GENESIS™
MODELS ED1 & ED2

Installation and Operating Manual for Genesis™ Models ED1 & ED2 with HART® output

Software Version 1.x

High Performance, Multiphase Detector

MAGNETROL® / AMETEK®

LEVEL MEASUREMENT SOLUTIONS

Read this Manual Before Installing
This manual provides information on the Genesis detector. It is important that all instructions are read carefully and followed in sequence.

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

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

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

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

Safety Messages
The Genesis 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.

Warranty
All AMETEK LMS electronic level and flow controls are warranted free of defects in materials or workmanship for eighteen months 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, AMETEK LMS will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

AMETEK LMS 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 AMETEK LMS products.

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

The AMETEK LMS quality assurance system is certified to ISO 9001, affirming our commitment to internationally recognized quality management standards and continuous improvement.

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

MAGNETROL® / AMETEK®
LEVEL MEASUREMENT SOLUTIONS

Genesis Models ED1 & ED2 Multiphase Detector

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1.0 Complete Installation

This section provides detailed procedures for properly installing, wiring, and configuring the Genesis Multiphase Detector.

1.1 Unpacking

Unpack the instrument carefully. Ensure that 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 main electronics agree with the packing slip and purchase order.
- Record the model and serial numbers for future reference when ordering parts.

Model Number

Serial Number

For optimal performance (and correlation to the Calibration Certificate included with all units), confirm the model and serial numbers shown on the nameplates of the Genesis probe and main electronics are identical.

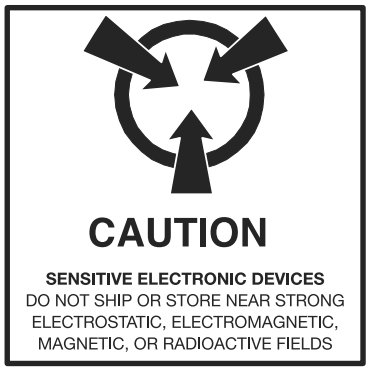
NOTE: To avoid moisture ingress in the housing, covers should be fully tightened at all times. For same reason, conduit entries should be properly sealed.

1.2 Electrostatic Discharge (ESD) Handling Procedure

AMETEK LMS 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 antistatic 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.

1.3 Before You Begin

1.3.1 Site Preparation

Each Genesis unit is built to match the physical specifications of the required installation. Ensure that the probe process connection is correct for the flanged or threaded mounting on the vessel where the probe will be placed. See Mounting, Section 1.4.

Ensure that all local, state, and federal regulations and guidelines are observed. See Wiring, Section 1.4.2.

1.3.2 Equipment and Tools

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

- Open-end wrenches (or adjustable wrench) to fit the process connection flange bolts.
- Flat-blade screwdrivers (small and medium sized)
- Digital multimeter

1.3.3 Operational Considerations

Product Specifications can be found in Section 2.6.

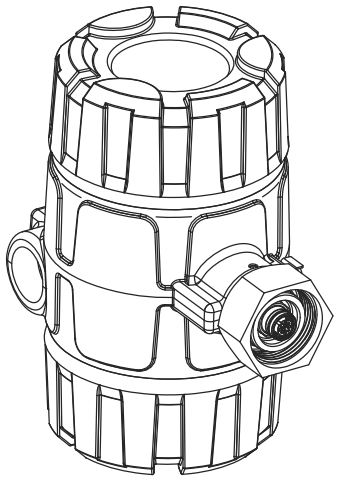
1.4 Mounting

All Genesis probes are mounted on to a tank or side-mounted chamber using flanged or threaded process connections. For information about the sizes and types of connections available, see Probe Model Number, Section 2.8.2.

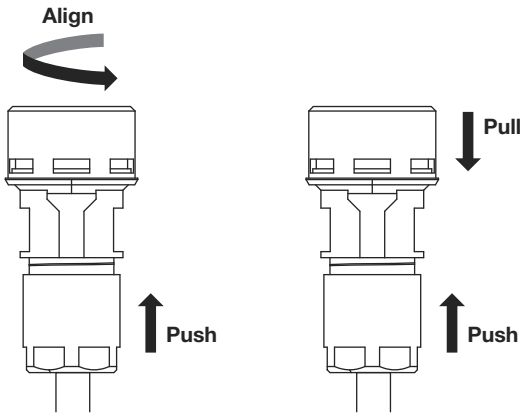
NOTE: Do not place insulating material around any part of the Genesis probe electronics itself, as this may cause excessive heat buildup.

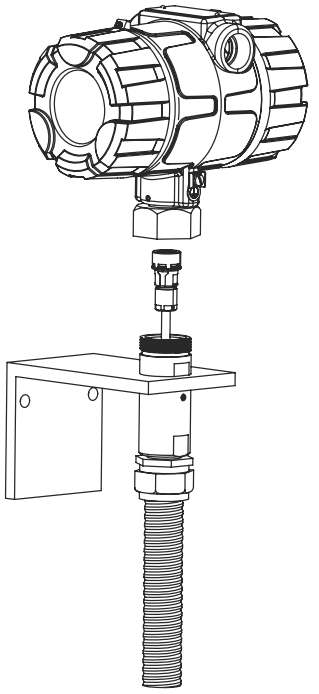
Ensure that all mounting connections are properly in place on the tank before installing the probe.

Compare the nameplate on the probe and main electronics with the product information to confirm that the Genesis probe is correct for the intended installation.



XP Connector in Main Electronics Base





WARNING! All Genesis probes should be installed such that the maximum level is a minimum of 200 mm (8") below the flange connection. This may include utilizing a nozzle or spool piece to raise the probe. Consult factory to ensure proper installation and operation.

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

1.4.1 Installing the Genesis Main Electronics

The Genesis is offered as standard in a remote configuration, with the base of tank main electronics separated from the top of tank electronics by up to 30 meters (100 feet).

Using the right angle bracket that is supplied, locate the main electronics for optimal viewing of the LCD display. While the housing can be mounted anywhere within the remote cable distance, this will typically be at the base of tank. (U-bolts can be utilized with the holes in the right angle bracket).

1. Ensure the remote cable length ordered is adequate for the installation.
2. Carefully connect the cable to the main electronics housing using the "quick-connect" cable as shown at left.
   - To connect the cable: Rotate the cable connector to align the polarity with the housing connector and simply push on the knurled end of the cable connector. No tools or tightening required.
   - To disconnect the cable: Push on the knurled end of the cable connector while lightly pulling back on the black spring loaded ring.
3. Orient the housing for convenient viewing, then secure it to the bracket using the threaded nut. LCD is rotatable in 90-degree increments.

1.4.2 Main Electronics Wiring

Caution: The Genesis operates at voltages of 24 VDC (SELV) (± 10%) with a maximum power draw of 10 Watts.

Wiring connections between the power supply and the Genesis main electronics should be made using 14–18 AWG shielded twisted pair instrument cable. 4–20 mA wiring can be accomplished using 18–22 AWG shielded twisted pair.

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

Do not apply power to the system until both the main electronics and probe electronics wiring is completed.

1.4.3 Explosion Proof

Explosion Proof (also referred to as XP or flameproof) is a method of designing equipment for installation into hazardous areas. A hazardous location is an area in which flammable gases or vapors are (or may be) present in the air in quantities sufficient to produce explosive or ignitable mixtures.

The wiring for the main electronics must be contained in Explosion Proof conduit extending into the safe area.

- An Explosion Proof conduit fitting (EY seal) is required between the hazardous and safe areas. See Agency Specifications, Section 2.5.
- The wiring between the main electronics and probe electronics (supplied by AMETEK LMS) is Intrinsically Safe (protected by an internal barrier contained within the main electronics).

Remove the cover from the wiring compartment.

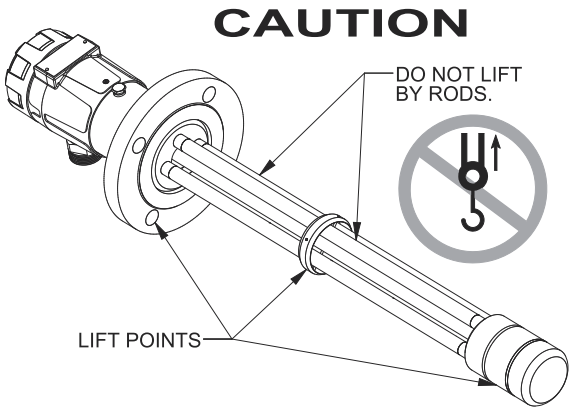
Connect the positive lead from the 24 VDC Power Supply to the left terminal and the negative lead from the 24 VDC power supply to the right terminal block labeled “POWER” on the wiring board within the main electronics housing. **(Do not apply power to the system until the probe electronics wiring has been completed.) See photo at left.**

Depending on the requirements of the application, connect the 4/20 mA wires to the Analog Output (AO) terminals on the wiring board within the main electronics housing.

- Analog Output 1 (AO1) is available with HART digital output, and should be configured to transmit the Primary Variable (PV). Options include:
  - Upper Level
  - Emulsion Top Level
  - Water Level
  - Sand Level
- The remaining three (3) outputs (AO2, AO3, and AO4) can be assigned to any of the other levels.

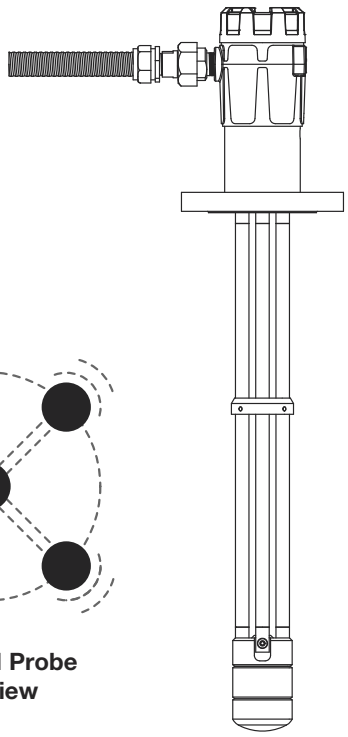
Replace the wiring cover securely to the housing.

