

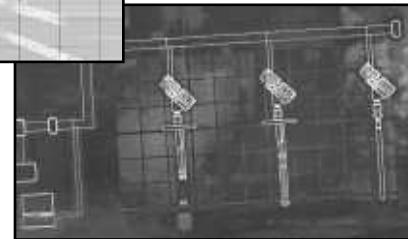
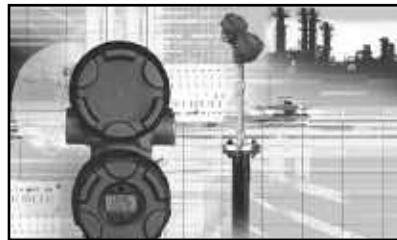
# ECLIPSE<sup>®</sup>

Enhanced Model 705 with  
PROFIBUS PA<sup>™</sup> Digital Output

705 software v3.x

PROFIBUS PA<sup>™</sup> Operating Manual

*Guided Wave Radar  
Level Transmitter*



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## Read this Manual Before Installing

This manual provides information on the Enhanced Eclipse Model 705 transmitter with PROFIBUS PA™ Output and should be used in conjunction with Eclipse I&O manual 57-600. It is important that all instructions are read and followed carefully.

### Safety Messages

The Eclipse system is designed for use in Category II, Pollution Degree 2 installations. 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.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

**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

### 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.

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

### Warranty

All Magnetrol/STI 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/STI will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

Magnetrol/STI 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/STI products.

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The quality assurance system in place at Magnetrol/STI 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.



# PROFIBUS PA<sup>™</sup> Enhanced Eclipse Model 705 Guided Wave Radar Transmitter

## Table of Contents

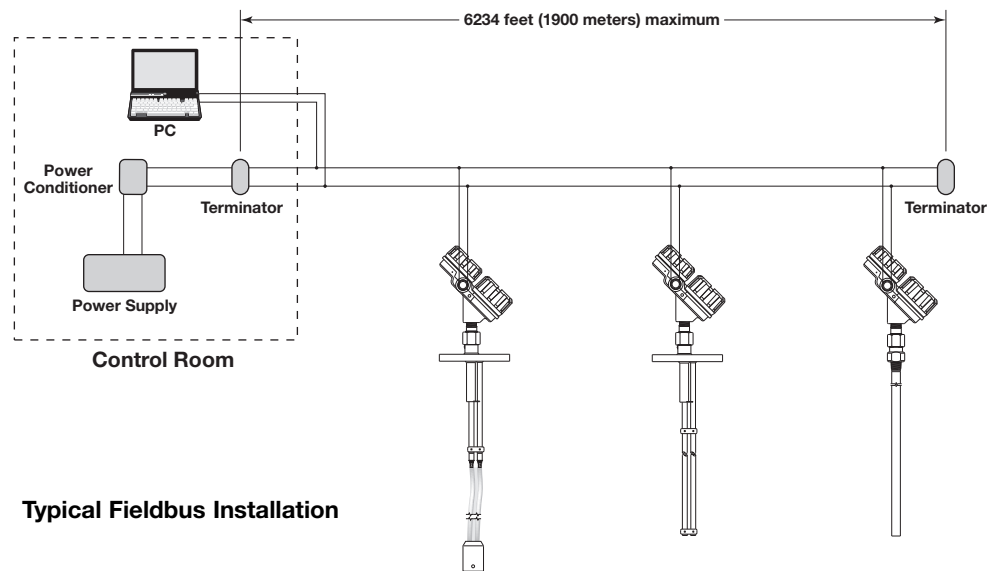
<b>1.0 PROFIBUS PA<sup>™</sup> Overview</b> .....	1	<b>4.0 Function Blocks</b> .....	17
1.1 Description .....	1	4.1 Overview.....	17
1.2 Benefits .....	2	4.1.1 Universal Fieldbus Block Parameters .....	17
1.3 Device Configuration.....	2	4.2 Resource Block.....	18
1.4 Intrinsic Safety .....	3	4.3 GWR Transducer Block .....	21
<b>2.0 QuickStart Installation</b> .....	4	4.3.1 GWR Transducer Block Parameters.....	21
2.1 Getting Started.....	4	4.3.2 Password Parameters.....	21
2.1.1 Equipment and Tools .....	4	4.3.3 Configuration Parameters.....	22
2.1.2 Configuration Information.....	5	4.3.4 Offset Description.....	23
2.2 QuickStart Mounting.....	5	4.4 Calibration Parameters .....	24
2.2.1 Probe.....	5	4.4.1 Factory Parameters .....	24
2.2.2 Transmitter.....	6	4.4.2 Firmware Version .....	25
2.3 QuickStart Wiring .....	6	4.5 Analog Input Block.....	25
2.4 QuickStart Configuration .....	7	4.5.1 AI Block Parameters .....	25
<b>3.0 Complete Installation</b> .....	8	<b>5.0 Model 705 Menu: Step by Step Procedure</b> .....	??
3.1 Unpacking .....	8	<b>6.0 Diagnostic Parameters</b> .....	28
3.2 Electrostatic Discharge (ESD) Handling Procedure..	8	6.1 Simulation Feature .....	29
3.3 Before You Begin.....	9	<b>7.0 Reference Information</b> .....	32
3.3.1 Site Preparation .....	9	7.1 Troubleshooting .....	32
3.3.2 Equipment and Tools .....	9	7.1.1 Troubleshooting System Problems.....	32
3.3.3 Operational Considerations.....	9	7.1.2 Error Messages .....	33
3.4 Mounting.....	9	7.1.3 PA Segment Checklist .....	35
3.4.1 Installing a Coaxial Probe.....	10	7.2 Agency Approvals.....	36
3.4.1.1 To install a coaxial probe.....	10	7.2.1 Agency Specifications –	
3.4.2 Installing a Twin Rod Probe .....	11	PROFIBUS PA <sup>™</sup> System .....	37
3.4.2.1 To install a rigid twin rod probe.....	11	7.3 Specifications .....	38
3.4.2.2 To install a Model 7x7 standard		7.3.1 Functional .....	38
flexible twin rod probe.....	12	7.3.2 Performance – Model 705 .....	39
3.4.3 Installing a Single Rod Probe .....	12	7.3.3 Performance – Model 705 Interface .....	40
3.4.3.1 Installing a rigid probe .....	13	7.4 Parts.....	41
3.4.3.2 Installing a flexible probe .....	13	7.4.1 Replacement Parts .....	41
3.4.4 Installation Guidelines–		7.4.2 Recommended Spare Parts .....	41
Models 7x2/7x5 Bulk Solids Probes .....	14	7.5 Model Numbers .....	42
3.4.4.1 Applications .....	14	7.5.1 Transmitter.....	42
3.4.4.2 Mounting recommendations .....	14	7.5.2 Probe.....	43
3.4.4.3 To install a bulk solids twin rod probe ..	14	7.6 References .....	46
3.4.4.4 To install a bulk solids single rod probe	15	<b>Appendix</b> .....	46
3.4.5 Installing the Transmitter .....	16	<b>Configuration Data Sheet</b> .....	47
3.4.5.1 Integral Mount.....	16		
3.4.5.2 Remote Mount.....	16		

## 1.0 PROFIBUS PA™ Overview

### 1.1 Description

PROFIBUS PA™ is a digital communications system that serially interconnects devices in the field. A fieldbus system is similar to a Distributed Control System (DCS) with two exceptions:

- Although a PROFIBUS PA™ system can use the same physical wiring as an existing 4–20 mA device, fieldbus devices are not connected point to point, but rather are multidropped and wired in parallel on a single pair of wires (referred to as a segment).
- PROFIBUS PA™ is a system that allows the user to distribute control across a network. Fieldbus devices are smart and actually maintain control over the system.



Typical Fieldbus Installation

Unlike 4–20 mA analog installations in which the two wires carry a single variable (the varying 4–20 mA current), a digital communications scheme such as PROFIBUS PA™ considers the two wires as a network. The network can carry many process variables as well as other information. The Enhanced Eclipse Model 705PA transmitter is a PROFIBUS PA™ certified device that communicates with the DPV1 protocol operating at 31.25 kbits/sec. The MBP physical layer is an approved IEC 61158 standard.

An IEC61158 shielded twisted pair wire segment can be as long as 6234 feet (1900 meters) without a repeater. Up to 4 repeaters per segment can be used to extend the distance. The maximum number of devices allowed on a fieldbus segment is 32 although this depends on the current draw of the devices on any given segment.

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Details regarding cable specifications, grounding, termination, and other network information can be found in IEC 61158 or the technical guideline “PROFIBUS PA™ User and Installation Guideline” at [www.profibus.com](http://www.profibus.com).

## 1.2 Benefits

The benefits of PROFIBUS PA™ can be found throughout all phases of an installation:

1. **Design/Installation:** Connecting multiple devices to a single pair of wires means less wire and fewer I/O equipment. Initial Engineering costs are also reduced because PROFIBUS International requires interoperability, defined as “the ability to operate multiple devices in the same system, regardless of manufacturer, without a loss of functionality.”

All PROFIBUS PA™ devices must be tested for interoperability by a PI accredited, independent testing agency. Magnetrol Model 705PA device certification. information can be found at [www.profibus.com](http://www.profibus.com).

2. **Operation:** A PROFIBUS PA™ system allows for multiple variables to be brought back from each device to the control room for additional trending and reporting.
3. **Maintenance:** The self-diagnostics residing in the smart field devices minimizes the need to send maintenance personnel to the field.

## 1.3 Device Configuration

The function of a PROFIBUS PA™ device is determined by the arrangement of a system of blocks. The types of blocks used in a typical User Application are described as follows:

**Physical Block** describes the characteristics of the PROFIBUS PA™ device such as the device name, manufacturer, and serial number.

**Function Blocks** are built into the PROFIBUS PA™ devices as needed to provide the desired control system behavior. There can be numerous function blocks in a single User Application.

**Transducer Blocks** contain information such as calibration parameters and sensor type. They are used to connect the sensor to the input function blocks.

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An important requirement of fieldbus devices is the interoperability concept mentioned earlier. Device Description (DD) technology can provide extended descriptions for each object and provides pertinent information useful for a host system.

DDs are similar to the drivers that your personal computer (PC) uses to operate peripheral devices connected to it.

#### **General PROFIBUS Information:**

- The Model 705 supports PA Profile Version 3.0
- The Ident Number issued by the PNO for Magnetrol Model 705 3.x is 0x09B3. The Ident Number is included in the name of the GSD file.
- The General Station Description (GSD) file provides information on the features and performance capabilities of a PROFIBUS device to allow easy configuration of PROFIBUS networks with devices from different manufacturers. The manufacturer-specific GSD file for PA Model 705 3.x is Mag\_09B3.gsd. Also, a bitmap file specified in the GSD file provides a symbolic representation of the device for network configuration tools.
- The Model 705 3.x can also use the profile-specific GSD file PA139703.gsd. If this general GSD file is used, the “Ident number Selector” parameter in the Physical Block must be set to the profile-specific ident number. The default selection of the “Ident Number Selector” parameter is the manufacturer-specific ident number.
- A Device Description is available for configuring the device using Simatic PDM.
- The range of device bus addresses is 0 to 126. 126 is the default address and all units will ship with address 126 unless a non-default address assignment is requested by the customer. The address can be changed via the fieldbus or the local LCD interface.

Additional information can be found at [www.profibus.com](http://www.profibus.com).

## **1.4 Intrinsic Safety**

The IEC61158 physical layer supports Intrinsic Safety (IS) applications with bus-powered devices. To accomplish this, an IS barrier or galvanic isolator is placed between the power supply in the safe area and the device in the hazardous area.

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IEC61158 also supports the Fieldbus Intrinsically Safe Concept (FISCO) model which allows more field devices in a network. The FISCO model considers the capacitance and inductance of the wiring to be distributed along its entire length. Therefore, the stored energy during a fault will be less and more devices are permitted on a pair of wires. Instead of the conservative entity model, which only allows about 90 mA of current, the FISCO model allows a maximum of 110 mA for Class II C installations and 240 mA for Class II B installations.

FISCO certifying agencies have limited the maximum segment length to 1000 meters because the FISCO model does not rely on standardized ignition curves.

The Enhanced Eclipse Model 705 is available with entity IS, FISCO IS, FNICO non-incendive, or explosion proof approvals.

## 2.0 QuickStart Installation

The QuickStart Installation procedures provide the key steps for mounting, wiring, and configuring the Eclipse level transmitter. These procedures are intended for experienced installers of electronic level measurement instruments. See Complete Installation, Section 3.0, for detailed installation instructions.

**WARNING:** The Model 7xD, 7xR or 7xT overfill probes should be used for Safety Shutdown/Overfill applications. All other Guided Wave Radar probes should be installed so the maximum overfill level is a minimum of 6" (150 mm) below the process connection. This may include utilizing a nozzle or spool piece to raise the probe. Consult factory to ensure proper installation.

## 2.1 Getting Started

Before beginning the QuickStart Installation procedures, have the proper equipment, tools, and information available.

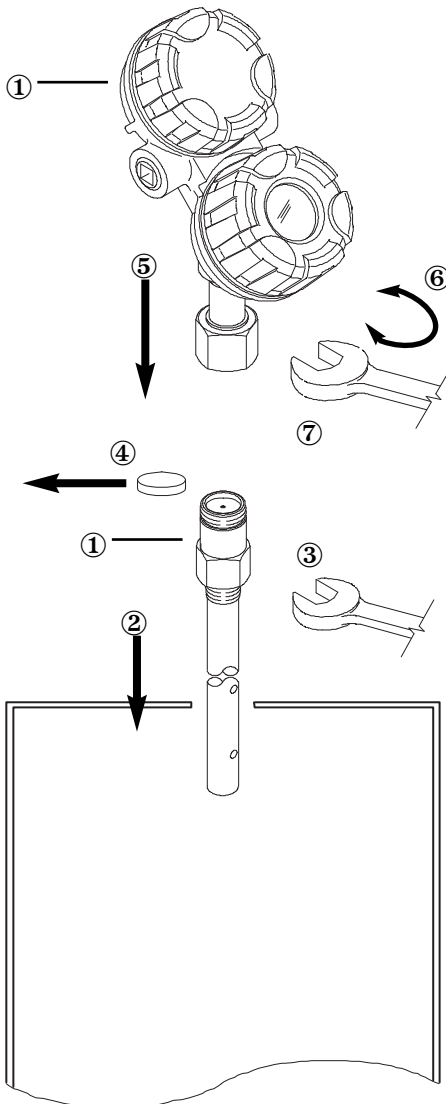
### 2.1.1 Equipment and Tools

- Open-end wrenches or adjustable wrench to fit the process connection size and type. Coaxial probe 1½" (38 mm), twin rod probe 1⅞" (47 mm), transmitter 1½" (38 mm). A torque wrench is highly desirable.
- Flat-blade screwdriver
- Cable cutter and ⅜" (2.5 mm) hex wrench (Flexible probes only)
- Fieldbus compatible power supply with proper termination

## 2.1.2 Configuration Information

Some key information is needed to configure the Eclipse transmitter. Complete the following operating parameters table before beginning configuration.

Display	Question	Answer
Probe Model	What probe model is listed on the model information? (first four digits of probe model number)	_____
Probe Mount	Is the probe mounted NPT, BSP, or flange?	_____
Measurement Type	What is the desired measurement? Choices are: Level only, Volume, Interface Level or Interface Level and Volume.	_____
Probe Length	What probe length is listed on the model information? (last three digits of probe model number)	_____
Level Offset	The desired level reading when the liquid is at the end of the probe.	_____
Dielectric	What is the dielectric constant range of the process medium? ( <i>Lower layer dielectric for interface applications</i> )	_____



## 2.2 QuickStart Mounting

**NOTE:** Confirm the configuration style and process connection size/type of the Eclipse transmitter. Ensure it matches the requirements of the installation before continuing with the QuickStart installation.

