowed.

Return Material Procedure

So that we may efficiently process any materials that are returned, it is essential that a "Return Material Authorization" (RMA) number be obtained from the factory, prior to the material's return. This is available through Magnetrol's local representative or by contacting the factory. Please supply the following information:

- 1. Company Name
- 2. Description of Material
- 3. Serial Number
- 4. Reason for Return
- 5. Application

Any unit that was used in a process must be properly cleaned in accordance with OSHA standards, before it is returned to the factory.

A Material Safety Data Sheet (MSDS) must accompany material that was used in any media.

All shipments returned to the factory must be by prepaid transportation.

All replacements will be shipped F.O.B. factory.



5300 Belmont Road • Downers Grove, Illinois 60515-4499 • 630-969-4000 • Fax 630-969-9489 • www.magnetrol.com 145 Jardin Drive, Units 1 & 2 • Concord, Ontario Canada L4K 1X7 • 905-738-9600 • Fax 905-738-306 Heikensstraat 6 • B 9240 Zele, Belgium • 052 45.11.11 • Fax 052 45.09.93 Regent Business Ctr., Jubilee Rd. • Burgess Hill, Sussex RH15 9TL U.K. • 01444-871313 • Fax 01444-871317