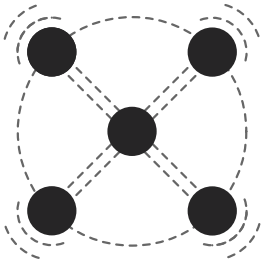
1.4.4 Installing a 5-conductor Pentarod Probe (Model PxF)



Before installing, ensure that the:

- The model and serial numbers shown on the nameplates of the Genesis main electronics and probe are identical. For optimal performance (and correlation to the Calibration Certificate included with all units), devices and probes should be installed as a matched set.
- Probe has adequate room for installation and has unobstructed entry to the bottom of the vessel.
- Process temperature, pressure, dielectric, and viscosity are within the probe specifications for the installation. See Specifications, Section 2.6.
- Ensure that the nozzle does not restrict performance by ensuring the following:
    - Nozzle is > 75mm (3") diameter.

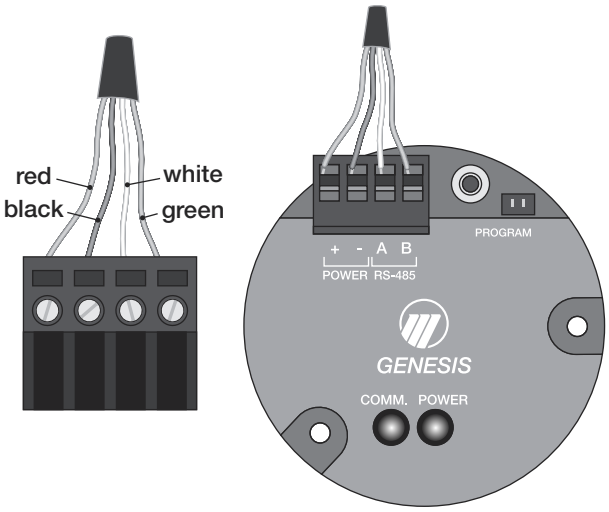




Pentarod Probe end view

1. Ensure that the process connection is the correct flanged or threaded mounting.
2. Carefully place the probe into the vessel. Align the gasket on flanged installations. Refer to drawing indicating lifting points shown at upper left.
3. Align the probe process connection with the flanged mounting on the vessel.
4. Tighten flange bolts.
5. Proceed to Probe Electronics Wiring, Section 1.4.5.

1.4.5 Probe Electronics Wiring



Remove the cover from the probe electronics housing.

Carefully remove the top section of the four-terminal block within the probe electronics housing.

Carefully feed the 4-position cable through the conduit entry and connect the four wires in the order of RED, BLACK, WHITE, and GREEN from left to right as shown:

Refer to wiring diagram within the probe electronics housing.

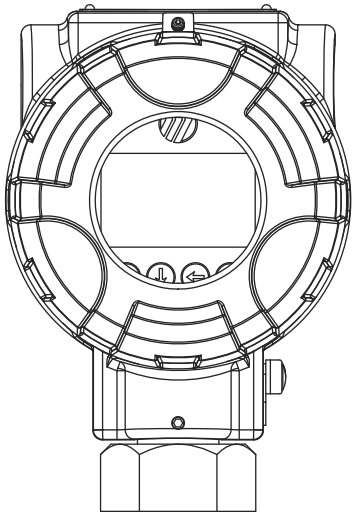
Insert the terminal block into the socket on the probe electronics module.

Secure the conduit connection.

Power can now be supplied to the system. Power and Comm LEDs should be illuminated.

Replace the cover securely onto the probe housing.

1.5 Configuration



Although the Genesis can be delivered pre-configured from the factory, it can also be easily configured in the shop or at the installation using the local LCD/Keypad or PACT*ware*/DTM. Bench configuration provides a convenient and efficient way to set up the unit before going to the tank site to complete the installation.

Before starting configuration, collect all operating parameters information. Refer to Section 1.7 for initial suggestions.

Apply power to the device and follow the step-by-step procedures below for the menu-driven display. Refer to Section 1.5.2.

Information on configuration using a HART communicator is given in Section 1.6, Configuration Using HART.

1.5.1 Bench Configuration

The Genesis can be easily configured at a test bench by connecting a 24 VDC (SELV) power supply directly to the power terminals as shown in the accompanying diagram.

NOTE: When using a HART communicator on Analog Output 1 for configuration, a minimum 250-ohm line load resistance is required. Refer to Section 1.6 and your HART communicator manual for additional information.

NOTE: The detector can be configured without the probe. Disregard the “Probe Comm Error” diagnostic indicator that will appear.

1.5.2 Menu Traversal and Data Entry

The four push buttons offer various forms of functionality for navigation and data entry.

The user interface is hierarchical in nature, best described as a tree structure. Each level in the tree contains one or more items. Items are either menu labels or parameter names.

- Menu labels are presented in all capital letters
- Parameters are capital words

1.5.2.1 Navigating the Menu

⇧ **UP** moves to the previous item in the menu branch.

⇩ **DOWN** moves to the next item in the menu branch.

⇦ **BACK** moves back one level to the previous (higher) branch item.

⇨ **ENTER** enters into the lower level branch or switches to the entry mode. Holding the ENTER down on any highlighted menu name or parameter will show help text for that item.

1.5.2.2 Data Selection

This method is used for selecting configuration data from a specific list.

⇧ **UP** and ⇩ **DOWN** to navigate the menu and highlight the item of interest.

⇨ **ENTER** allows modification of that selection.

⇧ **UP** and ⇩ **DOWN** to choose new data selection.

⇨ **ENTER** to confirm selection.

Use ⇦ **BACK** (Escape) key at any time to abort the procedure and escape to previous branch item.

1.5.2.3 Entering Numeric Data Using Digit Entry

This method is used to input numeric data, e.g., Probe Length, set 4mA and set 20mA.

Push button		Keystroke Action
	Up	Moves up to the next highest digit (0,1,2,3....9 or decimal point). If held down the digits scroll until the push button is released.
	Down	Moves down to the next lowest digit (9, 8, 7....0) or decimal point). If held down the digits scroll until the push button is released.
	Back	Moves the cursor to the left and deletes a digit. If the cursor is already at the leftmost position, then the screen is exited without changing the previously saved value.
	Enter	Moves the cursor to the right. If the cursor is located at a blank character position, the new value is saved.

All numeric values are left-justified, and new values are entered from left to right. A decimal point can be entered after the first digit is entered, such that .9 is entered as 0.9.

Some configuration parameters can have a negative value. In this case, the leftmost position is reversed for the sign (either "-" for a negative value, or "+" for a positive value).

1.5.2.4 Entering Numeric Data Using Increment/Decrement

Use this method to input the following data into parameters such as Damping and Failure Alarm.

Push button		Keystroke Action
	Up	Increments the displayed value. If held down the digits scroll until the push button is released. Depending on which screen is being revised, the increment amount may increase by a factor of 10 after the value has been incremented 10 times.
	Down	Decrements the displayed value. If held down the digits scroll until the push button is released. Depending on which screen is being revised, the decrement amount may increase by a factor of 10 after the value has been decremented 10 times.
	Back	Returns to the previous menu without changing the original value, which is immediately redisplayed.
	Enter	Accepts the displayed value and returns to the previous menu.

1.5.2.5 Entering Character Data

This method is used for parameters requiring alphanumeric character entry, such as for entering tags, etc.

General Menu Notes:

Push button		Keystroke Action
↑	Up	Moves to the previous character (Z...Y...X...W). If held down, the characters scroll until the push button is released.
↓	Down	Moves to the next item character (A...B...C...D). If held down, the characters scroll until the push button is released.
←	Back	Moves the cursor back to the left. If the cursor is already at the leftmost position, then the screen is exited without changing the original tag characters.
→	Enter	Moves the cursor forward to the right. If the cursor is at the rightmost position, then the new tag is saved.

1.5.3 Password Protection

The Genesis has three levels of password protection to restrict unapproved access to certain portions of the menu structure that affect the operation of the system. The user password can be changed to any numerical value up to 59999. When programmed for password protection, a password is required whenever configuration values are changed.

User Password

The User Password allows the customer to limit access to the basic configuration parameters.

The default User Password implemented in the detector at the factory is 0. With a password of 0, the device is no longer password protected and any value in the basic user menus can be adjusted without entering a confirming password.

NOTE: If a User Password is not known or has been misplaced, the menu item New Password in the DEVICE SETUP/ADVANCED CONFIG menu displays an encrypted value representing the present password. Contact Technical Support with this encrypted password to retrieve the original User Password.

Advanced Password

Certain portions of the menu structure that contain more advanced parameters are further protected by an Advanced Password.

This password will be provided, when necessary, by Factory technical support.

Factory Password

Calibration-related and other factory settings are further protected by a Factory Password.

1.5.4 Menu: Step-By-Step Procedure

The chart in the following section provides an overview of the menus and parameters as displayed by the Genesis. The menu layout is similar between the local Keypad/LCD interface, the DD, and the DTM.

Use this chart as a step-by-step guide to configure the unit to measure the various level in the vessel.

HOME SCREEN

The Home Screen consists of a “slide show” sequence of Measured Values screens which are rotated at 2-second intervals. Each Home screen can present up to four items of information:

- **HART® Tag**
- **Measured Value**
  Label, Numerical Value, Units
- **Status**
  Will be displayed as text or optionally with NAMUR NE 107 symbol
- **Primary Value Bar Graph** (shown in %)

The Home Screen presentation can be customized by viewing or hiding some of these items. See DISPLAY CONFIG under the DEVICE SETUP menu in Section 1.5.4 — Basic Configuration Menu.

At left is an example of a Home Screen for a Model ED1 configured to show the interface (water) level.

MAIN MENU

Pressing any key on the Home Screen will present the Main Menu, consisting of three basic menu labels shown in all capital letters.

- **DEVICE SETUP**
- **DIAGNOSTICS**
- **MEASURED VALUES**

As shown, the reverse video represents a cursor identifying the selected item, which will appear in reverse video on the LCD. The actions of the keys at this point are:

Push button		Keystroke Action
↑	Up	No action as the cursor is already at the first item in the MAIN MENU
↓	Down	Moves the cursor to DIAGNOSTICS
←	Back	Moves back to HOME SCREEN, the level above MAIN MENU
→	Enter	Presents the selected item, DEVICE SETUP

NOTE: Holding down the Enter key when the cursor is highlighted over a parameter or menu will provide additional information about that item.

DEVICE SETUP

Choosing DEVICE SETUP from the MAIN MENU will result in an LCD presentation as shown at left.

The small down arrow shown at the right hand side of the screen is the indication that more items are available below and can be accessed by pressing the DOWN key.