- 1 Confirm the model and serial numbers on the nameplates of the Eclipse probe and transmitter are identical.

**For applications using the Model 7xS steam probe, it is mandatory to keep the transmitter and probe matched as a set.**

### 2.2.1 Probe

- 2 Carefully place the probe into the vessel. Align the probe process connection with the threaded or flanged mounting on the vessel.

## 2.2.2 Transmitter

- ③ Tighten the hex nut of the probe process connection or flange bolts.

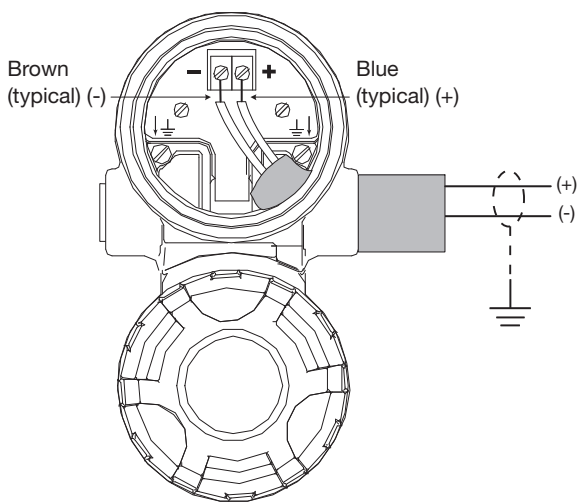
NOTE: Leave the plastic protective cap in place until ready to install the transmitter. Do not use sealing compound or TFE tape on probe connection to transmitter as this connection is sealed by a Viton® O-ring.

- ④ Remove the protective plastic cap from the top of the probe and store for future use. Make sure the top probe connector (female socket) is clean and dry. Clean with isopropyl alcohol and cotton swabs if necessary.
- ⑤ Place the transmitter on the probe. Align the universal connection at the base of the transmitter housing with the top of the probe. Hand tighten the connection.
- ⑥ Rotate the transmitter so that it is in the most convenient position for wiring, configuring, and viewing.
- ⑦ Using a 1½" (38 mm) wrench, tighten the universal connection on the transmitter ¼ to ½ turn beyond hand tight. A torque wrench is highly recommended to obtain 15 ft-lbs. This is a critical connection. **DO NOT LEAVE HAND TIGHT.**

## 2.3 QuickStart Wiring

**WARNING!** Explosion hazard. Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

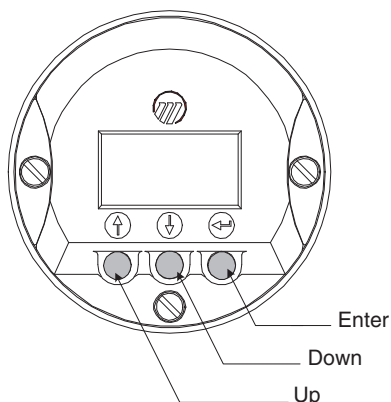
NOTE: Ensure that the electrical wiring to the Eclipse transmitter is complete and in compliance with all regulations and codes.



1. Remove the cover of the upper wiring compartment of the transmitter.
2. Attach a conduit fitting and mount the conduit plug in the spare opening. Pull the power supply wire through the conduit fitting.
3. Connect shield to an earth ground at power supply.
4. Connect the positive supply wire to the (+) terminal and the negative supply wire to the (-) terminal.
5. Replace the cover and tighten.

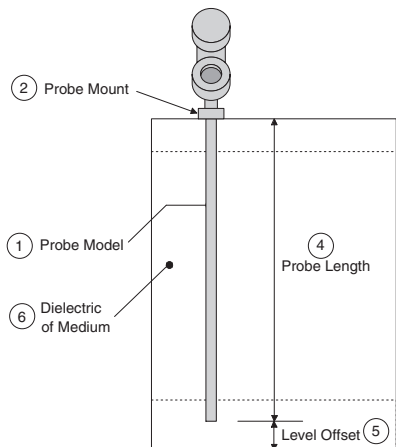
## 2.4 QuickStart Configuration

The Eclipse transmitter comes partially configured from the factory but can be reconfigured in the shop (disregard fault message due to unattached probe). The minimum configuration instructions required in the field follow. Use the information from the operating parameters table in Section 2.1.2 before beginning configuration.



1. Power up the transmitter.  
The display changes every 5 seconds to show one of two values: Status & Level.
2. Remove the cover of the lower electronic compartment.
3. Use the Up or Down Arrow (↑ ↓) keys to move from one step of the configuration program to the next step.
4. Press the Enter Arrow (↔) key. The last character in the first line of the display changes to an exclamation point (!). PrbModel  
xxx
5. Use the Up or Down Arrow (↑ ↓) keys to increase or decrease the value in the display or to scroll through the choices.
6. Press the Enter Arrow (↔) key to accept a value and move to the next step of the configuration program (the default password is 0).
7. After entering the last value, allow 10 seconds before removing power from the transmitter.

The following configuration entries are the minimum required for configuration (the default password is 0 from the LCD/keypad).



- |   |                      |  |
|---|----------------------|--|
| ① | PrbModel<br>(select) | Select the <b>Probe Model</b> to be used<br><b>Model 705:</b> 7xA-x, 7xB-x, 7xD-x, 7xE-x, 7xF-F, 7xF-P, 7xF-4, 7xF-x, 7xJ-x, 7xK-x, 7xP-x, 7xR-x, 7xS-x, 7xT-x, 7x1-x, 7x2-x, 7x5-x, 7x7-x                     |
| ② | PrbMount<br>(select) | Select the type of <b>Probe Mounting</b> to vessel (NPT, BSP, or flange).  |
| ③ | MeasType<br>(select) | Select from Level Only, Level and Volume, Interface Level or Interface Level and Volume.   |
| ④ | Probe Ln<br>xxx.x    | Enter the exact <b>Probe Length</b> as printed on the probe nameplate.   |
| ⑤ | LvlOfst<br>xxx.x     | Enter the <b>Level Offset</b> value. Refer to Section 2.6.6 for further information. (The unit is shipped from the factory with offset = 0; i.e., all measurements are referenced to the bottom of the probe). |
| ⑥ | Dielctrc<br>(select) | Enter the <b>Dielectric</b> range for the material to be measured.   |

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## 3.0 Complete Installation

This section provides detailed procedures for properly installing and configuring the Eclipse Guided Wave Radar Level Transmitter.

### 3.1 Unpacking

Unpack the instrument carefully. Make sure all components have been removed from the packing material. Check all the contents against the packing slip and report any discrepancies to the factory.

Before proceeding with the installation, do the following:

- Inspect all components for damage. Report any damage to the carrier within 24 hours.
- Make sure the nameplate model number on the probe and transmitter agree with the packing slip and purchase order.
- Record the model and serial numbers for future reference when ordering parts.

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Model Number

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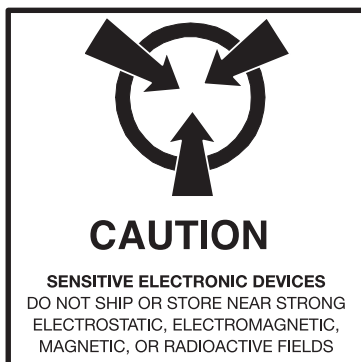
Serial Number

### 3.2 Electrostatic Discharge (ESD) Handling Procedure

Magnetrol's electronic instruments are manufactured to the highest quality standards. These instruments use electronic components that 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 anti-static bag is not available, wrap the 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 recommended.
- Handle 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.



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## 3.3 Before You Begin

### 3.3.1 Site Preparation

Each Eclipse transmitter is built to match the specific physical specifications of the required installation. Make sure the probe connection is correct for the threaded or flanged mounting on the vessel or tank where the transmitter will be placed. See Mounting, Section 3.4.

Make sure that the wiring between the power supply and Eclipse transmitter are complete and correct for the type of installation.

When installing the Eclipse transmitter in a general purpose or hazardous area, all local, state, and federal regulations and guidelines must be observed.

### 3.3.2 Equipment and Tools

No special equipment or tools are required to install the Eclipse transmitter. The following items are recommended:

- Open-end wrenches or adjustable wrench to fit the process connection size and type. Coaxial probe 1½" (38 mm), twin rod probe 1⅞" (47 mm), transmitter 1½" (38 mm). A torque wrench is highly desirable.
- Flat-blade screwdriver
- Fieldbus compatible power supply with proper termination

### 3.3.3 Operational Considerations

Operating specifications vary based on Probe model number.

## 3.4 Mounting

The Eclipse transmitter can be mounted to a tank using a variety of process connections. Generally, either a threaded or flanged connection is used. For information about the sizes and types of connections available, see Probe Model Numbers, Section 7.5.2.

**NOTE:** Do not place insulating material around any part of the Eclipse transmitter including the probe flange as this may cause excessive heat buildup.

Make sure all mounting connections are properly in place on the tank before installing the probe. Compare the nameplate on the probe and transmitter with the product information; make sure the Eclipse probe is correct for the intended installation.

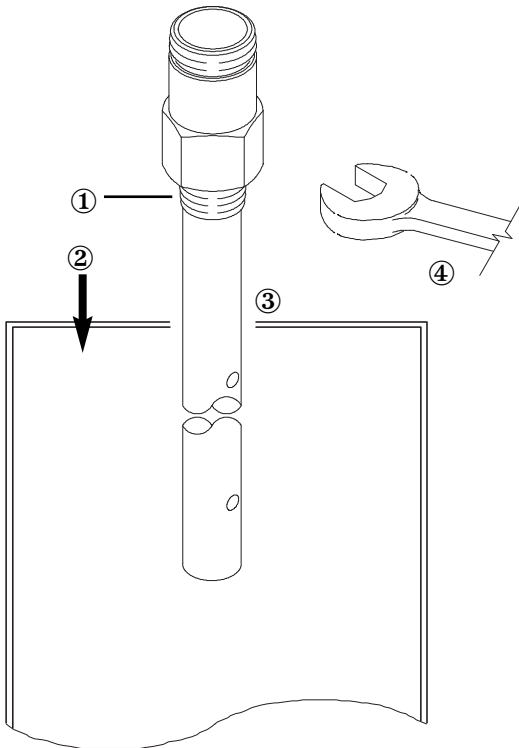
**WARNING!** The Model 7xD, 7xR or 7xT overfill probes should be used for Safety Shutdown/Overfill applications. All other Guided Wave Radar probes should be installed so the maximum overfill level is a minimum of 6" (150 mm) below the process connection. This may include utilizing a nozzle or spool piece to raise the probe. Consult factory to ensure proper installation.

**WARNING!** Do not disassemble probe when in service and under pressure.

### 3.4.1 Installing a Coaxial Probe (Models 7xA, 7xD, 7xP, 7xR, 7xS, and 7xT)

Before installing, make sure the:

- Model and serial numbers on the nameplates of the Eclipse probe and transmitter are identical.
- Probe has adequate room for installation and has unobstructed entry to the bottom of the vessel. The Model 7xD (High Temp./High Pressure) probe, Model 7xP (High Pressure) probe, Model 7xR (Overfill) probe, Model 7xS (Steam) probe and Model 7xT (Interface) probe require added clearance.
- Process temperature, pressure, dielectric, and viscosity are within the probe specifications for the installation.
- Model 7xD (High Temp./High Pressure) probes should be handled with extra care due to the ceramic spacers used throughout their length.



#### 3.4.1.1 To install a coaxial probe:

- ① Make sure the process connection is at least  $\frac{3}{4}$ " NPT or a flanged mounting.
- ② Carefully place the probe into the vessel. Align the gasket on flanged installations.
- ③ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ④ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.

**NOTE:** If the transmitter is to be installed at a later time, do not remove the protective cap from the probe. Do not use sealing compound or TFE tape on probe connection to transmitter as this connection is sealed by a Viton® O-ring.

### 3.4.2 Installing a Twin Rod Probe (Models 7xB, 7x5, and 7x7)

Before installing, make sure the:

- Model and serial numbers on the nameplates of the Eclipse probe and transmitter are identical.
- Probe has adequate headroom for installation and has unobstructed entry to the bottom of the vessel.
- Process temperature, pressure, dielectric, viscosity, and media buildup are within the probe specifications for the installation.

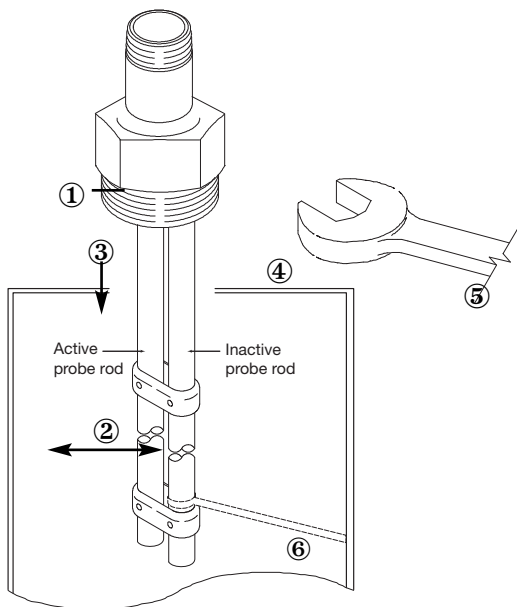
#### Nozzles:

The 7xB/7x5/7x7 Twin Rod probes may be susceptible to objects that are in close proximity. The following rules should be followed for proper application:

1. Nozzles should be 3" (80 mm) diameter or larger.
2. 7xB/7x5/7x7 Twin Rod probes should be installed such that the active rod is >1" (25 mm) from metallic objects such as pipes, ladders, etc., (a bare tank wall parallel to the probe is acceptable).

#### 3.4.2.1 To install a rigid twin rod probe:

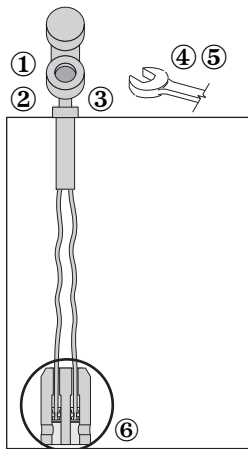
- ① Make sure the process connection is at least 2" NPT or a flanged mounting.
- ② Make sure that there is at least 1" (25 mm) spacing between the active probe rod and any part of the tank (walls, stillwell, pipes, support beams, mixer blades, etc.). Minimum stillwell diameter for Twin Rod probe is 3".
- ③ Carefully place the probe into the vessel. Align the gasket on flanged installations.
- ④ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ⑤ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.
- ⑥ Probe can be stabilized by attaching the inactive probe rod to vessel.



**NOTE:** If the transmitter is to be installed at a later time, do not remove the protective cap from the probe. Do not use sealing compound or TFE tape on probe connection to transmitter as this connection is sealed by a Viton® O-ring.

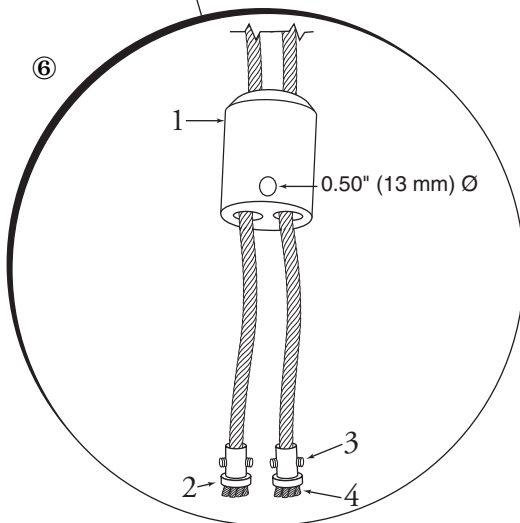
### 3.4.2.2 To install a Model 7x7 standard flexible twin rod probe:

- ① Make sure the process connection is at least 2" NPT or a flanged mounting.
- ② Make sure that there is at least 1" (25 mm) spacing between the active probe rod and any part of the tank (walls, stillwell, pipes, support beams, mixer blades, etc.). Minimum stillwell diameter for Twin Rod probe is 3".
- ③ Carefully place the probe into the vessel. Align the gasket on flanged installations.
- ④ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ⑤ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.



Probe can be shortened in the field:

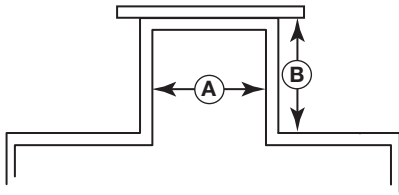
- ⑥ a. Raise the weight (1) to expose the two securing devices (2).
- b. Loosen the two #10-32 set screws (3) on both securing devices using a  $\frac{3}{32}$ " (2.5 mm) hex wrench and slide the securing devices off of the probe.
- c. Slide the TFE weight off of the probe.
- d. Cut and remove the required cable (4) length.
- e. Remove  $\frac{3}{8}$ " of the rib between the two cables.
- f. Strip  $\frac{5}{8}$ " (16 mm) of coating from the two cables.
- g. Slide the TFE weight back on to the probe.
- h. Reattach securing device and tighten screws.
- i. Enter new probe length (inches or cm) in software.



### 3.4.3 Installing a Single Rod Probe (Models 7x1, 7x2, 7xF, 7xJ)

Before installing, make sure the:

- Model and serial numbers on the nameplates of the Eclipse probe and transmitter are identical.
- Probe has adequate headroom for installation and has unobstructed entry to the bottom of the vessel.
- Process temperature, pressure, dielectric, viscosity, and media buildup are within the probe specifications for the installation.
- Nozzle does not restrict performance by ensuring the following:
  1. Nozzle is <2" (50mm) diameter.



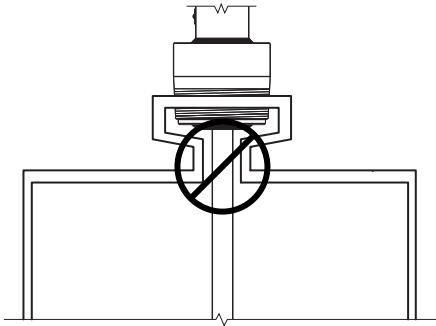
2. Ratio of Diameter: Length (A:B) is 1:1 or greater; any ratio <1:1 (e.g., a 2" x 6" nozzle = 1:3) may require a Blocking Distance and/or DIELECTRIC adjustment (see Section 2.6.5.2 Measurement Type: Level and Volume).

3. No pipe reducers (restrictions) are used.

- Probe is kept away from conductive objects to ensure proper performance. See Probe Clearance Table below. A lower gain (increase in DIELECTRIC setting) may be necessary to ignore certain objects.

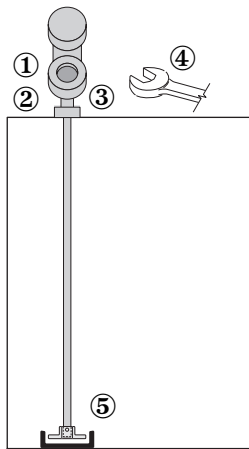
**PROBE CLEARANCE GUIDELINES**

Distance to Probe	Acceptable Objects
<6"	Continuous, smooth, parallel conductive surface, for example a metal tank wall; important that probe does not touch wall
>6"	<1" (25mm) diameter pipe and beams, ladder rungs
>12"	<3" (75mm) diameter pipe and beams, concrete walls
>18"	All remaining objects



**3.4.3.1 To install a Model 7xF rigid single rod probe:**

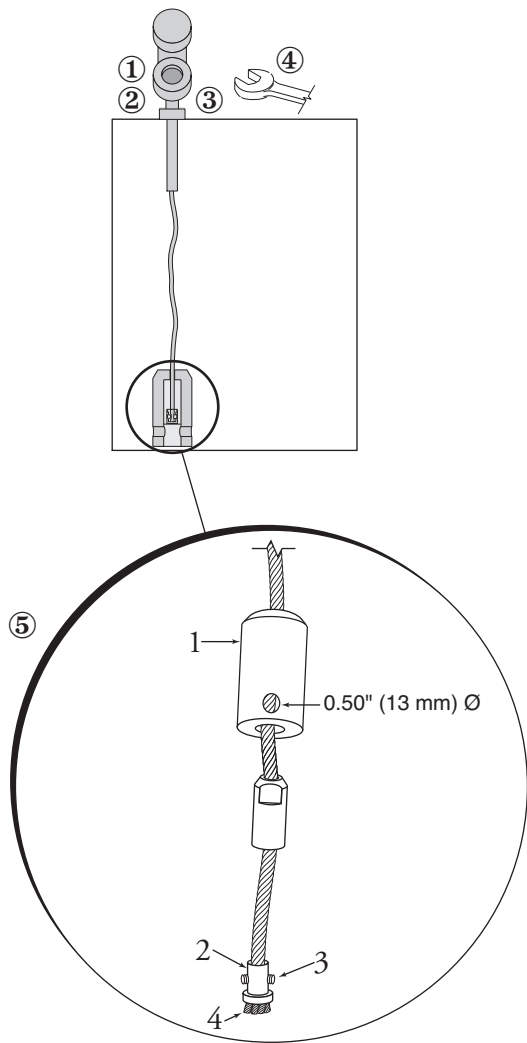
- ① Make sure the process connection is at least 2" NPT or a flanged mounting.
- ② Carefully place the probe into the vessel. Align the gasket on flanged installations.
- ③ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ④ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.
- ⑤ Probe can be stabilized by placing into a non-metallic cup or bracket at the bottom of the probe. A TFE bottom spacer (P/N 89-9114-001) is optional for mounting into a metallic cup or bracket.



**NOTE:** If the transmitter is to be installed at a later time, do not remove the protective cap from the probe. Do not use sealing compound or TFE tape on probe connection to transmitter as this connection is sealed by a Viton® O-ring.

**3.4.3.2 To install a Model 7x1 flexible single rod probe:**

- ① Make sure the process connection is at least 2" NPT or a flanged mounting.
- ② Carefully place the probe into the vessel. Align the gasket on flanged installations.



- ③ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ④ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.
- ⑤ Probe can be shortened in field:
  - a. Raise TFE weight (1) exposing securing device (2).
  - b. Loosen both #10–32 set screws (3) using  $\frac{3}{32}$ " (2.5 mm) hex wrench and remove securing device.
  - c. Cut and remove needed cable (4) length.
  - d. Reattach securing device and tighten screws.
  - e. Enter new probe length (inches or cm) in software.
- ⑥ Probe can be attached to the tank bottom using the 0.50" (13 mm)  $\varnothing$  hole provided in the TFE weight. Cable tension should not exceed 20 lbs.

### 3.4.4 Installation Guidelines

#### Models 7x2/7x5 Bulk Solids Probes

The Model 7x2 and 7x5 Bulk Solids probes are designed for a 3000 lb. (1360 kg) pull-down force for use in applications such as sand, plastic pellets and grains. It is offered with a maximum 75 foot (22 meter) probe length.

Model 7x2 Single Rod — dielectric  $\geq 4$

Model 7x5 Twin Rod — dielectric  $\geq 1.9$

NOTE: Avoid cement, heavy gravel, etc.

#### 3.4.4.1 Applications

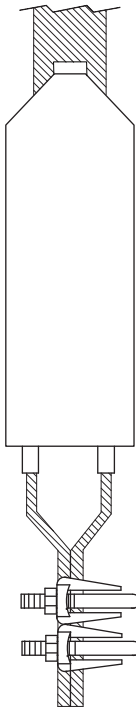
1. Plastic pellets, sugar: Dielectric constant 1.9-2.0
2. Grain, seeds, sand: Dielectric constant 2.0-3.0
3. Salts: Dielectric constant 4.0-7.0
4. Metallic powder, coal dust: Dielectric constant  $>7$

#### 3.4.4.2 Mounting recommendations

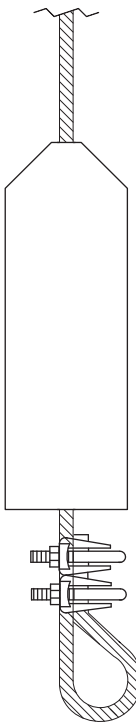
1. Use a weight instead of securing the probe to the vessel.
2. Mount probe at least 12 inches from the wall. Ideal location is  $\frac{1}{4}$  to  $\frac{1}{2}$  the diameter to average the angle of repose.
3. A metal flange must be used when mounting on plastic vessels.

#### 3.4.4.3 To install a Model 7x5 bulk solids flexible twin rod probe:

- ① Make sure the process connection is at least 2" NPT or a flanged mounting.



**Model 7x5 Dual Rod  
Bulk Solids Probe**



**Model 7x2 Single Rod  
Bulk Solids Probe**

- ② Make sure that there is at least 1" (25 mm) spacing between the active probe rod and any part of the tank (walls, stillwell, pipes, support beams, mixer blades, etc.). Minimum stillwell diameter for Twin Rod probe is 3".
- ③ Carefully place the probe into the vessel. Align the gasket on flanged installations.
- ④ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ⑤ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.

Refer to Bulk Solid Guidelines, Section 2.4.4.

Probe can be shortened in the field:

- ⑥ a. Loosen and remove the two cable clamps.
- b. Slide the weight off of the probe.
- c. Cut the cable to the required length.
- d. Remove 12 inches of the rib between the two cables.
- e. Strip 6 inches of coating from the two cables.
- f. Slide the weight back on to the probe.
- g. Reinstall the two cable clamps and tighten.
- h. Enter the new probe length (inches or cm) in software.

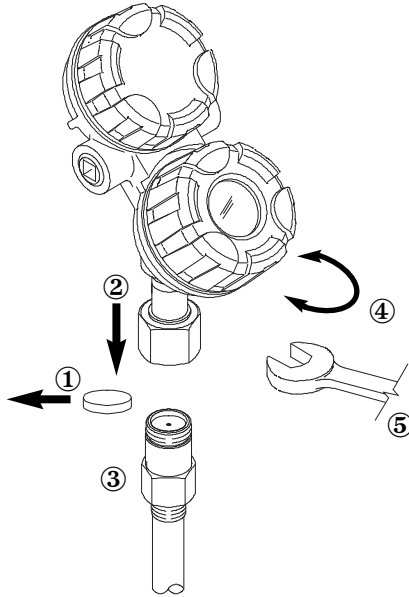
#### 3.4.4.4 To install a Model 7x2 bulk solids flexible single rod probe:

- ① Make sure the process connection is at least 2" NPT or a flanged mounting.
- ② Carefully place the probe into the vessel. Align the gasket on flanged installations.
- ③ Align the probe process connection with the threaded or flanged mounting on the vessel.
- ④ For threaded connections, tighten the hex nut of the probe process connection. For flanged connections, tighten flange bolts.
- ⑤ Probe can be shortened in field:
- ⑥ a. Loosen and remove the two cable clamps.
- b. Slide the weight off of the probe.
- c. Cut the cable to the required length plus 6.38".
- d. Slide the weight back on to the probe.
- e. Reinstall the two cable clamps and tighten.
- f. Enter the new probe length (inches or cm) in software.

### 3.4.5 Installing the Transmitter

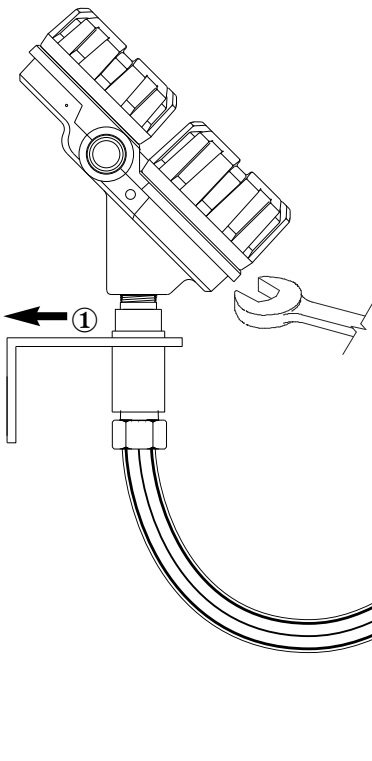
The transmitter can be ordered for installation as an Integral or Remote configuration.

#### 3.4.5.1 Integral Mount

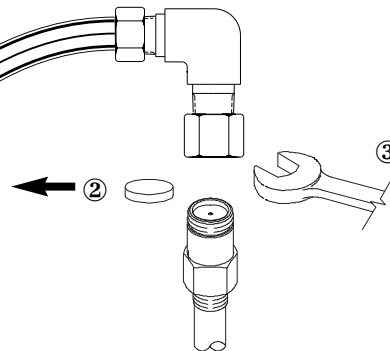


- ① Remove the protective plastic cap from the top of the probe. Put the cap in a safe place in case the transmitter has to be removed later.
- ② Place the transmitter on the probe. Be careful not to bend or dirty the gold, high frequency (male) connector.
- ③ Align the universal connection at the base of the transmitter housing with the top of the probe. Hand tighten the connection.
- ④ Rotate the transmitter to face the most convenient direction for wiring, configuration, and viewing.
- ⑤ When the transmitter is facing the desired direction, use a  $1\frac{1}{2}$ " (38 mm) wrench to tighten the universal connection on the transmitter to 15 ft-lbs. A torque wrench is highly recommended. This is a critical connection. **DO NOT LEAVE HAND TIGHT.**

#### 3.4.5.2 Remote Mount



- ① Mount the transmitter/remote bracket as an assembly within 33" (84 cm) of the probe. **DO NOT REMOVE TRANSMITTER FROM BRACKET.**
- ② Remove the protective plastic cap from the top of the probe. Put the cap in a safe place in case the transmitter has to be removed later.
- ③ Align the universal connection at the end of the remote assembly with the top of the probe. Using a  $1\frac{1}{2}$ " (38 mm) wrench, tighten the universal connection on the transmitter to 15 ft-lbs. A torque wrench is highly recommended. This is a critical connection. **DO NOT LEAVE HAND TIGHT.**



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## 4.0 Function Blocks

### 4.1 Overview

The Enhanced Eclipse Model 705 Guided Wave Radar Level Transmitter operates on the principle of Time Domain Reflectometry (TDR). Refer to Bulletins 57-101 and 57-600 for more detailed information on the Eclipse product family.

The Enhanced Eclipse Model 705PA is a Guided Wave Radar (GWR) level transmitter with six PROFIBUS PA™ Blocks (one Physical Block, one Transducer Block, and four Analog Input blocks). The idea of Function Blocks, which a user can customize for a particular application, is a key concept of fieldbus topology. Function Blocks consist of an algorithm, inputs and outputs, and a user-defined name.

The TRANSDUCER block output is available to the network through the ANALOG INPUT blocks.

The ANALOG INPUT blocks (AI) take the TRANSDUCER block level or volume values and makes them available as an analog value to the network. The AI blocks have scaling conversion, filtering, and alarm functions.