Section 1.5.5 shows the entire tree menu for the Genesis DEVICE SETUP Menu.

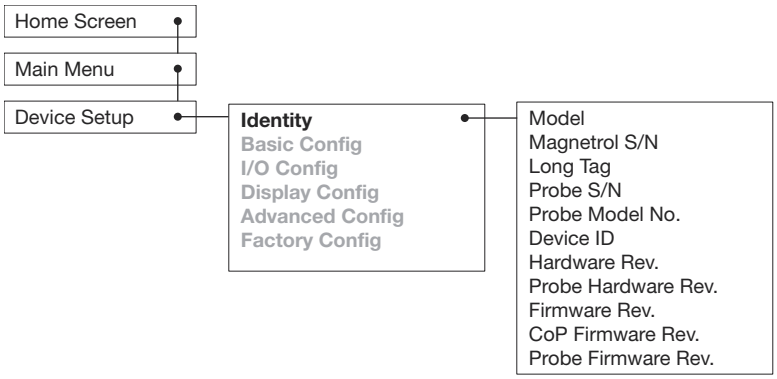
DIAGNOSTICS

Refer to Section 2.3.4

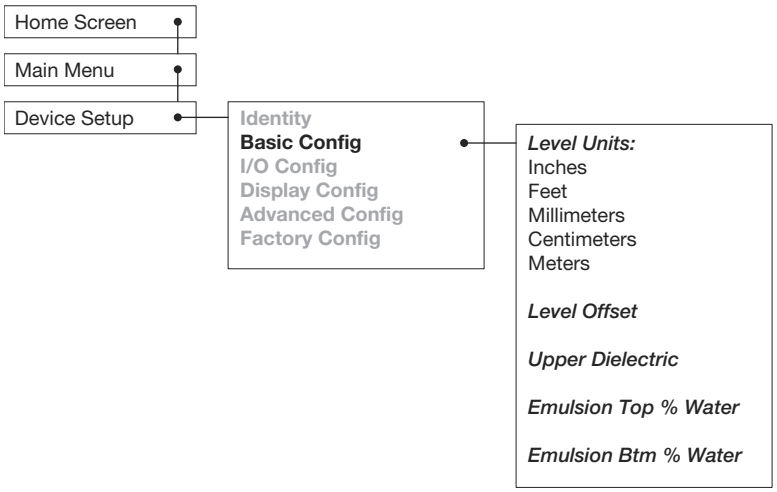
MEASURED VALUES

Allows the user to scroll through all of the available measured values for the measurement type chosen.

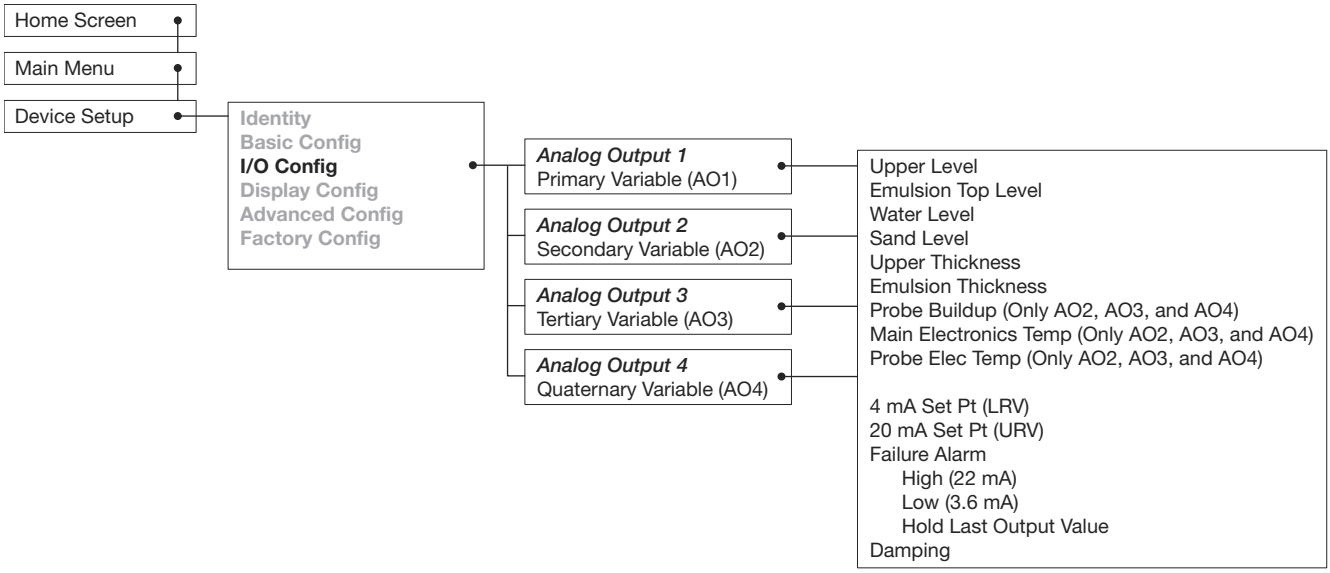
1.5.5 Device Setup — Identity



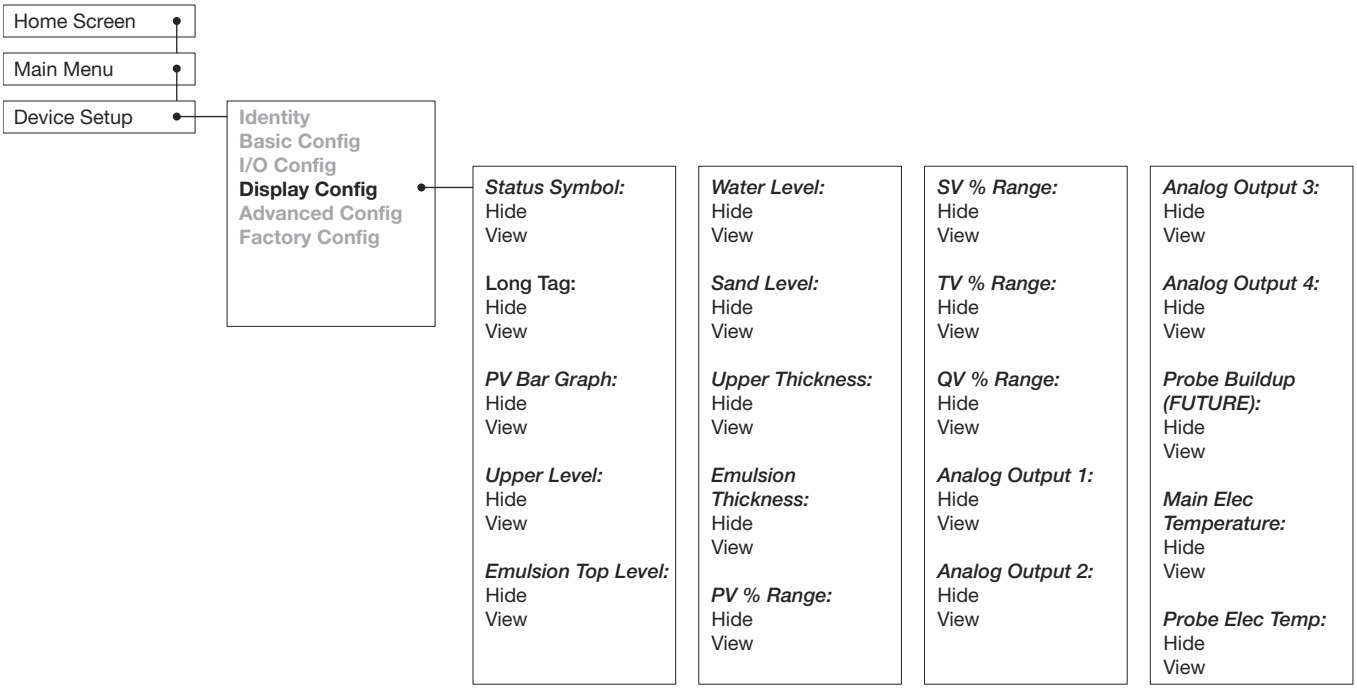
1.5.6 Device Setup — Basic Configuration