#### 4.1.1 Standard PROFIBUS™ Block Parameters

The following are general descriptions of the parameters common to all blocks. Additional information for a given parameter is described later in that specific block section.

**BLOCK\_OBJECT:** Contains the characteristics of the block. This object applies to every block and is placed before the first parameter.

**ST\_REV** A read-only parameter to track changes of static parameters in the associated block. ST\_REV will be incremented each time a static parameter is changed.

**TAG\_DESC (tag descriptor):** A user-supplied description of the block.

**STRATEGY:** A user-specified value that may be used in configuration or diagnostics as a key in sorting block information.

**ALERT\_KEY:** A user-assigned value that may be used in sorting alarms or events generated by a block.

**TARGET\_MODE:** This attribute indicates what mode of operation is desired for the block.

**MODE\_BLK:** A structured parameter composed of the actual mode, the normal and the permitted mode(s) of a block.

The actual mode is set by the block during its execution to reflect the mode used during execution

The permitted mode shows which changes of the target mode are valid for the specific block

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**ALARM\_SUM:** This parameter summarized the status of up to 16 block alarms.

## 4.2 Physical Block

The Physical block contains data specific to the Enhanced Model 705 PA transmitter, along with some information about the firmware.

NOTE: The Physical Block has no control function.

**MODE\_BLK:** Actual mode must be in AUTO in order for the AI Function blocks in the transmitter to operate.

NOTE: A Physical Block in “out of service” will stop all function block execution in the transmitter.

**SOFTWARE\_REVISION:** Revision number of the software of the field device.

**HARDWARE\_REVISION:** Revision number of the hardware of the field device.

**DEVICE\_MAN\_ID:** Identification code of the manufacturer of the field device.

**DEVICE\_ID:** Manufacturer specific identification of the device.

**DEVICE\_SER\_NUM:** Serial number of the device.

**DIAGNOSIS:** Detailed information about the device, bitwise coded.

**DIAGNOSIS\_EXTENSION:** Additional detailed information about the device.

**DIAGNOSIS\_MASK:** Definition of supported DIAGNOSIS information-bits.

0 = not supported

1 = supported

**DIAGNOSIS\_MASK\_EXTENSION:** Definition of supported DIAGNOSIS\_EXTENSION information-bits.

0 = not supported

1 = supported

**DEVICE CERTIFICATION:** Pertinent certifications of the device.

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**WRITE\_LOCKING:** Software write protection can be enabled or disabled.

**FACTORY\_RESET:** Command for resetting the device for default values. The setting of the bus address is not affected.

- **RESTART\_WITH\_DEFAULTS:** As RESTART DEFAULT will set all configuration parameters to their default values. Devices need to be reconfigured following activation of this function. The bus address is not affected.
- **WARM\_START:** No parameters changed
- **RESET\_ADDRESS\_TO\_DEFAULT:** Other parameter unchanged

**DESCRIPTOR:** User definable text string to describe the device within the application.

**DEVICE\_MESSAGE:** User definable message string used to describe the device within the application of in the plant.

**DEVICE\_INSTAL\_DATE:** Installation date of the device.

**IDENT\_NUMBER\_SELECTOR:** Selects manufacturer-specific Ident number issued by PNO or profile-specific Ident number to determine features and behavior for interacting with device.

**HW\_WRITE\_PROTECTION:** Indicates the position of a write block mechanism (e.g. hardware jumper).

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## 4.3 GWR Transducer Block

The GWR TRANSDUCER block is a custom block containing parameters that support the Enhanced Eclipse Model 705 level transmitter. It contains the GWR probe configuration, diagnostics, and calibration data, and outputs level with status information.

The TRANSDUCER block parameters are grouped in a useful configuration. There are both read-only parameters and read-write parameters within the TRANSDUCER block.

- The read-only parameters report the block status and operation modes.
- The read-write parameters affect the function block basic operation, level transmitter operation, and calibration.

**The Transducer Block remains in AUTO mode even when the local interface (keypad) is used to change a parameter online.**

### 4.3.1 GWR Transducer Block Parameters

The first eight parameters in the GWR TRANSDUCER block are the standard block parameters discussed in section 4.1.1. The standard parameters are followed by these additional required parameters for a Level Transducer Block: Corresponding parameter names from Profile specification are shown parenthetically if different from parameter names used by Model 705.

**LEVEL (PRIMARY\_VALUE):** The process value Level is Probe Level + Level Offset and an associated status.

**LEVEL\_UNIT (PRIMARY\_VALUE\_UNIT):** Unit of measurement for level process variable (primary value).

**PROBE\_LEVEL (LEVEL):** Level on the probe relative to the end of the probe in Probe Level units.

**PROBE\_LEVEL\_UNIT (LEVEL\_UNIT):** Unit of measurement for probe level parameters: Level Offset, Probe Level, Probe Level Hi, and Probe Level Lo.

**SENSOR\_VALUE:** Sensor Value is the physical value of the sensor (distance).

**SENSOR\_UNIT:** Unit of measurement for sensor parameters.

**SENSOR\_OFFSET:** Distance from the sensor reference point to the top of the tank in sensor units.

**CAL\_TYPE:** Defines type of calibration. Dry indicates that sensor value has no influence on the level calibration.

**SENSOR\_CAL\_LO (CAL\_POINT\_LO):** Sensor Cal Lo is the lower calibrated point of Sensor Value in sensor units. It refers to Probe Level Lo.

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**SENSOR\_CAL\_HI (CAL\_POINT\_HI):** Sensor Cal Hi is the upper calibrated point of Sensor Value in sensor units. It refers to Probe Level Hi.

**PROBE\_LEVEL\_LO (LEVEL\_LO):** Probe Level Low is the value of Probe Level at Sensor Cal Lo and is defined in Probe Level units.

**PROBE\_LEVEL\_HI (LEVEL\_HI):** Probe Level Hi is the value of Probe Level at Sensor Cal Hi and is defined in Probe Level units.

**LEVEL\_OFFSET:** Desired level reading when liquid surface is at end of probe. Level Offset is defined in Probe Level units.

**LIN\_TYPE:** Type of linearization. No linearization is supported.

**SENSOR\_HIGH\_LIMIT:** Upper process limit of the sensor in sensor units.

**SENSOR\_LOW\_LIMIT:** Lower process limit of the sensor in sensor units.

Another important parameter found later in the **TRANSDUCER** block list is **DEVICE\_STATUS**, which displays the status of the device. If more than one message exists, then the messages are displayed in priority order. Refer to Section 7.1.2, Error Messages.

If **DEVICE\_STATUS** indicates a problem, refer to Section 7.1, Troubleshooting.

**For a complete list of Transducer Block Parameters, refer to table in the Appendix.**

### 4.3.2 Password Parameters

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To change a parameter at the local user interface, a value matching the user password must be entered (Default=0). If the user password is entered, the instrument is in the user mode. After 5 minutes with no keypad activity, the entered password expires.

Factory password is for use by trained factory personnel only.

From the network, the instrument always behaves as if it is in the user mode by default. In other words, it is not necessary to enter the user password in order to write parameters from the network.

### 4.3.3 Eclipse Model 705 Configuration Parameters

This set of parameters within the Transducer Block is important and required to configure every Eclipse Model 705 transmitter.

**PROBE\_MODEL:** Select the choice that corresponds to the first four digits of the model number of the probe. An “x” in the selection means that character is variable (the probe model number is shown on the nameplates attached to both the transmitter and probe). For example, 7xA-x should be chosen for probe models beginning with 7EA or 7MA.

**PROBE\_MOUNT:** Select the type of mounting on the probe. The choices are NPT, BSP, and Flange.

**MEASUREMENT\_TYPE:** Select from LEVEL ONLY, LEVEL AND VOLUME, INTERFACE, or INTERFACE AND VOLUME.

**PROBE\_LENGTH:** Enter the exact length of the probe. The probe length is shown as the last three digits of the probe model number printed on the nameplates attached to the transmitter and probe. PROBE\_LENGTH is shown in SENSOR\_UNITS.

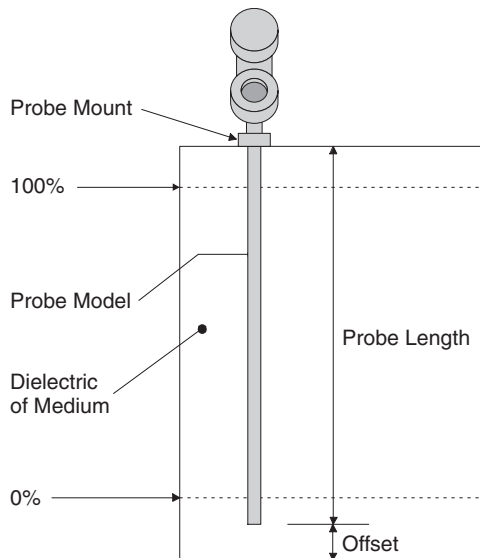
**LEVEL\_OFFSET:** Enter the distance from the probe tip to the desired 0% reference in PROBE\_LEVEL\_UNITS. The acceptable range is from -300 inches to 600 inches. Refer to Section 4.3.4 for additional information.

**DIELECTRIC\_RANGE:** Select from 10–100, 3–10, 1.7–3.0, or 1.7–1.4

**NOTE:** All dielectric ranges are not available with all probes.

If an unsupported dielectric range is selected, the transmitter will give a negative response and the value displayed will revert to its previous value.

**THRESHOLD:** The threshold can be set as either FIXED or CFD. The factory default is CFD. This parameter should only be changed to FIXED in those applications measuring total level having a lower dielectric material over a higher dielectric material. A typical example for FIXED Threshold is a hydrocarbon application having water bottoms.

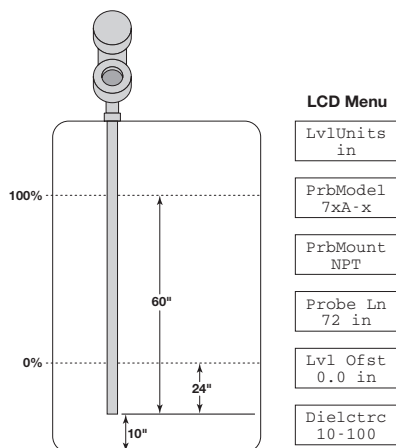


### 4.3.4 Offset Description

The parameter referred to as LEVEL\_OFFSET in the Transducer Block is the desired level reading when liquid surface is at the end of the probe. The Eclipse transmitter is shipped from the factory with LEVEL\_OFFSET set to 0. With this configuration, all measurements are referenced from the bottom of the probe. See Example 1.

**Example 1 (LEVEL\_OFFSET = 0 as shipped from factory):**

Application calls for a 72-inch NPT Coaxial probe in water with the bottom of the probe 10 inches above the bottom of the tank. The user wants the 0% point at 24 inches and the 100% point at 60 inches as referenced from the bottom of the probe.

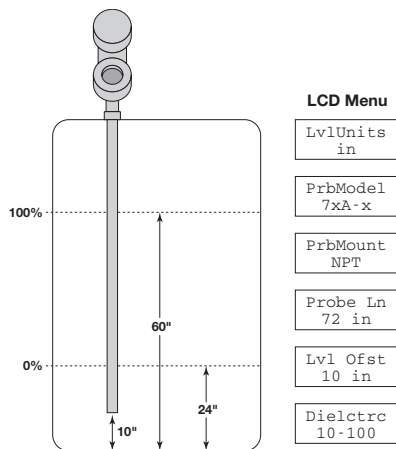


**Example 1**

In those applications in which it is desired to reference all measurements from the bottom of the vessel, the value of LEVEL\_OFFSET should be changed to the distance between the bottom of the probe and the bottom of the vessel as shown in Example 2.

**Example 2:**

Application calls for a 72-inch NPT coaxial probe in water with the bottom of the probe 10 inches above the bottom of the tank. The user wants the 0% point at 24 inches and the 100% point at 60 inches as referenced from the bottom of the tank.

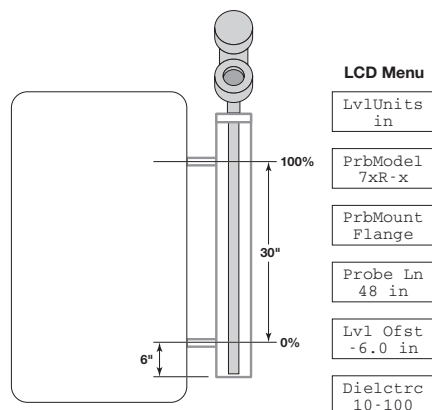


**Example 2**

When the Eclipse transmitter is mounted in a chamber/bridle, it is usually desirable to configure the unit with the 0% point at the lower process connection and the 100% point at the upper process connection. The span is the center-to-center dimension. In this case, a negative LEVEL\_OFFSET needs to be entered. In doing so, all measurements are then referenced at a point up on the probe as shown in Example 3.

**Example 3:**

Application calls for a 48-inch cage-coaxial flanged probe measuring water in a chamber with the bottom of the probe 6 inches below the lower process connection. The user wants the 0% point to be 0 inches at the bottom process connection and the 100% point to be 30 inches at the top process connection.



**Example 3**

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## 4.4 User-Calibration Parameters

One of the main advantages of the Enhanced Eclipse Model 705 transmitter is that the device does not need to be calibrated in the field. Every Enhanced Eclipse Model 705 transmitter is shipped from the factory precisely calibrated.

On the other hand, part of the advantage of PROFIBUS PA™ is to provide the ability to monitor changes and make adjustments to a transmitter. The fieldbus concept allows a user to make calibration adjustments if deemed necessary.

**NOTE:** The original factory calibration settings are restored when a new probe length value is assigned.

**It is highly recommended that factory calibration be used for optimum performance.**

Contact the factory for information on how to perform a User Calibration.

### 4.4.1 Factory Parameters

**The following parameters are used for either troubleshooting or are parameters adjusted at the factory. They should never be changed in the field.**

The factory-adjustable calibrated parameters are WINDOW, CONVERSION\_FACTOR, and SCALE\_OFFSET.

WINDOW is used to adjust for the variations in the analog section of the Eclipse TDR measurement engine. CONVERSION\_FACTOR and SCALE\_OFFSET are the main factory calibration settings.

**WINDOW:** determines the amount of delay between the generation of the transmitted signal pulse and the start of the measurement cycle.

**FID\_TICKS:** a measure of the time to the fiducial (reference) pulse.

**LEVEL\_TICKS:** a measure of the time to the level of the product being measured.

**CONVERSION\_FACTOR:** the slope of the factory-set calibration line.

**SCALE\_OFFSET:** the intercept of the calibration line.

#### 4.4.2 Firmware Version

The last parameter in the TRANSDUCER block gives the firmware version of the transmitter.

**FIRMWARE\_VERSION:** displays the version of the firmware.

### 4.5 Analog Input Block

The ANALOG INPUT (AI) block takes the Transducer Block input data, selected by channel number, and makes it available to other function blocks at its output:

1. Level
2. Volume
3. Interface
4. Interface Volume

#### 4.5.1 AI Block Parameters

The first eight parameters in an AI block are the standard block parameters discussed in section 4.1.1. Additional analog input function block parameters are as follows:

**BATCH:** A parameter intended to be used in Batch application in line with IEC 61512 Part 1.

**OUT:** Contains the current measurement value in the configuration engineering unit.

**PV\_SCALE:** High and low scale values used to convert Process Variable Configured by channel into percent.

**OUT\_SCALE:** The high and low scale values, the engineering code, and number of digits to the right of the decimal point to be used in displaying the OUT parameters.

**LIN\_TYPE:** Type of linearization. No linearization is supported in the AI function blocks.

**CHANNEL:** Selects the measurement value from an active transducer block as the input to the function block.

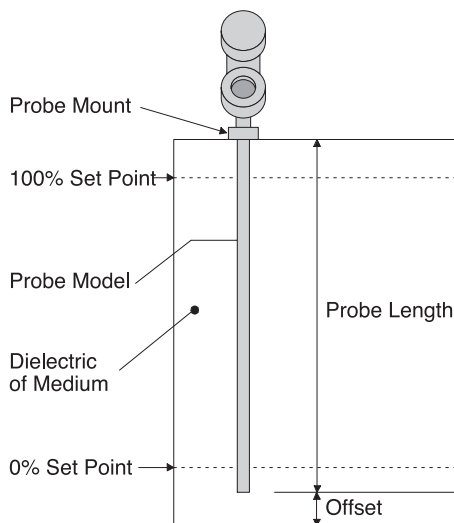
**PV\_FTIME:** Filter time of the Process Variable.

**FSAFE\_TYPE:** Defines the reaction of a device, if a fault is detected and the quality of the process variable input from the transducer block is BAD.

0 = FSAFE\_VALUE is used as OUT

1 = Use last stored valid OUT value

2 = OUT has incorrect calculated value; status remains “bad”.



Scaling

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**FSAFE\_VALUE:** Default value for the OUT parameter, if a fault is detected, and FSAFE\_TYPE is 0.

**HI\_LIM:** Value of the upper limit of warnings.

**LO\_LIM:** Value of the lower limit of warnings.

**ALARM\_HYS:** Hysteresis to adjust sensitivity of alarm triggering.

**HI\_HI\_LIM:** Value of the upper limit of alarms.

**HI\_LIM:** Value of the upper limit of warnings.

**LO\_LIM:** Value of the lower limit of warnings.

**LO\_LO\_LIM:** Value of the lower limit of alarms.

**HI\_HI\_ALM:** State of the upper limit of alarms.

**HI\_ALM:** State of the upper limit of warnings.

**LO\_ALM:** State of the lower limit of warnings.

**LO\_LO\_ALM:** State of the lower limit of alarms.

**SIMULATE:** For commissioning and test purposes, the input value of the Transducer Block in the AI Block can be modified.

**OUT\_UNIT\_TEXT:** Allows the user to write text if a specific unit of the OUT parameter is not in the code list.

The TRANSDUCER and AI block's actual mode in the MODE\_BLK parameter must be set to AUTO to pass the PV Value through the AI to the network.

Transducer scaling, called PV\_SCALE, is applied to the PV from the CHANNEL to produce the FIELD\_VAL in percent. Units of PV\_SCALE are the same as the units of the TRANSDUCER BLOCK process variable configured by channel.

Damping Filter is a feature of the AI block. PV\_FTIME parameter is the time constant of a single exponential filter for the PV, in seconds. This parameter can be used to dampen out fluctuation in level due to excessive turbulence.

The AI block has multiple ALARM functions that monitor the OUT parameter for out of bound conditions.

## 5.0 Model 705 Menu: Step by Step Procedures

The following table describes the software menu displayed by the Eclipse PROFIBUS PA™ transmitter for “Level Only” measurement. Use this table as a step by step guide to configure the transmitter.

The second column presents the menus shown on the transmitter display. The displays are in the order they would appear if the arrow keys were used to scroll through the menu. The numbers on the first column are not shown in the display. They are only provided as reference.

The third column provides the actions to take when configuring the transmitter. Additional information or an explanation of an action is given in the fourth column. (Shaded sections are factory menu items).

### 4.5.1 Measurement Type: Level Only

	Display	Password	Action	Comment
1	*Status* *Level *	None	Transmitter Display	MeasType = Lvl Only
2	Level xxx.x lu	None	Transmitter Display	All MeasType selections
3	LvlUnits (select)	User	<b>Select</b> the Level units	<b>Select</b> from cm, inches, feet, meters, percent
4	PrbModel (select)	User	<b>Select</b> the type of probe used	Select from <b>7xA-x, 7xB-x, 7xD-x, 7xK-x, 7xP-x, 7xR-x, 7xE-x, 7xF-x, 7xF-E, 7xF-F, 7x1-x, 7x2-x, 7x5-x, 7x7-x, 7xF-4, 7xF-P, 7xJ-x, 7xS-x, 7xT-x</b>
5	PrbMount (select)	User	<b>Select</b> the type of probe mounting	<b>Select</b> from NPT, BSP or Flange
6	MeasType (select)	User	<b>Select</b> type of measurement	<b>Select</b> from Lvl Only, Lvl&Vol, Infrface, lfc&Vol
7	SnsrUnit (select)	User	<b>Select</b> the Sensor units	<b>Select</b> from cm, inches, feet, meters
8	Probe Ln xxx.x su	User	<b>Enter</b> the exact length of the probe	11.8 to 900 in (30 to 2286 cm)
9	PrbLvlUn	User	<b>Select</b> Probe Level units	<b>Select</b> from cm, inches, feet, meters, percent
10	Lvl Ofst xxx.x plu	User	<b>Enter</b> desired Level reading when probe is dry	-90 to 300 in (-223.6 to 762 cm)

	Display	Password	Action	Comment
11	Dielctrc (select)	User	<b>Select</b> range bounding the dielectric constant of the medium	<b>Select</b> from 1.4-1.7, 1.7-3, 3-10, 10-100
12	Senstvtv xxx	Superuser or user	<b>Adjust</b> gain value upward or downward to sense liquid surface	(Superuser password required for dual element probes.)
13	BlockDis xx.x su	User	<b>Enter</b> distance below reference point where level is not sensed	-99.9 to 2286 cm (-39.3 to 900 in)
14	SftyZone (select)	User	<b>Select</b> behavior when level is sensed in safety zone	Off, On, Latch
15	SZHeight xx.x su	User	<b>Enter</b> distance below BlockDis where SZ Fault will be asserted	5.1 to 2286 cm (2 to 900 in)
16	SZ Latch Reset	User	<b>Press</b> Enter to clear a Safety Zone latch	
17	Threshld (select)	User	<b>Select</b> from CFD, Fixed	For interface, refers to threshold for upper level pulse
18	Trim Lvl xx.x su	Superuser or user	<b>Enter</b> value to adjust Level reading	-20.0 inches <= Lvl Trim <= +20.0 inches (Superuser password required if negative fiducial.)
19	Dev Addr	User	Set Device Address	0 to 126
20	LvlTicks xxxxx	User	Diagnostic Display	Time of flight from fiducial to level signal
32	Medium	None	Diagnostic Display	Interface mode only. Unknown, Oil Only, Thin Oil, Thick Oil
33	New Pass xxx	User	<b>Enter</b> new password (0-255)	Displays encrypted value of present password
34	Language (select)	User	<b>Select</b> from English, Spanish, French, German	Language choice for LCD display
35	Mdl705PA Ver 3.0A	None	Transmitter Display	Product identification Firmware version
36	DispFact (select)	None	<b>Select</b> Yes to display factory parameter menus	
37	History Status	None	Diagnostic Display to view present status and recent exceptions	
38	Run Time xxxx.x h	None	Diagnostic Display showing elapsed time since power on	Cleared to zero with History Reset
39	History Reset	Superuser	<b>Press</b> Enter and select yes to clear history	Similar to SZ Mode Reset.
40	FidTicks xxxx	None	Diagnostic Display	Time of flight from start of ramp to fiducial
41	Fid Sprd xxx	None	Diagnostic Display	Spread in fiducial ticks readings
42	Fid Type (select)	Superuser	Superuser parameter	<b>Select</b> from Positive, Negative. Selection only allowed for some probes, fixed for others

	Display	Password	Action	Comment
43	Fid Gain xxx	Superuser	Superuser parameter	
44	Window xxx	Factory	Factory Parameter	Calibration parameter
45	Conv Fct xxxx	Factory	Factory Parameter	Calibration parameter
46	Scl Ofst xxx	Factory	Factory Parameter	Calibration parameter
47	Neg Ampl xxx	Superuser	Superuser parameter	Diagnostic parameter
48	Ifc Ampl	Superuser	Superuser parameter	Appears for interface only
49	Pos Ampl xxx	Superuser	Superuser parameter	Diagnostic parameter
50	Signal xxx	None	Diagnostic Display	Indication of level signal amplitude
51	Compsate	Superuser	Superuser Parameter	Select from None, Manual, Auto
52	DrateFct xxxx	None	Diagnostic Display	Compsate = Auto, velocity derating factor
53	TargAmpl xxxx	None	Diagnostic Display	Compsate = Auto, target negative threshold amplitude
54	Targ Tks xxxx	None	Diagnostic Display	Compsate = Auto, measured time of flight from fiducial to target
55	Targ Cal xxxx	Factory	Diagnostic Display	Compsate = Auto, calibrated time of flight from fiducial to target in room temperature air
56	OperMode (select)	Superuser	Superuser parameter	Compsate = Auto, select from Run, Cal, Off
57	7xK Corr xxx	Superuser	Superuser parameter	Probe Model = 7xK, Distance in mm from fiducial to user reference point
58	Snsr Val xxx.x su	None	Distance to the target relative to the sensor reference point.	
59	SnrCalLo xxx.x su	Superuser	The lower calibrated point of Sensor Value. It refers to PrLvl Lo.	In Sensor Units. Set to entered Probe Ln
60	SnrCalHi xxx.x su	Superuser	The higher calibrated point of Sensor Value. It refers to PrLvl Hi.	In Sensor Units
61	ProbeLvl xxx.x plu	None	Level on the probe relative to the end of the probe.	
62	PrLvl Lo xxx.x plu	Superuser	Value of PrLvl at SnrCalLo.	In Probe Level Units
63	PrLvl Hi xxx.x plu	Superuser	Value of PrLvl at SnrCalHi.	In Probe Level Units

	Display	Password	Action	Comment
64	ElecTemp xxx C	None	Diagnostic Display	Present temperature in electronics compartment (degrees Celsius)
65	Max Temp xxx C	Superuser	Diagnostic Display	Maximum electronics temperature recorded
66	Min Temp xxx C	Superuser	Diagnostic Display	Minimum electronics temperature recorded
67	SZ Hyst xx.x su	Superuser	Superuser Parameter	Safety Zone hysteresis height

## 6.0 Diagnostic Parameters

The Eclipse Model 705 measurement engine runs through a series of self-tests and will detect and report faulty operation. The TRANSDUCER BLOCK displays these faults in the DEVICE\_STATUS parameter. Refer to Section 7.1.2 for more information on specific faults and warnings.

When the Model 705 transmitter is initially powered on, the measurement engine does not have enough valid measurement cycles to make a decision about the output level. For the first sixteen measurement cycles after power is applied, the QUALITY is “Uncertain,” the SUB\_STATUS is “Initial value,” and the LIMIT attribute is “Constant.”

When the Model 705 is operating correctly, the QUALITY is shown as “GOOD,” and the SUB\_STATUS is “Non-Specific.”

Depending on the FAIL SAFE MODE in AI BLOCK, when the Enhanced Model 705 measurement cycle fails to find a valid output level, the transmitter maintains the last good value as the output and flags the failure. The LIMIT attribute is the same as the last good measurement. Excessive disrupted cycles causes the transmitter to go into a defined operational mode based on the cause of the disrupted cycles.

When the Enhanced Model 705 detects a level above the highest measurement point of the probe the operational mode is shown as “May Be Flooded.” This is due to the fact that, since the actual level location above the top of some probes is not known, the output may not be accurate.

The Model 705 operational mode is DRY\_PROBE when the level is below the end of the probe. Again, the output may not be accurate, since the location of the level below the end of the probe is not known. The TRANSDUCER BLOCK output is calculated as LEVEL\_OFFSET.

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When in the dry probe condition, the Model 705 compares the measured length of the probe to the value entered into the PROBE\_LENGTH parameter. If the measured value does not match PROBE\_LENGTH, a fault is reported. The QUALITY will be shown as “Bad,” and the SUB\_STATUS is “Configuration error.”

If the Model 705 fails to find a measurable level, either due to an actual loss of a level signal or the loss of a proper Fiducial (reference) signal, the TRANSDUCER BLOCK maintains the last good value as the output and flags the failure. The QUALITY is “Bad,” the SUB\_STATUS is “Sensor failure” for no level (or “Device failure” for loss of the Fiducial), and the LIMIT attribute is “Constant.”

## **6.1 Simulation Feature**

The Eclipse Model 705 with PROFIBUS PA™ supports the Simulate feature in the Analog Input block. The Simulate feature is typically used to exercise the operation of an AI block by simulating a TRANSDUCER block input.

When an Analog Input Block is in Manual Mode, the operator can also set the value and status of the OUT parameter to simulate different AI BLOCK outputs.

## 7.0 Reference Information

### 7.1 Troubleshooting

**WARNING!**

Explosion hazard. Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

The Eclipse transmitter is designed and engineered for trouble-free operation over a wide range of operating conditions. Common transmitter problems are discussed in terms of their symptoms and recommended corrective actions. Information on how to handle material buildup on the probe is also provided in this section.

#### 7.1.1 Troubleshooting System Problems

Symptom	Problem	Solution
LEVEL and % OUTPUT values are inaccurate.	Basic configuration data is questionable.	Reconfigure the Probe Model and/or Probe Mount, Probe Length or Level Offset. 1) Ensure the Level is accurate.
	Interface level has significant emulsion.	Examine process to reduce/eliminate emulsion layer.
LEVEL readings are repeatable but consistently high or low from actual by a fixed amount.	Configuration data does not accurately match probe length or tank height.	Ensure proper Probe Model, Level Offset & probe length. Adjust trim level value by the amount of noted inaccuracy.
LEVEL and % OUTPUT values fluctuate.	Turbulence	Increase the Damping factor until the readings stabilize.
	High Frequency connection	Check Fid Spread (should be stable within $\pm 10$ counts).
LEVEL and % OUTPUT values all reading low vs. actual.	Lower dielectric material over higher dielectric material, e.g., oil over water	Select Fixed Threshold option.
	Coating, clumping or buildup on probe	These may be expected inaccuracies due to affect on pulse propagation.
	Dense, water based foam	These may be expected inaccuracies due to affect on pulse propagation.
Level Reading on Display is stuck at full scale.	Software believes probe is flooded (level near very top of probe).	Check actual level. If probe is not flooded, Check for buildup or obstructions near top of probe. Select higher dielectric range. Check for condensation in probe connection. Add Blocking Distance.
LEVEL and % OUTPUT values values all at maximum level.	Possible configuration issue with single rod probe	1) Increase Blocking Distance 2) Increase Dielectric Range
LEVEL and % OUTPUT values reading high vs. actual.	Possible obstruction in tank affecting single rod probe	1) Increase Dielectric Range until obstruction is ignored 2) Relocate probe away from obstruction
LEVEL value reading high when should be zero.	Transmitter loose or disconnected from probe	Ensure transmitter connected securely to probe.

NOTE: When consulting the factory concerning improper operation, use proper tables on Pages 65-67. Enter all data when transmitter is working CORRECTLY and INCORRECTLY.