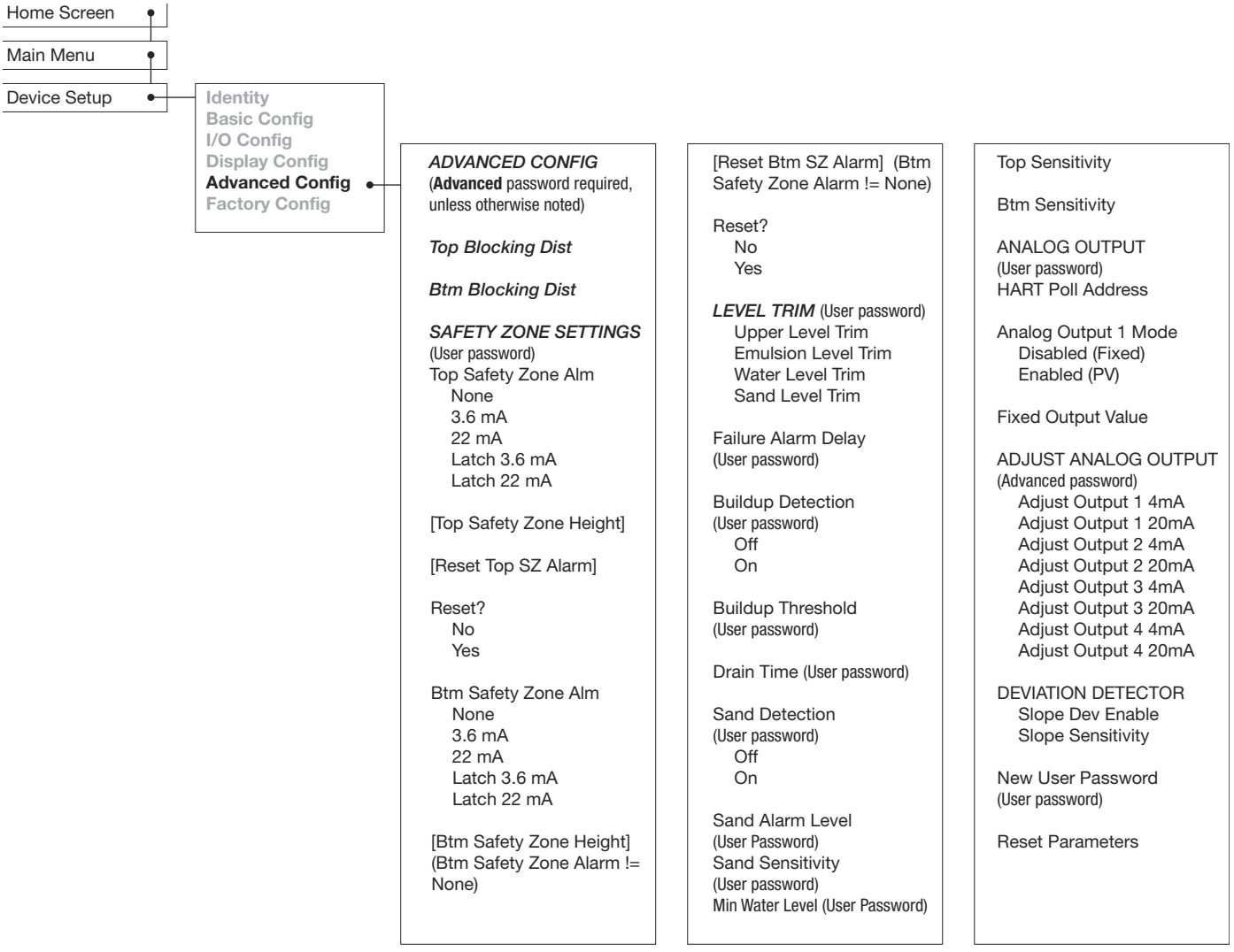
1.5.7 Device Setup — I/O Configuration



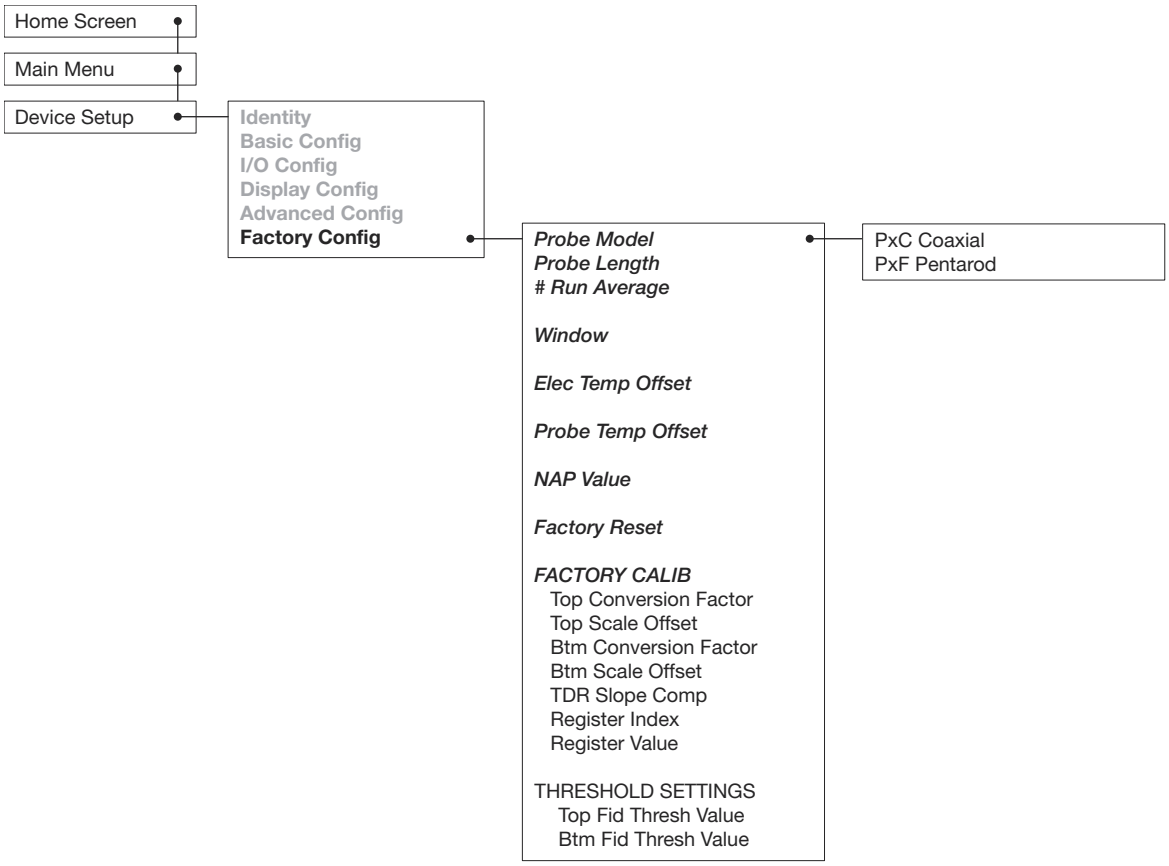
1.5.8 Device Setup — Display Configuration



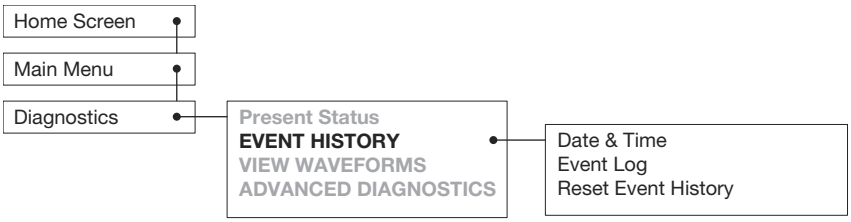
1.5.9 Device Setup — Advanced Configuration



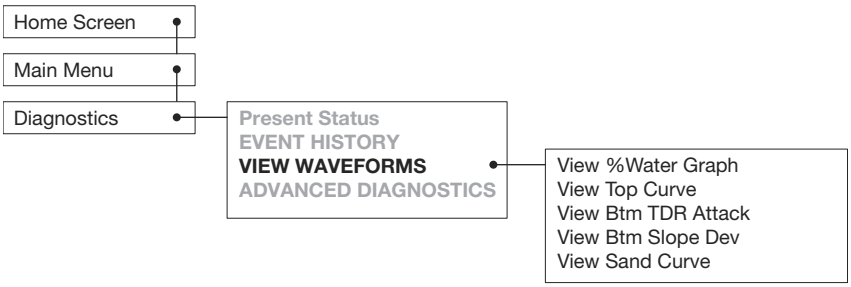
1.5.10 Device Setup — Factory Configuration



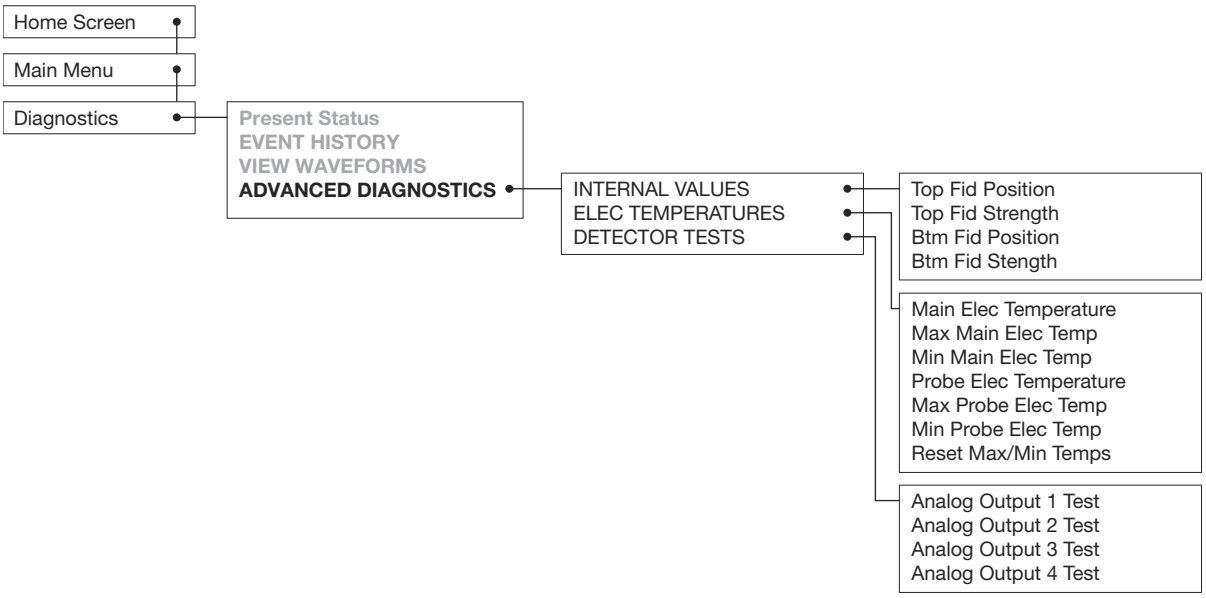
1.5.11 Diagnostics — Event History



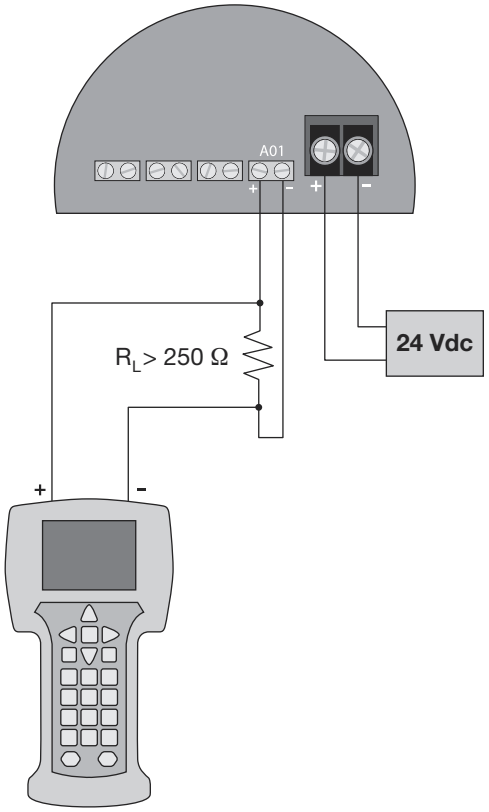
1.5.12 Diagnostics — View Waveforms



1.5.13 Diagnostics — Advanced



1.6 Configuration Using HART



A HART (Highway Addressable Remote Transducer) remote unit, such as a HART communicator, can be used to provide a communication link to the Genesis. When connected to the control loop, the same system measurement readings shown on the device are also shown on the communicator. The communicator can also be used for configuration.

The HART communicator may need to be updated to include the Genesis software (Device Descriptions). Refer to your HART Communicator Manual for update instructions.

One can also access configuration parameters using PACT*ware* and the DTM, or using AMS with EDDL.

1.6.1 Connections

A HART communicator can be operated using Analog Output 1 (AO1) from a remote location by connecting it to a remote junction or by connecting it directly to the terminal block in the wiring compartment of the Genesis main
electronics.

HART uses the Bell 202 frequency shift keying technique of high-frequency digital signals. It operates on the 4–20 mA loop and requires 250 Ω load resistance. A typical connection between a communicator and the Genesis is shown at left.

1.6.2 HART Communicator Display

A typical communicator display is an 8-line by 21-character LCD. When connected, the top line of each menu displays the model and its tag number or address. For detailed operating information, refer to the instruction manual provided with the HART communicator.

1.6.3 HART Revision Table

Models ED1 & ED2 1.x

HART Version	HCF Release Date	Compatible with ED1/ED2 Software
Dev Rev 1, DD Rev 1	March 2022	Version 1.0b and later

1.7 Initial Configuration/Commissioning

While the Genesis can be delivered pre-configured for the specific application, it is relatively simple confirm and/or to re-configure if necessary.

Refer to Section 1.5 for descriptions of the complete menu structure and various LCD pushbuttons.

All menus and parameters can be accessed via the LCD user interface, the DD using a HART configurator, or via PACT*ware* and the DTM.

The BASIC CONFIG menu is the starting point for the initial commission process.

Press any key from the HOME Screen

1. Scroll to DEVICE SETUP, then press Enter
2. Scroll to BASIC CONFIG, then press Enter
3. A series of parameters will be displayed:

Level Units
Select the Units of measurement for the level readout:

- Inches
- Feet
- Millimeters
- Centimeters
- Meters

Level Offset
Enter the desired level reading when the liquid is at the end of the probe. Range is -3 to +6 meters (-10 to +20 feet). Refer to Section 2.4 for further information. (With default Level Offset = 0, all measurements are referenced from the bottom of the probe.)

Upper Dielectric
Enter the Dielectric Constant of the upper process medium. (Default of 2.1 will suffice for most applications).

Emulsion Top % Water
Enter the desired %Water for the top of the emulsion.

Emulsion Bottom % Water
Enter the desired %Oil for the bottom of the emulsion.

The I/O Config Menu is next. Press the back button to return to DEVICE SETUP menu.

Up to four (4) analog outputs can be configured for the following:

- Upper Level
- Emulsion Top Level
- Water Level
- Sand Level
- Upper Thickness
- Emulsion Thickness

NOTE: Bottom 8" (200 mm)of probe is inactive. Only those levels rising above the bulb will be detected.

Analog Output 1 (AO1) provides HART digital communication.

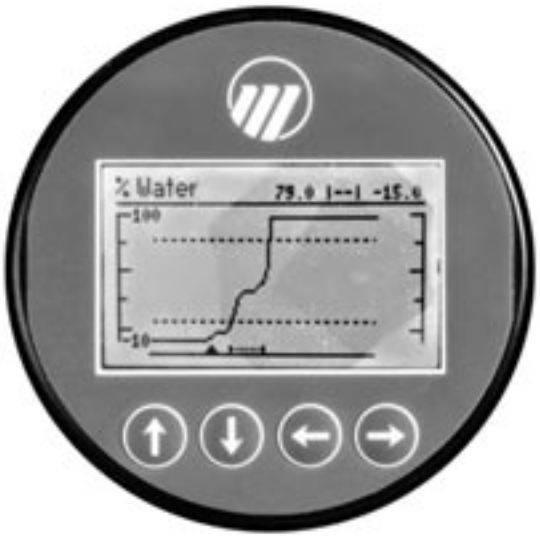
1. Scroll to I/O Config, then press Enter
2. Choose the desired analog output, then press Enter.
3. Select the desired level to correspond to that output, then press Enter.
4. Scroll to the 4mA and 20mA set point, and set each accordingly.
5. Confirm proper choice for the Failure Alarm.

The device is now commissioned and should be reporting the various levels in the vessel.

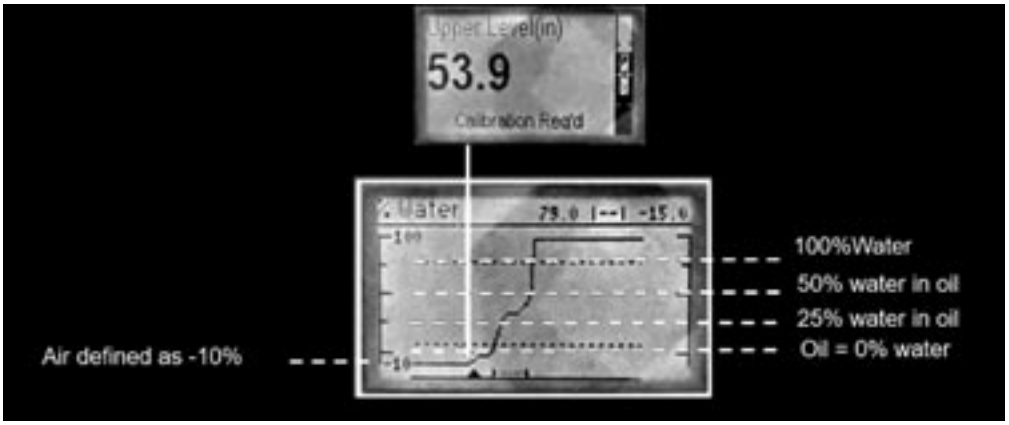
Press the back arrow until you return to the MAIN MENU.

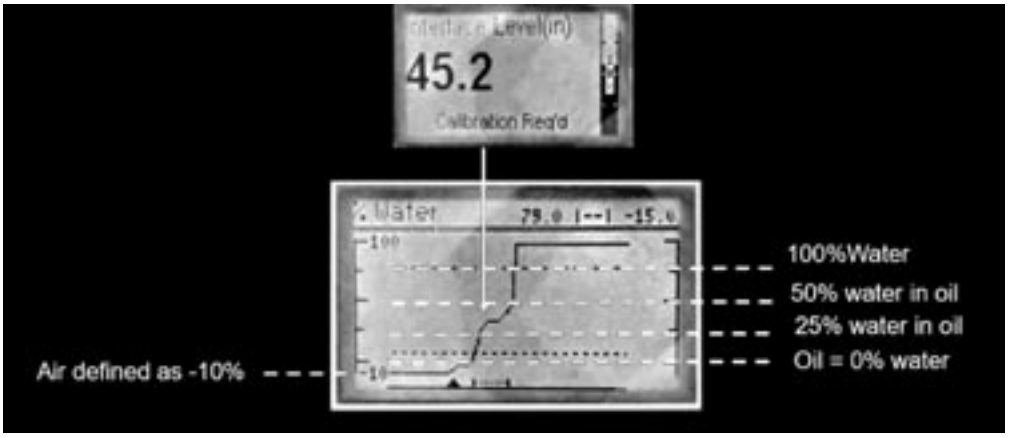
1. Scroll to Diagnostics, then press Enter.
2. Scroll to VIEW WAVEFORMS, then press Enter.
3. Scroll to Top Curve, the press Enter.

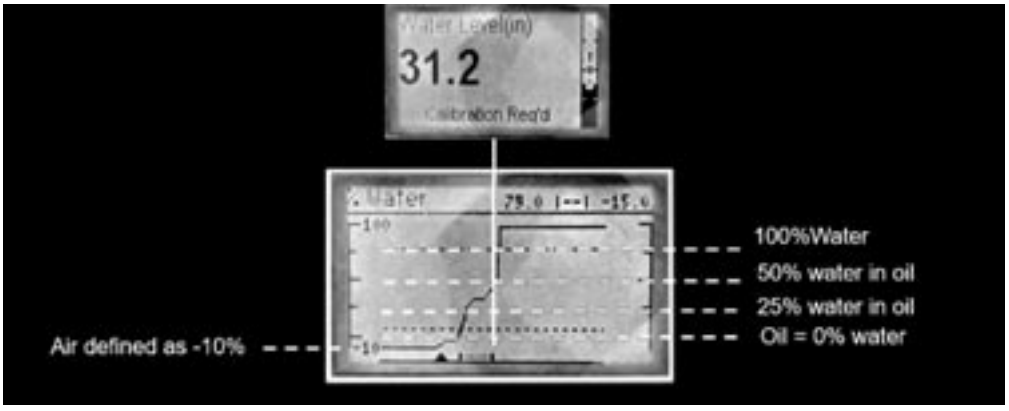
You will be presented with a waveform similar to:



As this device operates upon a series of detectable impedance both up and down the probe, the reflections in the waveform correspond to the various levels within the vessel, such as:







2.0 Reference Information

This section presents an overview of the operation of the Genesis Multiphase Detector, information on troubleshooting common problems, listings of agency approvals, lists of replacement and recommended spare parts, and detailed physical, functional, and performance specifications.

2.1 Detector Description

The Genesis is a 24 VDC (SELV) powered Multiphase Detector utilizing Time Domain Reflectometry (TDR) to detect various layers of emulsion within a vessel. The Genesis is comprised of three basic components:

- A remote top of probe housing
- A base of tank main electronics housing
- Flexible interconnecting conduit with mounting bracket

2.2 Theory of Operation

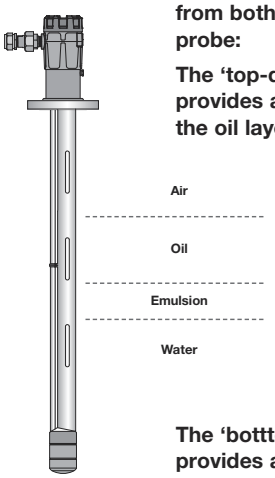
2.2.1 Time Domain Reflectometry (TDR)

TDR uses pulses of electromagnetic (EM) energy to measure distances or levels. When a pulse reaches a dielectric discontinuity (created by the surface of a process medium), part of the energy is reflected. The larger the dielectric discontinuity, the larger the amplitude (strength) of the reflection.