## 7.1.2 Error Messages

Display Message	Description	Comment
OK	None	Normal operating mode
Initial	None	Program is Initializing. This is a transient condition.
DryProbe	None	Normal message for a dry probe. End of probe signal is being detected.
EOP<Probe Length	End of Probe signal from a dry probe is out of range	<ol style="list-style-type: none"> <li>1) Ensure probe length is entered correctly</li> <li>2) Set transmitter to a lower dielectric range</li> <li>3) Consult factory</li> </ol>
EOP High	End of Probe signal is out of range	<ol style="list-style-type: none"> <li>1) Ensure probe length is entered correctly</li> <li>2) Consult factory</li> </ol>
WeakSgnl	Signal amplitude is lower than desired.	<ol style="list-style-type: none"> <li>1) Set transmitter to lower dielectric range</li> <li>2) Increase sensitivity</li> </ol>
Flooded?	Loss of level signal possibly due to flooding, twin rod probes only	<ol style="list-style-type: none"> <li>1) Decrease level in vessel</li> <li>2) Set transmitter to lower dielectric range</li> <li>3) Replace with Model 7xR Overfill probe</li> </ol>
NoSignal	No level signal being detected.	<ol style="list-style-type: none"> <li>1) Ensure dielectric setting is correct for measured medium</li> <li>2) Increase sensitivity</li> <li>3) Confirm that the probe type is proper for the dielectric of the medium</li> <li>4) Consult factory</li> </ol>
No Fid	Fiducial signal is not being detected	<ol style="list-style-type: none"> <li>1) Check connection between probe and transmitter</li> <li>2) Check for moisture on top of probe</li> <li>3) Check for damaged gold pin on the high frequency connector</li> <li>4) Consult factory</li> </ol>
FidShift	FidTicks shifted from expected value	<ol style="list-style-type: none"> <li>1) Check connection between probe and transmitter</li> <li>2) Check for moisture on top of probe</li> <li>3) Check for damaged gold pin on the high frequency connector</li> <li>4) Consult factory</li> </ol>
SZ Alarm	Safety Zone alarm has been tripped	Decrease level in vessel
Hi Temp	Present temperature in electronics compartment is above +80° C	<ol style="list-style-type: none"> <li>1) Transmitter may need to be moved to ensure ambient temperature is within specification</li> <li>2) Change to remote mount transmitter</li> </ol>

## 7.1.2 Error Messages

Display Message	Description	Comment
Lo Temp	Present temperature in electronics compartment is below -40° C.	1) Transmitter may need to be moved to ensure ambient temperature is within specification 2) Change to remote mount transmitter
HiVolFLT	Level more than 5% above highest point in strapping table.	Verify strapping table is entered correctly.
Sys Warn	Unexpected but non-fatal software event	Consult factory
Default Cal	Factory set default calibration parameters are in use, level reading may be inaccurate	Consult factory
SlopeErr	Ramp circuit generating improper voltage	Consult factory
No Ramp	No End-of-Ramp signal detected	Consult factory
Default Params	Internal non-volatile parameters have been defaulted	Consult factory
LVL<Probe Length	Apparent position of the upper level pulse is beyond the end of the probe	Check entered probe length and threshold

## 7.1.3 Error Mapped to Diagnosis

Some error codes are mapped to information bits in the PHYSICAL\_BLOCK\_DIAGNOSIS parameter as shown in the following table:

Display Message	Description
No Signal Fault	Failure in Measurement
Lvl<PL Fault	Failure in Measurement
EOP<PL Fault	Failure in Measurement
No End of Ramp Fault	Electronic Hardware Failure/Maint Required
No Fiducial Fault	Electronic Hardware Failure/Maint Required
Default Parameters Fault	Configuration not valid
EOP High Fault	Configuration not valid
Hi Temperature Warning	Electronic Temperature too high

Note that PV status for Interface and Volume process variables may indicate a configuration error if the correct Measurement Type has not been selected. In this case, “Configuration not valid” will not be set in the DIAGNOSIS parameter since level measurement may still be correct.

Also, a Default Parameters Fault is indicated after a Factory Reset which will result in the DIAGNOSIS indication “Configuration not valid”.

### 7.1.3 PROFIBUS PA™ Segment Checklist

There can be several reasons for a PROFIBUS PA™ installation to be in a faulty condition. In order to assure that communication can be established, the following requirements must be met.

- Device supply voltage must be higher than 9 VDC with a maximum of 32 VDC.
- Total current draw of a given segment cannot exceed the rating shown on the power conditioner and/or barrier.
- Device polarity must be correct.
- Two 100 Ω, 1 μF terminators must be connected to the network—one at each end of the segment.
- Cable length plus spur length must not exceed the following values:


Number of Spurs	1 Device	2 Devices	3 Devices	4 Devices
25–32	—	—	—	—
19–24	100 ft. (30 m)	—	—	—
15–18	200 ft. (60 m)	100 ft. (30 m)	—	—
13–14	300 ft. (90 m)	200 ft. (60 m)	100 ft. (30 m)	—
1–12	400 ft. (120 m)	300 ft. (90 m)	200 ft. (60 m)	100 ft. (30 m)

Pair	Shield	Twisted	Size	Length	Type
Single	Yes	Yes	AWG 18 (0.8 mm <sup>2</sup> )	6,200 ft. (1,900 m)	A
Multi	Yes	Yes	AWG 22 (0.32 mm <sup>2</sup> )	3,900 ft. (1,200 m)	B
Multi	No	Yes	AWG 26 (0.13 mm <sup>2</sup> )	1,300 ft. (400 m)	C
Multi	Yes	No	AWG 16 (1.25 mm <sup>2</sup> )	650 ft. (200 m)	D

- The cable shield is to be hard grounded only at one point close to the DCS. In addition, the cable shield can be capacitively grounded in multiple places to improve EMC protection.

If all of these requirements are met, a stable communication should be established.

## 7.2 Agency Approvals

AGENCY	MODEL APPROVED	APPROVAL CATEGORY	APPROVAL CLASSES
<b>FM</b>  APPROVED	705-53XX-1XX 705-53XX-2XX	Intrinsically Safe	Class I, Div. 1; Groups A, B, C, & D Class II, Div. 1; Groups E, F, & G T4 Class III, Type 4X IP66 Entity/FISCO
	705-53XX-3XX 705-53XXX-4XX	Explosion Proof ① (with Intrinsically Safe probe)	Class I, Div. 1; Groups B, C & D Class II, Div. 1; Groups E, F, & G T4 Class III, Type 4X IP66
	705-53XX-XXX 705-53XX-XXX	Non-Incendive Suitable for: ②	Class I, Div. 2; Groups A, B, C, & D Class II, Div. 2; Groups F & G T4 Class III, Type 4X IP66
<b>CSA</b> 	705-53XX-1XX 705-53XX-2XX	Intrinsically Safe	Class I, Div. 1; Groups A, B, C, & D Class II, Div. 1; Group G T4 Class III, Type 4X Entity/FISCO
	705-53XX-3XX 705-53XX-4XX	Explosion Proof ① (with Intrinsically Safe probe)	Class I, Div. 1; Groups B, C & D Class II, Div. 1; Group G T4 Class III, Type 4X
	705-53XX-XXX 705-53XX-XXX	Non-Incendive Suitable for: ②	Class I, Div. 2; Groups A, B, C, & D Class II, Div. 2; Group G T4 Class III, Type 4X
<b>ATEX</b> 	705-53XX-AXX 705-53XX-BXX	Intrinsically Safe	⊕ II 1G, EEx ia IIC T4
	705-53XX-CXX 705-53XX-DXX	Flame Proof ①	⊕ II 1/2G, EEx d [ia] IIC T4
	705-53XX-EXX 705-53XX-FXX	Non-sparking ②	⊕ II 3G, EEx n II T4..T6

① Factory Sealed: This product has been approved by Factory Mutual Research (FM), and Canadian Standards Association (CSA), as a Factory Sealed device.

② Measured media inside vessel must be non-flammable only.



These units are in conformity of:

1. The EMC Directive: 89/336/EEC. The units have been tested to EN 61000-6-2/2001 and EN 61000-6-4/2001.
2. Directive 94/9/EC for equipment or protective system for use in potentially explosive atmospheres.

# 7.2.1 Agency Specifications – PROFIBUS PA™ System

**HAZARDOUS (CLASSIFIED) LOCATION**  
 Class I, Division 1, Groups A, B, C, D  
 Class II, Division 1, Groups E, F, G  
 Class III, Division 1

Eclipse Level Transmitter  
 Model 705-52xx-xxxx  
 705-53xx-xxxx

$U_i$  (Vmax) = 17.5V  
 $I_i$  (Imax) = 500 mA  
 $P_i$  = 5.5W  
 $C_i$  ≤ 5nF  
 $L_i$  ≤ 10μH  
 Leakage current ≤ 50μA

Eclipse Level Transmitter  
 Model 705-52xx-xxxx  
 705-53xx-xxxx

$U_i$  (Vmax) = 17.5V  
 $I_i$  (Imax) = 500 mA  
 $P_i$  = 5.5W  
 $C_i$  ≤ 5nF  
 $L_i$  ≤ 10μH  
 Leakage current ≤ 50μA

**UNCLASSIFIED LOCATION**

$U_o$  (Voc or Vt) = 17.5V  
 $I_o$  (Isc or It) = 500mA  
 $P_o$  = 1.0W

or

Any FM/CSA Approved  
 Intrinsically Safe  
 Associated Apparatus with  
 Parameters suitable for the  
 FISCO Concept.

**FISCO Concept:**  
 The FISCO concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for the interconnection is that the voltage ( $U_i$  or  $V_{max}$ ), the current ( $I_i$  or  $I_{max}$ ) and the power ( $P_i$ ) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage ( $U_o$  or  $V_o$  or  $V_t$ ), the current ( $I_o$  or  $I_s$  or  $I_t$ ) and the power ( $P_o$  or  $P_t$ ) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance ( $C_i$ ) and ( $L_i$ ) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to  $5nF$  and  $10μH$  respectively.

In each segment only one active device, normally the associated apparatus, is allowed to supply energy to the bus system. The maximum energy available to the bus system ( $U_o$ ,  $V_o$  or  $V_t$ ) of this device must be limited to the range of 14V to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 50μA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect the devices needs to have the parameters in the following range:

- Loop resistance  $R_L$ : 15 ... 150Ω/km
- Inductance per unit length  $L$ : 0.4 ... 1mH/km
- Capacitance per unit length  $C$ : 80 ... 200nF/km
- $C = C_1$  line/line + 0.5 C line/screen, if both lines are floating or
- $C = C_1$  line/line + C line/screen, if screen is connected to one line.
- Length of splice ≤ 5m (Cables with only constant terminus connections with no energy storage capability)
- Length of spur cable ≤ 30m
- Length of trunk cable ≤ 1km

At each end of the trunk cable an approved inflexible termination with the following parameters is required:  
 $R = 90Ω$  and  $C = 0 ... 2.2μF$   
 $R = 90Ω$  and  $C = 0 ... 2.2μF$

The number of passive devices connected to the bus segment is not limited for IS reasons. If the above rules are followed, up to a total length of 1000m (sum of the length of the trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Note:

**FOR PROPER INSTALLATION REFERENCE ALL APPLICABLE NOTES FROM PAGE 1 – 99-5055-001**

Any FM/CSA Approved  
 Intrinsically Safe  
 Associated Apparatus with  
 Parameters suitable for the  
 FISCO Concept.

Approved  
 Terminator

$U_i$  (Vmax) = 24V  
 $I_i$  (Imax) = 280 mA  
 $P_i$  = 1.93W

or

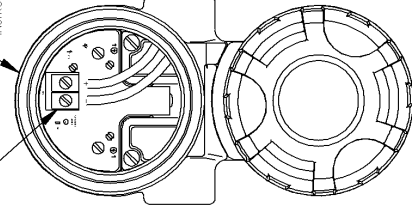
Any approved termination with  
 $R = 90 ... 100Ω$   
 $C = 0 ... 2.2μF$

**HAZARDOUS LOCATION**  
 MODEL LABEL IDENTIFIED  
 INTRINSICALLY SAFE FOR  
 CLASS I, DIVISION 1, GROUPS A, B, C, D  
 CLASS II, DIVISION 1, GROUPS E, F & G ONLY FOR CSA  
 CLASS III

**ENTY**  
 $V_{max} = 28.6V$   
 $I_{max} = 280mA$   
 $P_{max} = 1.1W$   
 $C_i = 5nF$   
 $L_i = 10μH$

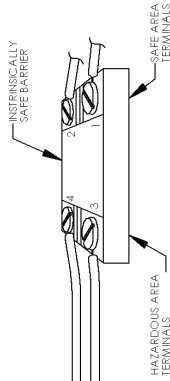
MODEL 70X-50XX-XXX  
 70X-51XX-XXX

SEE NOTE 1  
 TRANSMITTER  
 INSTRUMENT



**NON-HAZARDOUS LOCATION**  
 LIMITING VALUES  
 $V_{oc} < 140V$   
 $I_{sc} < 140mA$   
 $L_s > 3.4μH$

THE VOLTAGE ( $V_{oc}$ ) AND CURRENT ( $I_{sc}$ ) WHICH THE TRANSMITTER CAN RECEIVE MUST BE LESS THAN THE VOLTAGE ( $V_{oc}$ ) AND CURRENT ( $I_{sc}$ ) OF THE INSTRUMENT WHICH CAN WITHSTAND A SHORT CIRCUIT CURRENT ( $I_{sc}$ ) AND THE MAXIMUM VOLTAGE ( $V_{oc}$ ) AND CURRENT ( $I_{sc}$ ) WHICH CAN WITHSTAND THE MAXIMUM CAPACITANCE ( $C_i$ ) AND INDUCTANCE ( $L_i$ ) OF THE LOAD AND THE TRANSMITTER. THE TRANSMITTER MUST BE INTERCONNECTED WITH THE INSTRUMENT BY THE LEAST THAN THE CAPACITANCE ( $C_i$ ) OR THE INDUCTANCE ( $L_i$ ) WHICH CAN BE DRIVEN BY THE SOURCE DEVICE.



"SEE NOTE 2"

1. FOR EXPLOSION PROOF OR DUST IGNITION PROOF INSTALLATIONS, THE U.S. GROUND TERMINAL SHALL BE CONNECTED TO APPROPRIATE INTRINSICALLY SAFE GROUND IN ACCORDANCE WITH THE CANADIAN ELECTRICAL CODE (CEC) FOR CSA OR THE NATIONAL ELECTRICAL CODE (NEC) FOR CSA. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE APPLICABLE NATIONAL ELECTRICAL CODE. THE CEC FOR CSA OR THE NEC AND ANSIRDP 13.6 (FOR PARTIAL) MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT. BARRIERS MUST BE CSA-CERTIFIED FOR CANADIAN INSTALLATIONS AND CONTROL EQUIPMENT CONNECTED TO PROTECTIVE BARRIERS MUST NOT USE OR GENERATE MORE THAN 250 VDC OR 75V AC.
2. THE TRANSMITTER MUST BE USED WHEN THE TRANSMITTER IS INSTALLED IN CLASS I & II ENVIRONMENTS.
3. FOR CSA INTRINSICALLY SAFE SECOND INTENT USES.
4. FOR CSA INTRINSICALLY SAFE SECOND INTENT USES.
5. FOR CSA INTRINSICALLY SAFE SECOND INTENT USES.
6. FOR CSA INTRINSICALLY SAFE SECOND INTENT USES.
7. FOR CSA WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR THE SAFETY OF THE EQUIPMENT.
8. FOR SUPPLY CONNECTIONS USE WIRE SUITABLE FOR THE OPERATING TEMPERATURE FOR 79°C AMBIENT USE WITH A MINIMUM TEMPERATURE RATING OF 79°C.
9. THE TRANSMITTER IS NOT SUITABLE FOR CLASS I, DIVISION 2 GROUPS A, B, C & D.
10. THE TRANSMITTER IS NOT SUITABLE FOR CLASS II, DIVISION 2, AN HAZARDOUS LOCATION AND DOES NOT REQUIRE CONNECTION TO A PROTECTIVE BARRIER WHEN INSTALLED PER THE CEC FOR CSA OR THE NEC FOR FMRC AND WHEN CONNECTED TO A POWER SOURCE NOT EXCEEDING 30 VDC.