TDR has been used for decades in the telephone, computer, and power transmission industries. In these industries, TDR is used to successfully find wire or cable breaks and shorts. An EM pulse is sent through the wire, traveling unimpeded until it finds line damage due to a break or short. A reflection is then returned from the damaged area of the wire, enabling a timing circuit to pinpoint the location.

In the typical TDR level transmitter, a waveguide with a characteristic impedance in air is used as a probe. When part of the probe is immersed in a material other than air, there is lower impedance due to the fact that a liquid will have a higher dielectric constant than air. When an EM pulse is sent down the probe and meets the dielectric discontinuity that occurs at the air/liquid surface, a reflection is generated. What makes the Genesis special is the fact that, not only is a signal sent down from the top of the probe, there is also a signal being sent up from the bottom of the probe. This unique (patented) combination of signals, along with advanced internal algorithms allows the device to report Upper Hydrocarbon level, the top of the emulsion, the interface (water), and possibly sediment below.

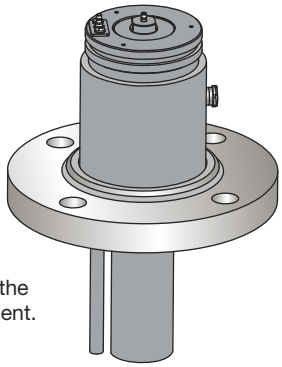
2.2.2 Application Description



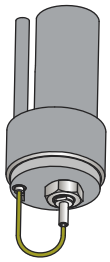
Signals are transmitted from both ends of the probe:

The 'top-down' signal provides a clear view of the oil layer.

The 'botttom-up' signal provides a clear view of the water level.



Two Signals
One transmitting for the top-down measurement.



One transmitting for the bottom-up measurement.

Hydrocarbon/water (two-phase) interface measurement is prevalent in the Oil & Gas and Chemical (and other) industries. The ability to separate dry (water-free) hydrocarbon upper fluid in the top of a vessel and clean (hydrocarbon-free) water from the bottom is fundamental to this measurement.

Developments in TDR/GWR measurement have shown to measure both levels quite accurately when the interface is relatively clean and distinct. However, when a mixture of HC/water, i.e. an emulsion (or rag layer) is present (thereby no distinct impedance change), TDR/GWR based measurements become less effective.

In that case, the application could actually become a four-phase measurement:

- Total Level (top of hydrocarbon)
- Top of Emulsion (water in oil)
- Bottom of Emulsion (oil in water or water level)
- Sand (sediment)

Two common applications where multiphase detection is very beneficial to customers are in Separators/Treaters and Desalters. 3-Phase Separators are typically large horizontal drums designed to separate raw hydrocarbon streams into their individual components. The challenge is that interface level measurement is a critical measurement which is often relied upon to actuate a water "dump" valve to eliminate unwanted water-bottoms from the vessel. Inaccurate measurement of the oil, emulsion, or water levels can increase settling times, can increase the use of Demulsifying chemicals, reduce vessel throughput (capacity). All of which adversely impact profitability as the emulsion layer along the hydrocarbon/water interface can contaminate the hydrocarbon with water (and vice versa). Accurate level control ensures the hydrocarbon is "water-free"; and, the disposal water doesn't carry much hydrocarbon requiring treatment to be re-processed or disposed of. Furthermore, companies spend millions of dollars each year to treat their waste water to be hydrocarbon-free. This spending can be reduced with more accurate separation/interface level control, reducing the amount of processing and chemical use to ensure no hydrocarbon and other materials remain in the water. All said, the goal is to ensure that the oil goes where it needs to without containing water, and that water goes where it needs to without containing oil…all the while reducing the use and cost of chemicals while maximizing throughput.

Desalters are an important process element at many downstream and upstream operations. The primary purpose of a desalter is to remove impurities from the oil. In upstream applications, this can consist of chloride salts, water, and other minerals (sediments). In downstream applications, many of the impurities have been removed, so the focus there is further refinement of the salt and water out of the crude. Any salt in a hydrocarbon presents serious corrosion and scaling concerns, which is why it must be removed. The salt within the remnant brine of the crude oil is dissolved with fresh water. Desalting removes both salt and residual free water. Field desalting is necessary due to meet pipeline specification requirements. The challenge is that interface level must be accurate enough to control and keep free water from contacting the desalter electrodes, which can cause expensive damage. The goal in this application is to keep the interface level constant to increase efficiency, otherwise electrical field changes will disturb electrical coalescence.

2.3 Troubleshooting and Diagnostics

The Genesis is designed and engineered for trouble-free operation over a wide range of operating conditions. It continuously runs a series of internal self-tests and displays helpful messages on the large graphic liquid crystal display (LCD) when attention is required.

The combination of these internal tests and diagnostics messages offer a valuable proactive method of troubleshooting. The device not only tells the user what wrong, but also, and more importantly, offers suggestions on how to solve the problem.

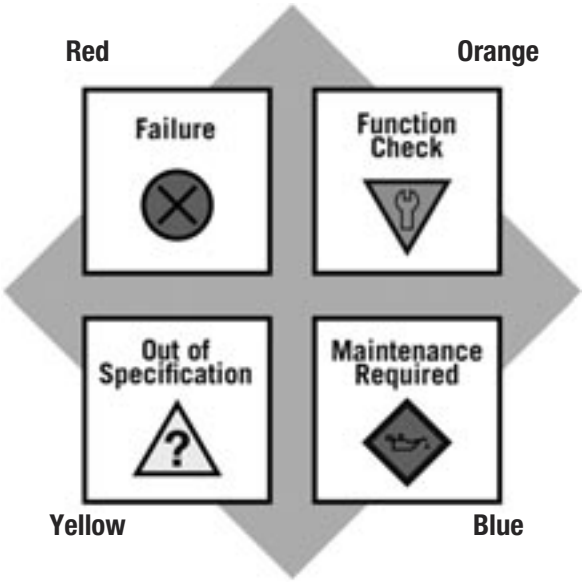
All of this information can be obtained directly from the device on the LCD, or remotely by using a HART communicator or PACT*ware* and the Genesis DTM.

PACT*ware*™ PC Program

The Genesis offers the ability to perform more advanced diagnostics such as Trending and Echo Curve analysis using a PACT*ware* DTM. This is a powerful troubleshooting tool that can aid in the resolution of any diagnostic indicators that may appear.

Refer to section 2.3.1 for additional information.

2.3.1 Diagnostics (Namur NE 107)



The Genesis includes an exhaustive list of Diagnostic Indicators which follow the NAMUR NE 107 guidelines.

NAMUR is an international user association of automation technology in process industries, whose goal is to promote the interest of the process industry by pooling experiences among its member companies. In doing so, this group
promotes international standards for devices, systems, and technologies.

The objective of NAMUR NE 107 was essentially to make maintenance more efficient by standardizing diagnostics information from field devices. This was initially integrated via FOUNDATION fieldbus, but the concept applies regardless of the communication protocol.

According to the NAMUR NE107 recommendation, "Self Monitoring and Diagnosis of Field Devices," fieldbus diagnostic results should be reliable and viewed in the context of a given application. The document recommends categorizing internal diagnostics into four standard status signals:

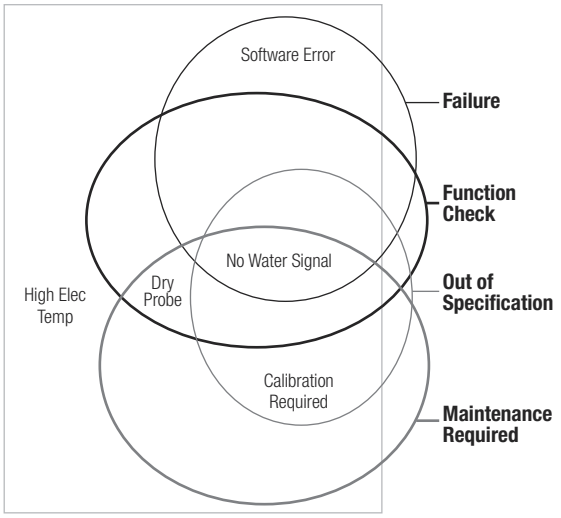
- Failure
- Function Check
- Out of Specification
- Maintenance required

These categories are shown by both symbols and colors, depending on the display capability.

In essence, this approach ensures that the right diagnostic information is available to the right person-at the right time. In addition, it allows diagnostics to be applied, as most appropriate, for a particular plant application (such as process control engineering or asset management maintenance). Customer specific mapping of diagnostics to these categories allows for flexible configuration depending on the user's requirements.

From an external perspective, diagnostic information includes measurement of process conditions, in addition to detection of internal device or system anomalies.

As mentioned above, the indicators can be assignable (via the DTM or host system) by the user to any (or none) of the NAMUR recommended Status Signal categories: Failure, Function Check, Out of Specification, and Maintenance Required.



Diagnostic indicators can be mapped to multiple categories, an example is shown in the diagram at left.

In this example, “Calibration Required” is mapped to both the Out of Specification and Maintenance Required status signals, and the diagnostic indicator named “High Temperature” is mapped to none of the signals.

Indicators that are mapped to the Failure category will normally result in a current loop alarm output. The alarm state for typical HART instruments is configurable as high (22 mA), Low (3.6 mA), or Hold (last value).

Users will not have the ability to unassign certain indicators from the Failure signal category as the user interfaces will prohibit or reject such re-assignment entries). This is to ensure that current loop alarms are asserted in situations where the device is not able to provide measurements due to critical failures. (For example, if the alarm selection has not been set to Hold, or a fixed current mode is in effect.)

A default mapping of all diagnostic indicators will be applied initially, and can be re-applied through use of a reset function.

Refer to the table on next page for a complete listing of diagnostic indicators, along with their explanations, default categories, and recommended remedies.

NOTES:
1) The remedies shown in this table can also be seen on the main electronics LCD by viewing the present status screen when the device is in a diagnostic condition.
2) Those indicators showing failure as the default result in an alarm condition.

2.3.2 Diagnostic Indication Simulation

The DD and DTM allow for the ability to manipulate diagnostic indicators. Intended as a means to verify the configuration of the diagnostic parameters and connected equipment, a user can manually change any indicator to and from the active state.

2.3.3 Diagnostic Indicator Table

Below is a listing of the Genesis diagnostic indicators, showing their priority, explanations and recommended remedies. (Priority 1 is highest priority.)

Priority	Indicator Name	Default Category	Explanation	Remedy (Context Sensitive Help)
1	Software Error	Failure All AOs	Incorrect instruction sequence or other software malfunction.	Contact AMETEK LMS Technical Support.
2	Probe Comm Error	Failure All AOs	Probe electronics not responding to coprocessor.	Check wiring / cable connections in probe electronics compartment.
3	Coprocessor Comm Error	Failure All AOs	Coprocessor not responding to main processor.	Contact AMETEK LMS Technical Support.
4	TDR Board Error	Failure All AOs	Probe electronics malfunction	Contact AMETEK LMS Technical Support.
5	Probe Memory Error	Failure All AOs	Activated when the memory device in probe fails to respond.	Contact AMETEK LMS Technical Support.
6	DAC Failure	Failure All AOs	DAC not responding correctly.	Contact AMETEK LMS Technical Support.
7	Firmware Conflict	Failure All AOs	The firmware in the probe electronics is not compatible with the firmware in the main electronics.	Contact AMETEK LMS Technical Support.
8	Default Parameters	Failure All AOs	Some or all parameters reset to default values.	Perform complete Device Configuration
9	No Top Fiducial	Failure All AOs except Water Level	Top-down waveform missing “fiducial” characteristics	Contact AMETEK LMS Technical Support.
10	No Btm Fiducial	FailureWater Level AO	Bottom-up waveform missing “fiducial” characteristics	Contact AMETEK LMS Technical Support.
11	Top Safety Zone Alm	FailureUpper Level AO	Upper Level signal within Top Safety Zone region.	Ensure that liquid cannot reach Top Blocking Distance.
12	Btm Safety Zone Alm	FailureWater Level AO	Water Level signal within Bottom Safety Zone region.	Ensure that liquid cannot reach Bottom Blocking Distance.
13	Spare Indicator	No Effect	None	
14	EoP Above Probe End	Failure All AOs	End of Probe signal detected closer than Probe Length.	Check settings: View Echo Curve.
15	EoP Below Probe End	Failure All AOs	End of Probe signal detected beyond Probe Length	Check settings: Probe Length. View Echo Curve
16	Spare Indicator	No Effect	None	
17	No Water Signal	FailureWater Level AO	Bottom waveform missing characteristics indicative of water.	
18	Initializing	Function Check	System initializing, measurements not yet valid.	Standard start-up message. Wait for up to 10 seconds.
19	Spare Indicator	No Effect	none	
20	Spare Indicator	No Effect	none	

Priority	Indicator Name	Default Category	Explanation	Remedy (Context Sensitive Help)
21	Probe [Top] Buildup	Maintenance Required	A clean probe will show an abrupt transition from air to oil. This indicator is active when the transition from air to oil exceeds the Buildup Threshold. This serves as a warning that sometime soon the top-level will begin reading on the probe-fouling instead of the fluid.	View waveform to confirm. Clean probe.
22	Sand Detected	Maintenance Required	Sand detected covering the probe bottom, exceeding the Sand Threshold	
23	Adjust Analog Out AO1	Maintenance Required	loop trim parameters at default values	Contact AMETEK LMS Technical Support.
24	Adjust Analog Out AO2	Maintenance Required	loop trim parameters at default values	Contact AMETEK LMS Technical Support.
25	Adjust Analog Out AO3	Maintenance Required	loop trim parameters at default values	Contact AMETEK LMS Technical Support.
26	Adjust Analog Out AO4	Maintenance Required	loop trim parameters at default values	Contact AMETEK LMS Technical Support.
27	Spare Indicator	No Effect	none	
28	Spare Indicator	No Effect	none	
29	High Elec Temp	Out of Spec	Present electronics temperature above maximum [70 ºC].	Shield instrument from heat source or increase air circulation. Locate remotely in a cooler area.
30	Low Elec Temp	Out of Spec	Present electronics temperature below minimum [-40 ºC].	Insulate instrument. Locate it remotely in a warmer area.
31	High Probe Elec Temp	Out of Spec	Present probe electronics temperature above maximum [70 ºC].	Shield Probe Housing from heat source.
32	Low Probe Elec Temp	Out of Spec	Present probe electronics temperature below minimum [-40 ºC].	Insulate Probe housing.
33	Spare Indicator	No Effect	None	
34	Spare Indicator	No Effect	None	
35	Calibration Required	Out of Spec	Distance calibration parameters or electronics temperature offsets are at default values.	Return device to factory for recalibration.
36	Spare Indicator	No Effect	None	
37	Dry Probe	No Effect	No levels detected on probe	If unexpected, verify proper probe length for application.
38	Spare Indicator	No Effect	None	
39	Spare Indicator	No Effect	None	
40	Sequence Record	No Effect	Instruction execution followed a valid but unexpected sequence. Val 1: Sequence Record Val 2: 0	If desired, report Sequence Record number to factory.

The Genesis offers the ability to perform Trending and Echo Curve analysis via the local graphical LCD or by using PACT*ware* and the DTM. The Genesis DTM is a powerful troubleshooting tool that can aid in the resolution of some of the Diagnostic Indicators shown above.

2.3.4 Diagnostic Help

Selecting DIAGNOSTICS from the MAIN MENU presents a list of four ITEMS from the top level of the DIAGNOSTICS tree.

When Present Status is highlighted, the highest Magnetrol priority active diagnostic indicator (numerically lowest in Table 2.3.3) is displayed on the bottom LCD line, which is “OK” as shown at left. Pressing the ENTER key moves the active diagnostic indicator to the top line outdented and presents in the lower area of the LCD a brief explanation of and possible remedies for the indicated condition. A blank line separates the explanation from the remedies. Additional active diagnostic indicators, if any, appear with their explanations in descending priority order. Each additional active indicator name-explanation pair is separated by a blank line from the one above.

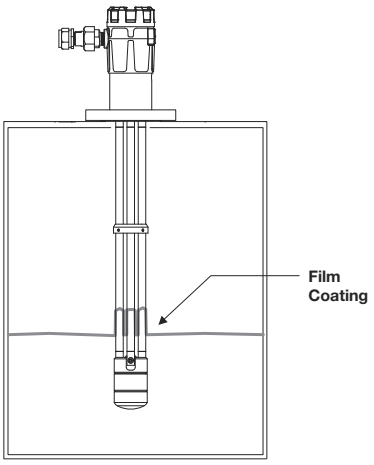
If the explanation and remedy text (and additional name-explanation pairs) exceeds the available space, a ⇩ appears in the rightmost column of the last line indicating more text below. In this situation, the DN key scrolls text up one line at a time. Similarly, while text exists above the upper line of the text field, a ⇧ appears in the rightmost column of the top (text) line. In this situation, the UP key scrolls the text down one line at a time. Otherwise the DN and UP keys are inoperative. In all cases the ENT or DEL key reverts to the previous screen.

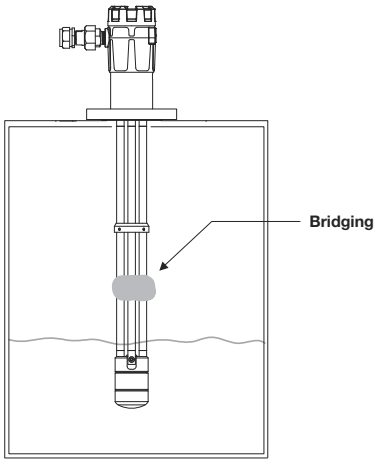
When the device is operating normally and the highlight cursor is positioned on Present Status, the bottom LCD line displays “OK” because no diagnostic indicators are active.

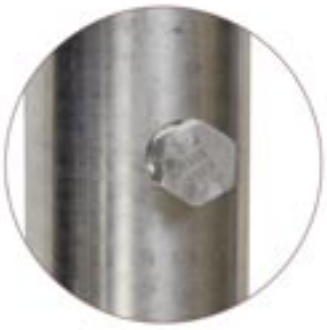
EVENT HISTORY – This menu displays the parameters related to diagnostic event logging.

ADVANCED DIAGNOSTICS – This menu displays parameters related to some of the advanced diagnostics available within the Genesis Multiphase Detector.

VIEW WAVEFORMS – This menu allows the user to display the various Echo Curves on the LCD.







2.3.5 Troubleshooting Application Issues

There can be numerous reasons for application-related issues. Media buildup on the probe is covered here.

Media buildup on the probe is typically not a problem in most cases— Genesis circuitry works very effectively. Media buildup should be viewed as two types:

- Continuous Film Coating
- Bridging

Continuous Film Coating

One type of potential application problem is when the media forms a continuous coating on the probe. Although the Genesis will continue to measure effectively, some small inaccuracies may occur as the signal propagation is affected by the thickness, length, and dielectric constant of the
coating.

It is a very rare case where filming causes a noticeable performance degradation.

Bridging

A more common coating problem occurs when the process medium is viscous or solid enough to actually clog, or bridge, between the elements. This bridging can cause a noticeable degradation in performance. For example, high dielectric media (e.g., water-based) can be detected as level at the location of the bridging.

Similarly, a problem can develop if the product begins to build up on or near the spacers that separate the probe elements. High dielectric media (e.g., water-based) will cause the greatest error.

Refer to Section 2.6.2 for viscosity specifications on the various Genesis probes.

Optional Flushing Connection

The maintenance of probes in applications containing buildup or crystallization can be significantly improved by using an optional flushing connection. This flushing connection, which is available with both probe styles, is a metal extension with a port welded above the process connection. The port allows the user to purge the inside of the probes during routine maintenance.

Contact the factory for any questions regarding applications with potential coating and buildup.

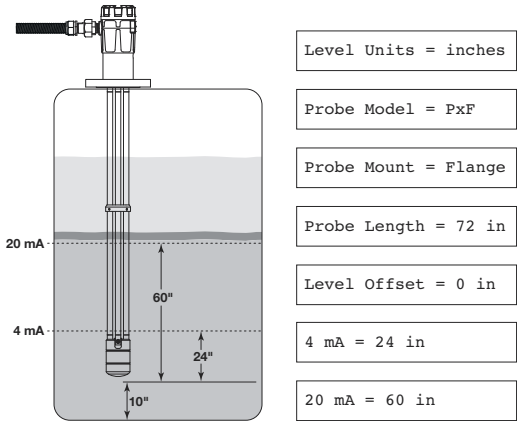
2.4 Configuration Information

This section is intended to offer additional configuration-related details with respect to some of the parameters shown in the Menu in Section 1.5.