10. CSA CERTIFIED BARRIERS WITH LIMITED OUTPUT CHARACTERISTICS MUST BE USED. REFER TO THE LIMITED OUTPUT CHARACTERISTICS TABLE FOR THE LIMITED OUTPUT CHARACTERISTICS. THE PARAMETERS LISTED ARE TYPICAL ASSOCIATED APPARATUS (SAFETY BARRIER, GROUP A-B) PARAMETERS FOR LINEAR AND NONLINEAR SUPPLIES. FOR TYPICAL OUTPUT CURRENTS AS LISTED.

BARRIER OUTPUT CURRENT (ISC)	LINEAR TYPE BARRIER OUTPUT		NONLINEAR TYPE BARRIER OUTPUT	
	VOC	CS	VOC	CS
80mA	30V	0.15μF	140V	0.15μF
100mA	28V	0.15μF	120V	0.15μF
120mA	26V	0.15μF	100V	0.15μF
140mA	24V	0.21μF	140V	0.21μF

THE OUTPUT POWER OF A LINEAR OUTPUT BARRIER MAY BE CALCULATED AS FOLLOWS:  
 $P_{out}(VOC)$  OR  $P_{out}(Isc)$   
 THE OUTPUT POWER OF A NONLINEAR OUTPUT BARRIER MAY BE CALCULATED AS FOLLOWS:  
 $P_{out}(VOC)$  OR  $P_{out}(Isc)$

AGENCY LISTED DRAWING  
 ALL REVISIONS TO THIS DRAWING REQUIRE QA APPROVAL



5305 BELMONT ROAD, DOWNERS GROVE, ILLINOIS 60515, AREA CODE 630/989-4000

099-5055-G SHEET 2 OF 3

## 7.3 Specifications

### 7.3.1 Functional

<b>System Design</b>	
Measurement Principle	Guided time-of-flight via time domain reflectometry
<b>Input</b>	
Measured Variable	Level, determined by the time-of-flight of a guided radar pulse from transmitter to product surface and back
Zero and Span	6 inches to 75 feet (15 to 2286 cm)
<b>User Interface</b>	
Keypad	3-button menu-driven data entry and system security
Indication	2-line x 8-character display
Digital Communication	PROFIBUS PA™ Profile Version 3.0, MBP (31.25 kbits/sec)
Minimum Operating Voltage	9 VDC
Quiescent Current Draw	15 mA
DEV Revision	0X01
Function Blocks	AI_1, AI_2, AI_3, AI_4
Damping	Adjustable 0-10 seconds
<b>Power</b> (Measured at instrument terminals)	
General Purpose/Explosion Proof	9 to 32 VDC (15 mA maximum current draw)
IS/FISCO/FNICO	9–32 VDC (15 mA maximum current draw)
<b>Housing</b>	
Material	Aluminum A356T6 (<0.20% copper), optional 316 stainless steel
Cable Entry	¾" NPT and M20
<b>Environment</b>	
Operating Temperature	-40 to +175° F (-40 to +80° C)
Display Function Operating Temperature	-5 to +160° F (-20 to +70° C)
Storage Temperature	-50 to +175° F (-40 to +80° C)
Humidity	0-99%, non-condensing
Electromagnetic Compatibility	Meets CE Requirements: EN 50081-2, EN 50082-2
<b>Note: Twin Rod and Single Rod probes must be used in metallic vessel or stillwell to maintain CE requirement.</b>	
Mounting Affects:	Twin Rod: Active rod must be mounted at least 1" (25 mm) from any surface or obstruction. Minimum stillwell diameter for Twin Rod probe is 3". Single Rod: Nozzles do not restrict performance by ensuring the following: No nozzle is <2" (50 mm) diameter Ratio of Diameter: Length is 1:1 or greater; any ratio <1:1 (e.g., a 2" x 6" nozzle = 1:3) may require a Blocking Distance and/or DIELECTRIC adjustment (see Section 2.6.5) No pipe reducers are used Obstructions (See Probe Clearance Table, page 44) Keep conductive objects away from probe to ensure proper performance
Shock Class	ANSI/ISA-S71.03 Class SA1
Vibration Class	ANSI/ISA-S71.03 Class VC2

### 7.3.2 Performance - Model 705

Reference Conditions ②	Reflection from water at +70° F (+20° C) with 72" coaxial probe (CFD threshold)
Linearity ③	Coaxial/Twin Rod Probes: <0.1% of probe length or 0.1 inch (whichever is greater)
	Single Rod Probes: <0.3% of probe length or 0.3 inch (whichever is greater)
Measured Error	Coaxial/Twin Rod Probes: ±0.1% probe length or 0.1 inch (whichever is greater)
	Single Rod Probes ±0.5% probe length or 0.5 inch (whichever is greater)
Resolution	±0.1 inch
Repeatability	<0.1 inch
Hysteresis	<0.1 inch
Response Time	<1 second
Warm-up Time	<5 seconds
Operating Temp. Range	-40° to +175° F (-40° to +80° C)
LCD Temp. Range	-5° to +160° F (-20° to +70° C)
Ambient Temp. Effect	Approximately +0.02% of probe length/ ° C
Process Dielectric Effect	<0.3 inch within selected range
Humidity	0-99%, non-condensing
Electromagnetic Compatibility	Meets CE requirements (EN-61000-6-2/2001, 61000-6-4/2001) (Twin and Single Rod probes must be used in metallic vessel or stillwell to maintain CE requirement)

② Specifications will degrade with Model 7xB, 7xD, and 7xP probes and/or Fixed threshold configuration.

③ Top 24 inches of Model 7xB probe: 1.2 inches (30 mm). Specification for top 48 inches of single rod will be application dependent.

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### 7.3.3 Performance - Model 705 Interface

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Reference Conditions	Reflection from liquid of selected dielectric at +70° F (+20° C) with 72" probe
Linearity	<0.5 inch
Measured Error	Upper layer ±1 inch Interface layer ±1 inch (clean distinct interface required)
Upper Layer Dielectric	1.4–5.0
Interface Layer Dielectric	>15
Resolution	±0.1 inch
Repeatability	<0.5 inch
Hysteresis	<0.5 inch
Response Time	<1 second
Warm-up Time	<5 seconds
Operating Temp. Range	-40° to +175° F (-40° to +80° C)
LCD Temp. Range	-5° to +160° F (-20° to +70° C)
Ambient Temp. Effect	Approximately ±0.02% of probe length/ ° C
Humidity	0-99%, non-condensing
Electromagnetic Compatibility	Meets CE requirements (EN-61000-6-2/2001, EN 61000-6-4/2001)

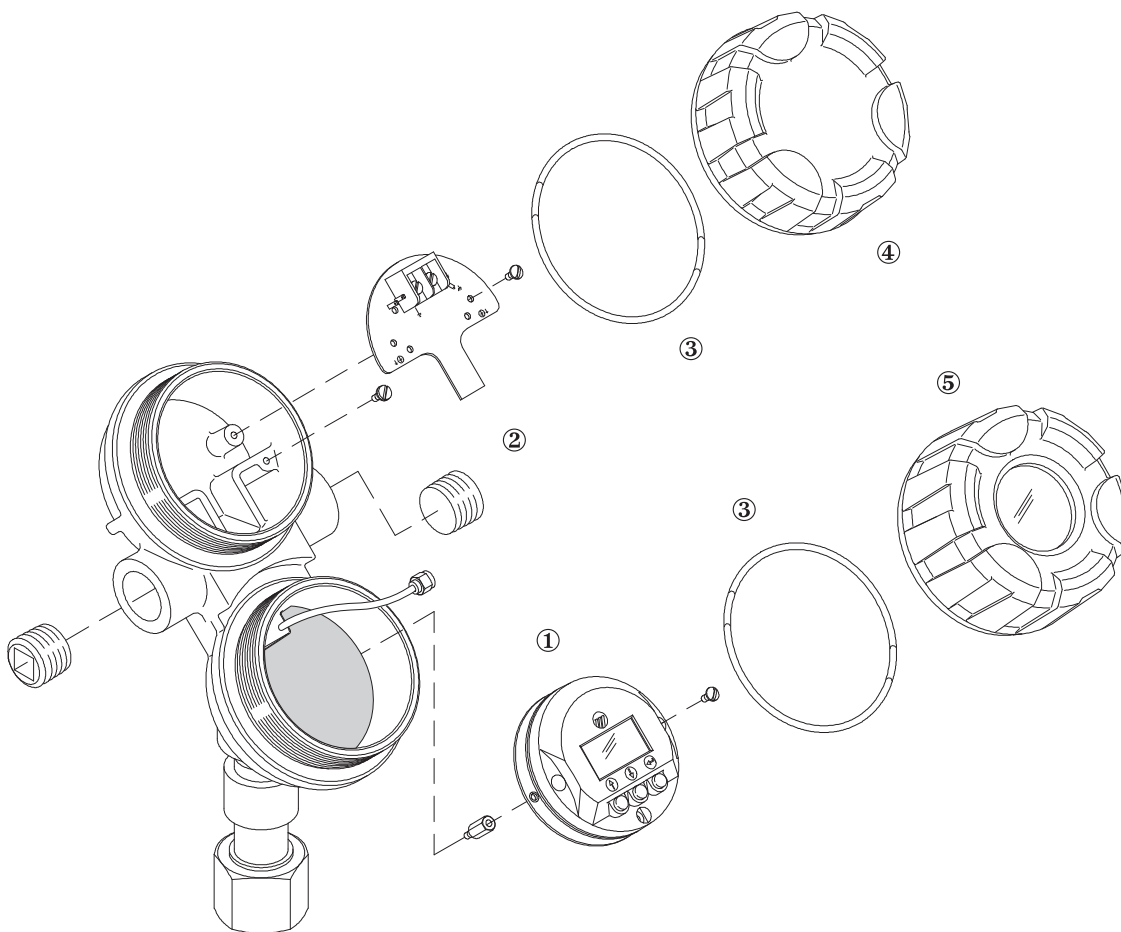
## 7.4 Parts

### 7.4.1 Replacement Parts

Item	Description	Part Number
①	Electronic module PROFIBUS PA™	Z31-2846-001
②	Terminal board PROFIBUS PA™	Z30-9151-003
③	O-ring (VITON) (Consult Factory for alternative O-ring materials)	012-2201-237
④	Housing cover without glass	004-9193-003
⑤	Housing cover with glass (GP, IS) (XP)	036-4410-001 036-4410-003

### 7.4.2 Recommended Spare Parts

Item	Description	Part Number
①	Electronic module PROFIBUS PA™	Z31-2846-001
②	Terminal board PROFIBUS PA™	Z30-9151-003





## 7.5.2 Probe

### BASIC MODEL NUMBER

7E	Eclipse GWR probe, English unit of measure
7M	Eclipse GWR probe, Metric unit of measure

### CONFIGURATION/STYLE

A	Coaxial, 3/4" process connection or larger	(Dielectric range ≥1.4)
B	Twin Rod, 2" NPT or 3" flanged process connection or larger	(Dielectric range ≥1.9)
D	Coaxial, High Temperature/High Pressure, 3/4" process conn. or larger	(Dielectric range ≥1.4)
F	Single Rod, Rigid, 2" process connection or larger	(Dielectric range ≥1.9)
J	Single Rod, Rigid, High Temperature/High Pressure	(Dielectric range ≥ 1.9)
P	Coaxial, High Pressure, 3/4" process connection or larger	(Dielectric range ≥1.4)
R	Coaxial, Overfill, 3/4" process connection or larger	(Dielectric range ≥1.4)
S	Coaxial, Hot Water/Steam, 3/4" process connection or larger	(Dielectric range ≥10)
1	Single Rod, Flexible, 2" process connection or larger	(Dielectric range ≥1.9)
2	Single Rod, Flexible Bulk Solid, 2" process connection or larger	(Dielectric range ≥4.0)
5	Twin Rod, Flexible Bulk Solid, 2" process connection or larger	(Dielectric range ≥1.9)
7	Twin Rod Flexible, 2" NPT or 3" flanged process connection or larger	(Dielectric range 1.9–10)

### MATERIAL OF CONSTRUCTION

A	316/316L stainless steel
B	Hastelloy C, Configuration/Style codes A, B, F and R only
C	Monel, Configuration/Style codes A, B, F and R only
E	Sanitary, 316/316L stainless steel (20 Ra finish), Configuration/Style code F only, Process connections codes 4P, 5P, and 6P only
F	PFA faced flange, 2" to 4", 150# to 300#, Configuration/Style code F only, Process connection codes 43, 44, 53, 54, 63, 64, DA, DB, EA, EB, FA, and FB only
K	316/316L stainless steel probe and process connection, ASME B31.1 specifications (model 7xS only)
P	Paint Probe, 316/316L SS, 3/4" process connection or larger Configuration/Style code F only: maximum length 72"
4	PFA insulated rod, 2" NPT process connection or larger, Configuration/Style code F only

### PROCESS CONNECTION SIZE/TYPE

Refer to pages 44 and 45 for selections

### O-RINGS

0	Viton® GFLT
1	EPDM (Ethylene Propylene Rubber)
2	Kalrez 4079
8	Aegis PF128
N	None (Use with probes 7xD, 7xP, 7xF-E, 7xF-F, 7xF-P)

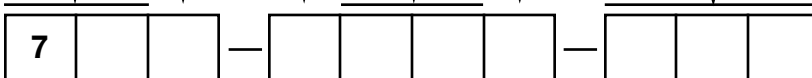
### LENGTH – PROBE MODELS 7xA, 7xB, 7xD, 7xF, 7xJ, 7xP, 7xR & 7xS

24" to 240" (60 cm to 610 cm) (7xS only: 180" (457 cm) maximum)  
(unit of measure is determined by second digit of Model Number)

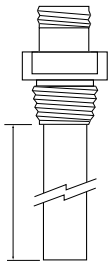
Examples: 24 inches = 024; 60 centimeters = 060

### LENGTH – PROBE MODEL 7x1, 7x2, 7x5 & 7x7

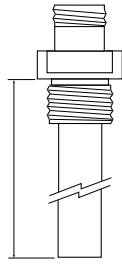
6' to 75' (2 to 22 m) (unit of measure is determined by second digit of Model Number) Examples: 30 feet = 030; 10 meters = 010



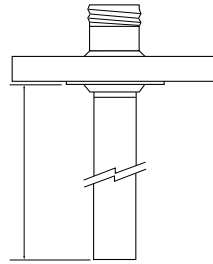
## 7.5.2 Probe



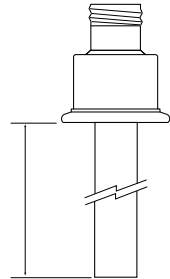
Insertion Length  
NPT Process Connection



Insertion Length  
BSP Process Connection



Insertion Length  
ANSI or DIN Welded Flange



Insertion Length  
Sanitary Flange

### PROCESS CONNECTION SIZE/TYPE

#### THREADED CONNECTIONS

11	¾" NPT Thread ①
22	1" BSP Thread ①
41	2" NPT Thread ③
42	2" BSP Thread ③

#### ANSI RAISED FACE FLANGE CONNECTIONS

23	1" 150#	ANSI Raised Face Flange ①	48	2" 2500#	ANSI Raised Face Flange ②
24	1" 300#	ANSI Raised Face Flange ①	53	3" 150#	ANSI Raised Face Flange
25	1" 600#	ANSI Raised Face Flange ②	54	3" 300#	ANSI Raised Face Flange
27	1" 900/1500#	ANSI Raised Face Flange ②	55	3" 600#	ANSI Raised Face Flange ②
28	1" 2500#	ANSI Raised Face Flange ②	56	3" 900#	ANSI Raised Face Flange ②
33	1½" 150#	ANSI Raised Face Flange ①	57	3" 1500#	ANSI Raised Face Flange ②
34	1½" 300#	ANSI Raised Face Flange ①	58	3" 2500#	ANSI Raised Face Flange ②
35	1½" 600#	ANSI Raised Face Flange ②	63	4" 150#	ANSI Raised Face Flange
37	1½" 900/1500#	ANSI Raised Face Flange ②	64	4" 300#	ANSI Raised Face Flange
38	1½" 2500#	ANSI Raised Face Flange ②	65	4" 600#	ANSI Raised Face Flange ②
43	2" 150#	ANSI Raised Face Flange ①	66	4" 900#	ANSI Raised Face Flange ②
44	2" 300#	ANSI Raised Face Flange ①	67	4" 1500#	ANSI Raised Face Flange ②
45	2" 600#	ANSI Raised Face Flange ②	68	4" 2500#	ANSI Raised Face Flange ②
47	2" 900/1500#	ANSI Raised Face Flange ②			

#### ANSI RING JOINT FLANGE CONNECTIONS

3K	1½" 600#	ANSI Ring Joint Flange ②	5L	3" 900#	ANSI Ring Joint Flange ②
3M	1½" 900/1500#	ANSI Ring Joint Flange ②	5M	3" 1500#	ANSI Ring Joint Flange ②
3N	1½" 2500#	ANSI Ring Joint Flange ②	5N	3" 2500#	ANSI Ring Joint Flange ②
4K	2" 600#	ANSI Ring Joint Flange ②	6K	4" 600#	ANSI Ring Joint Flange ②
4M	2" 900/1500#	ANSI Ring Joint Flange ②	6L	4" 900#	ANSI Ring Joint Flange ②
4N	2" 2500#	ANSI Ring Joint Flange ②	6M	4" 1500#	ANSI Ring Joint Flange ②
5K	3" 600#	ANSI Ring Joint Flange ②	6N	4" 2500#	ANSI Ring Joint Flange ②

- ① Configuration/Style Codes A, D, P, R & S only.
- ② Configuration/Style Codes D & P only.
- ③ Configuration/Style Codes B, F, 1, 2, 5 & 7 only.



## 7.5.2 Probe

### SANITARY FLANGE CONNECTIONS

3P	1½" Triclover® type, 16 AMP Sanitary Flange
4P	2" Triclover type, 16 AMP Sanitary Flange
5P	3" Triclover type, 16 AMP Sanitary Flange
6P	4" Triclover type, 16 AMP Sanitary Flange

### PROPRIETARY AND SPECIALTY FLANGE CONNECTIONS

TT	3½" 600#	Fisher® - Proprietary Carbon Steel (249B) Torque Tube Flange
TU	3½" 600#	Fisher - Proprietary 316 Stainless Steel (249C) Torque Tube Flange
UT	2½" 600#	Masoneilan® - Proprietary Carbon Steel Torque Tube Flange
UU	2½" 600#	Masoneilan - Proprietary 316 Stainless Steel Torque Tube Flange

### DIN FLANGE CONNECTIONS

BA	DN 25, PN 16	DIN 2527 Form B Flange ①	DG	DN 50, PN 250	DIN 2527 Form E Flange ②
BB	DN 25, PN 25/40	DIN 2527 Form B Flange ①	DH	DN 50, PN 320	DIN 2527 Form E Flange ②
BC	DN 25, PN 64/100	DIN 2527 Form E Flange ②	DJ	DN 50, PN 400	DIN 2527 Form E Flange ②
BF	DN 25, PN 160	DIN 2527 Form E Flange ②	EA	DN 80, PN 16	DIN 2527 Form B Flange
BG	DN 25, PN 250	DIN 2527 Form E Flange ②	EB	DN 80, PN 25/40	DIN 2527 Form B Flange
BH	DN 25, PN 320	DIN 2527 Form E Flange ②	ED	DN 80, PN 64	DIN 2527 Form E Flange ②
BJ	DN 25, PN 400	DIN 2527 Form E Flange ②	EE	DN 80, PN 100	DIN 2527 Form E Flange ②
CA	DN 40, PN 16	DIN 2527 Form B Flange ①	EF	DN 80, PN 160	DIN 2527 Form E Flange ②
CB	DN 40, PN 25/40	DIN 2527 Form B Flange ①	EG	DN 80, PN 250	DIN 2527 Form E Flange ②
CC	DN 40, PN 64/100	DIN 2527 Form E Flange ②	EH	DN 80, PN 320	DIN 2527 Form E Flange ②
CF	DN 40, PN 160	DIN 2527 Form E Flange ②	EJ	DN 80, PN 400	DIN 2527 Form E Flange ②
CG	DN 40, PN 250	DIN 2527 Form E Flange ②	FA	DN 100, PN 16	DIN 2527 Form B Flange
CH	DN 40, PN 320	DIN 2527 Form E Flange ②	FB	DN 100, PN 25/40	DIN 2527 Form B Flange
CJ	DN 40, PN 400	DIN 2527 Form E Flange ②	FD	DN 100, PN 64	DIN 2527 Form E Flange ②
DA	DN 50, PN 16	DIN 2527 Form B Flange	FE	DN 100, PN 100	DIN 2527 Form E Flange ②
DB	DN 50, PN 25/40	DIN 2527 Form B Flange	FF	DN 100, PN 160	DIN 2527 Form E Flange ②
DD	DN 50, PN 64	DIN 2527 Form E Flange ②	FG	DN 100, PN 250	DIN 2527 Form E Flange ②
DE	DN 50, PN 100	DIN 2527 Form E Flange ②	FH	DN 100, PN 320	DIN 2527 Form E Flange ②
DF	DN 50, PN 160	DIN 2527 Form E Flange ②	FJ	DN 100, PN 400	DIN 2527 Form E Flange ②

- ① Configuration/Style Codes A, D, P, R & S only.  
 ② Configuration/Style Codes D & P only.



## 7.6 References

1. "PROFIBUS™, A Pocket Guide" by Ronald W. Mitchell
2. PNO Specification 3.042, "Profile for Process Control Devices"
3. PNO Specification 2.092, "PROFIBUS PA - User and Installation Guideline"

## Appendix – Transducer Block Parameters

ITEM	PARAMETER NAME	PARAMETER LABEL
0	BLOCK_OBJECT	BLOCK OBJECT
1	ST_REV	ST REV
2	TAG_DESC	TAG DESC
3	STRATEGY	STRATEGY
4	ALERT_KEY	ALERT KEY
5	TARGET_MODE	TARGET MODE
6	MODE_BLK (Act, Perm, Norm)	MODE BLK
7	ALARM_SUM	ALARM SUM
8	LEVEL	Level
9	LEVEL_UNIT	Level Unit
10	PROBE_LEVEL	Probe Level
11	PROBE_LEVEL_UNIT	Probe Level Unit
12	SENSOR_VALUE	Sensor Value
13	SENSOR_UNIT	Sensor Unit
18	SENSOR_OFFSET	Sensor Offset
19	CAL_TYPE	Cal Type
20	SENSOR_CAL_LO	Sensor Cal Lo
21	SENSOR_CAL_HI	Sensor Cal Hi
22	PROBE_LEVEL_LO	Probe Lvl Lo
23	PROBE_LEVEL_HI	Probe Lvl Hi
24	LEVEL_OFFSET	Level Offset
25	LIN_TYPE	Lin Type
28	SENSOR_HIGH_LIMIT	Sensor Hi Lmt
29	SENSOR_LOW_LIMIT	Sensor Lo Lmt
53	PROBE_MODEL	Probe Model
54	PROBE_MOUNT	Probe Mount
55	MEASUREMENT_TYPE	Measurement Type
56	PROBE_LENGTH	Probe Length
57	DIELECTRIC_RANGE	Dielctric Rng
58	SENSITIVITY	Sensitivity
59	BLOCKING_DISTANCE	Blocking Distance
60	SAFETY_ZONE_MODE	SafeZone Mode
61	SAFETY_ZONE_HEIGHT	SafeZone Ht
62	SAFETY_ZONE_LATCH_RESET	SZ Latch Rst
63	THRESHOLD	Threshold
64	TRIM_LEVEL	Trim Level
65	VOLUME	Volume
66	VOLUME_UNIT	Volume Unit
67	INTERFACE	Interface
68	INTERFACE_UNIT	Ifc Unit
69	UPPER_LIQUID_DIELECTRIC	Upr Liq Diel
70	INTERFACE_THRESHOLD	Ifc Threshld
71	INTERFACE_VOLUME	Ifc Vol
72	INTERFACE_VOLUME_UNIT	Ifc Vol Unit
73	STRAP_TABLE_LENGTH	Strap Table Length
74	TABLE_VOLUME_UNIT	Table Volume Unit
75	STRAPPING_TABLE_POINT01	StrapTbl Pt01
76	STRAPPING_TABLE_POINT02	StrapTbl Pt02
77	STRAPPING_TABLE_POINT03	StrapTbl Pt03
78	STRAPPING_TABLE_POINT04	StrapTbl Pt04
79	STRAPPING_TABLE_POINT05	StrapTbl Pt05
80	STRAPPING_TABLE_POINT06	StrapTbl Pt06
81	STRAPPING_TABLE_POINT07	StrapTbl Pt07
82	STRAPPING_TABLE_POINT08	StrapTbl Pt08
83	STRAPPING_TABLE_POINT09	StrapTbl Pt09
84	STRAPPING_TABLE_POINT10	StrapTbl Pt10

ITEM	PARAMETER NAME	PARAMETER LABEL
85	STRAPPING_TABLE_POINT11	StrapTbl Pt11
86	STRAPPING_TABLE_POINT12	StrapTbl Pt12
87	STRAPPING_TABLE_POINT13	StrapTbl Pt13
88	STRAPPING_TABLE_POINT14	StrapTbl Pt14
89	STRAPPING_TABLE_POINT15	StrapTbl Pt15
90	STRAPPING_TABLE_POINT16	StrapTbl Pt16
91	STRAPPING_TABLE_POINT17	StrapTbl Pt17
92	STRAPPING_TABLE_POINT18	StrapTbl Pt18
93	STRAPPING_TABLE_POINT19	StrapTbl Pt19
94	STRAPPING_TABLE_POINT20	StrapTbl Pt20
95	FID_TICKS	Fid Ticks
96	FID_SPREAD	Fid Spread
97	LEVEL_TICKS	Lvl Ticks
98	INTERFACE_TICKS	Ifc Ticks
99	INTERFACE_MEDIUM	Ifc Medium
100	ENTER_PASSWORD	Enter Password
101	NEW_PASSWORD	New User Password
102	DEVICE_STATUS	Device Status
103	HISTORY_MESSAGE	History Message
104	HISTORY_CONTROL	History Control
105	RESET_HISTORY	Reset History
106	FID_TYPE	Fid Type
107	FID_GAIN	Fid Gain
108	WINDOW	Window
109	CONVERSION_FACTOR	Conv Factor
110	SCALE_OFFSET	Scale Offset
111	NEGATIVE_THRESHOLD_AMPLITUDE	NegThrsh Ampl
112	INTERFACE_THRESHOLD_AMPLITUDE	IfcThrsh Ampl
113	POSITIVE_THRESHOLD_AMPLITUDE	PosThrsh Ampl
114	SIGNAL	Signal
115	COMPENSATION	Compensation
116	DERATE_FACTOR	Derate Factor
117	TARGET_AMPLITUDE	Target Amplitude
118	TARGET_TICKS	Target Ticks
119	TARGET_CAL	Target Cal
120	TARGET_OPERATING_MODE	Target OperMode
121	7XK_DISTANCE_CORRECTION	7XK Dist Corr
122	ELECTRONICS_TEMPERATURE	Elec Temp
123	MAX_ELECTRONICS_TEMPERATURE	Max Elec Temp
124	MIN_ELECTRONICS_TEMPERATURE	Min Elec Temp
125	RESET_ELECTRONICS_TEMPERATURE	Reset Elect Temp
126	SAFETY_ZONE_HYSTERESIS	SafeZone Hyst
127	LCD_LANGUAGE	LCD Language
128	STEAM_CAL_MOUNT	Steam Cal Mount
129	RAMP_SLOPE	Ramp Slope
130	BASE_FID_TICKS	Base Fid Ticks
131	FACTORY_PARAM_1	Factory Param 1
132	FACTORY_PARAM_2	Factory Param 2
133	ECHO_SUMMARY	Echo Summary
134	ECHO_DATA	Echo Data
135	ECHO_DATA_INDEX	EchoData Indx
136	NON_VOL_STAT	Non Vol Stat
137	DATE_CODE	Date Code
138	MAGNETROL_SERIAL_NUMBER	Magnetrol S/N
139	FIRMWARE_VERSION	Firmware Ver



# Enhanced Model 705 Eclipse Guided Wave Radar Transmitter PROFIBUS PA™ Configuration Data Sheet

Copy blank page and store calibration data for future reference and troubleshooting.

Item	Value	Value	Value		
Vessel Name					
Vessel #					
Process Medium					
Tag #					
Electronics Serial #				<b>TROUBLESHOOTING</b>	
Probe Serial #				<b>Working Value</b>	<b>Non-Working Value</b>
LvlUnits					
VolUnits (opt.)					
IfcUnits (opt.)					
IfcVolUn (opt.)					
PrbModel					
PrbMount					
MeasType					
SnsrUnit					
Probe Ln					
PrbLvlUn					
Lvl Ofst					
TblVolUn (opt.)					
StrapTbl (opt.)					
Upr Diel (opt.)					
Dielctrc					
Sensvty					
BlockDis					
SftyZone					
SZHeight					
Threshld					
IfcThrsh (opt.)					
Trim Lvl					
Language					
Fid Type					
Fid Gain					
Window					
Conv Fct					
Scl Ofst					



## Enhanced Model 705 Eclipse Guided Wave Radar Transmitter PROFIBUS PA™ Configuration Data Sheet

Copy blank page and store calibration data for future reference and troubleshooting.

Item	Value	Value	Value	TROUBLESHOOTING	
				Correct Value	Incorrect Value
Neg Ampl					
Ifc Ampl (opt.)					
Pos Ampl					
Compsate					
Targ Cal (opt.)					
OperMode (opt.)					
7xK Corr (opt.)					
SnrCalLo					
SnrCalHi					
PrLvl Lo					
PrLvl Hi					
SZ Hyst					
Software Version					
New Password					
Name:					
Date:					
Time:					

### Service Policy

Owners of Magnetrol/STI 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/STI 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/STI'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.

Eclipse Guided Wave Radar transmitters may be protected by one or more of the following U.S. Patent Nos. US 6,062,095; US 6,247,362; US 6,588,272; US 6,626,038; US 6,640,629; US 6,642,807; US 6,690,320; US 6,750,808; US 6,801,157. May depend on model.



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 145 Jardin Drive, Units 1 & 2 • Concord, Ontario Canada L4K 1X7 • 905-738-9600 • Fax 905-738-1306  
 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



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