2.4.1 Level Offset Description

The parameter referred to as Level Offset in the Genesis DEVICE SETUP/BASIC CONFIG menu is defined as the desired level reading when liquid surface is at the tip of the probe.

The Genesis 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.



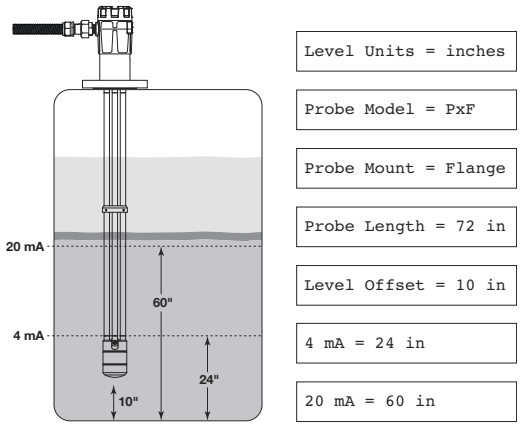
Example 1

Example 1 (Level Offset = 0 as shipped from factory):

Application calls for a 72-inch Model PxF five-conductor Pentarod probe. The bottom of the probe is 10 inches above the bottom of the tank.

The user wants the 4 mA Set Point (LRV) at 24 inches and the 20 mA Set Point (URV) at 60 inches **as referenced from the bottom of the probe**.

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

Example 2:

Application calls for a 72-inch Model PxF five-conductor probe. The bottom of the probe is 10 inches above the bottom of the tank.

The user wants the 4 mA Set Point (LRV) at 24 inches and the 20 mA Set Point (URV) at 60 inches **as referenced from the bottom of the tank**.

2.4.2 Reset Function

A parameter labeled “Reset Parameter” is located at the end of the DEVICE SETUP/ADVANCED CONFIG menu. This parameter gives the user the ability to reset the configuration.

Unique to the Genesis is the ability for AMETEK LMS to fully “pre-configure” devices to customer requests. For that reason, the Reset function will return the device back to the state **at which it left the factory**.

It is recommended that AMETEK LMS Technical Support be contacted as the Advanced User password will be required for this reset.

2.4.3 Additional Diagnostic/Troubleshooting Capabilities

2.4.3.1 Event History

As a means for improved troubleshooting capability, a record of significant diagnostic events is stored with time and date stamps. A real time on board clock (which must be set by the operator), will maintain the current time.

2.4.3.2 Context-sensitive Help

Descriptive information relevant to the highlighted parameter in the menu will be accessible via the local display and remote host interfaces. This will most often be a parameter-related screen, but could also be information about menus, actions (for example, Loop [Analog Output] Test, resets of various types), diagnostic indicators, etc.

For example: Emulsion Top % Water: The percent water at the top of the emulsion level.

2.4.3.3 Trend Data

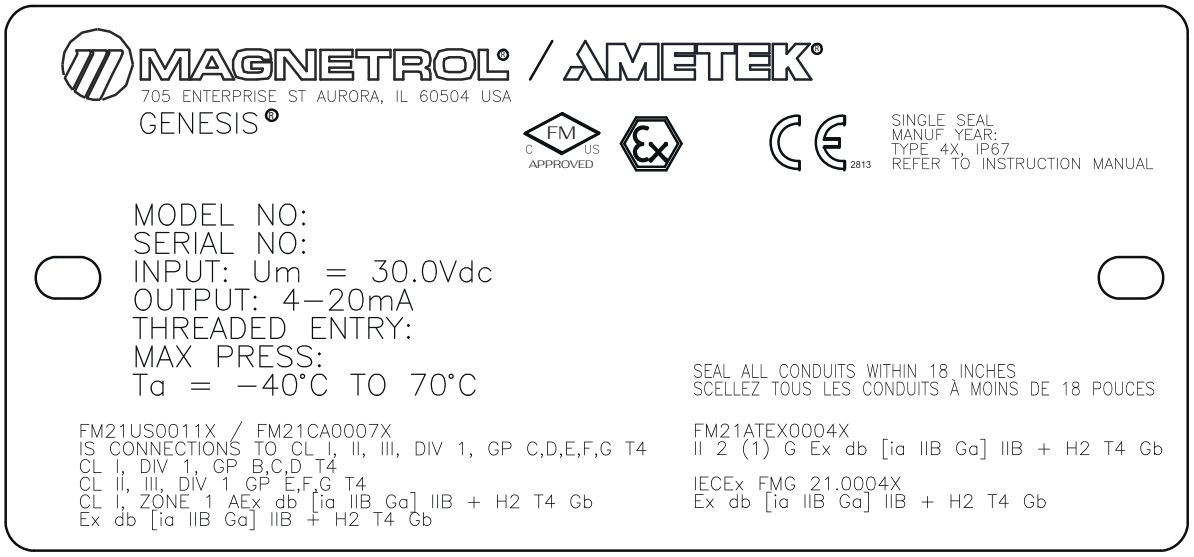
Another valuable feature of the Genesis is the ability to log several measured values (selectable from any of the primary, secondary, or supplemental measured values) at a configurable rate (for example, once every five minutes) for a period ranging from several hours to a number of days (depending on the configured sample rate and number of values to be recorded). The data will be stored in non-volatile memory with date and time information for subsequent retrieval and visualization using the associated Genesis DTM.

2.5 Agency Approvals

These units are in compliance with the EMC-directive 2014/30/EU, the PED-directive 2014/68/EU and the ATEX directive 2014/34/EU.

AVERTISSEMENT! Danger d'explosion éventuel. Ne brancher ou débrancher des équipements que si l'alimentation électrique a été coupée ou si la zone est réputée non dangereuse.

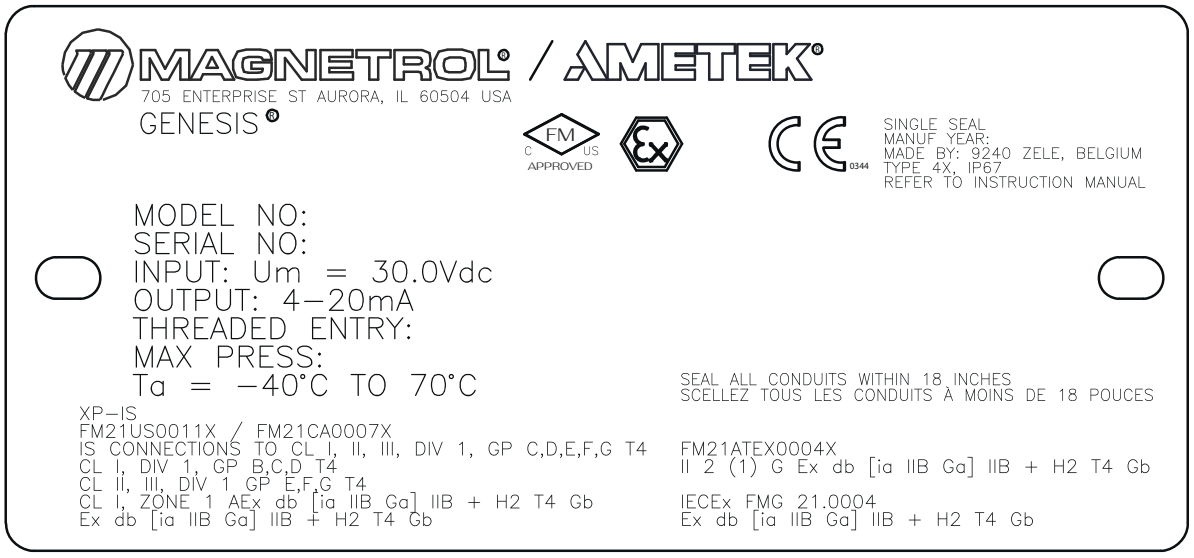
DETECTOR EDx-210x-xxx



Genesis: Aurora

Explosion Proof - Flameproof with I.S. probe output

5th Digit: 1 = HART
8th Digit: 3 = Explosion/Flameproof with I.S. probe output

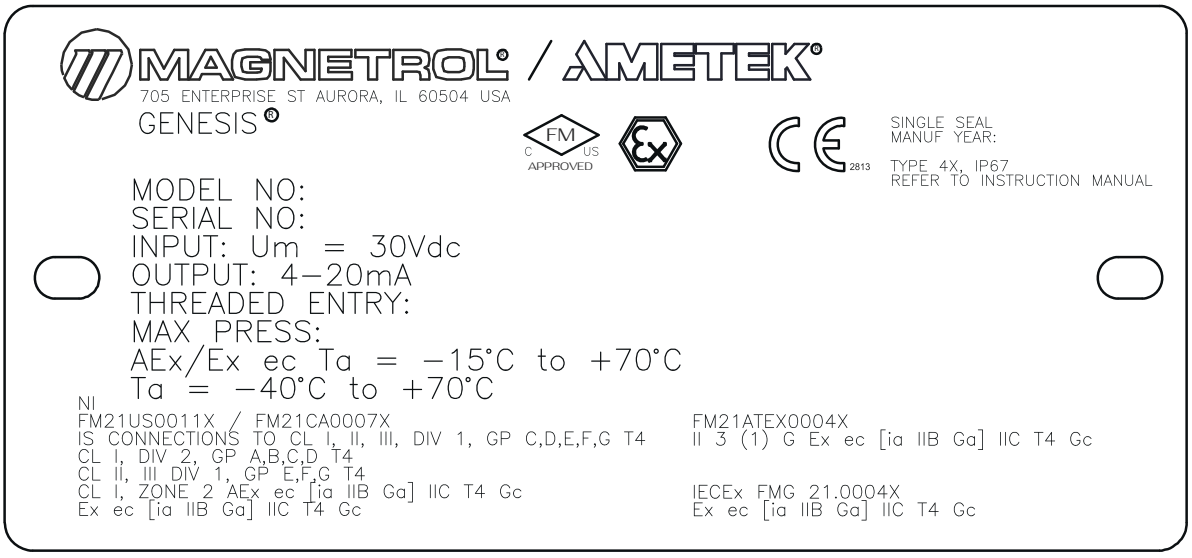


Genesis: Zele

Explosion Proof - Flameproof with I.S. probe output

5th Digit: 1 = HART
8th Digit: 3 = Explosion/Flameproof with I.S. probe output

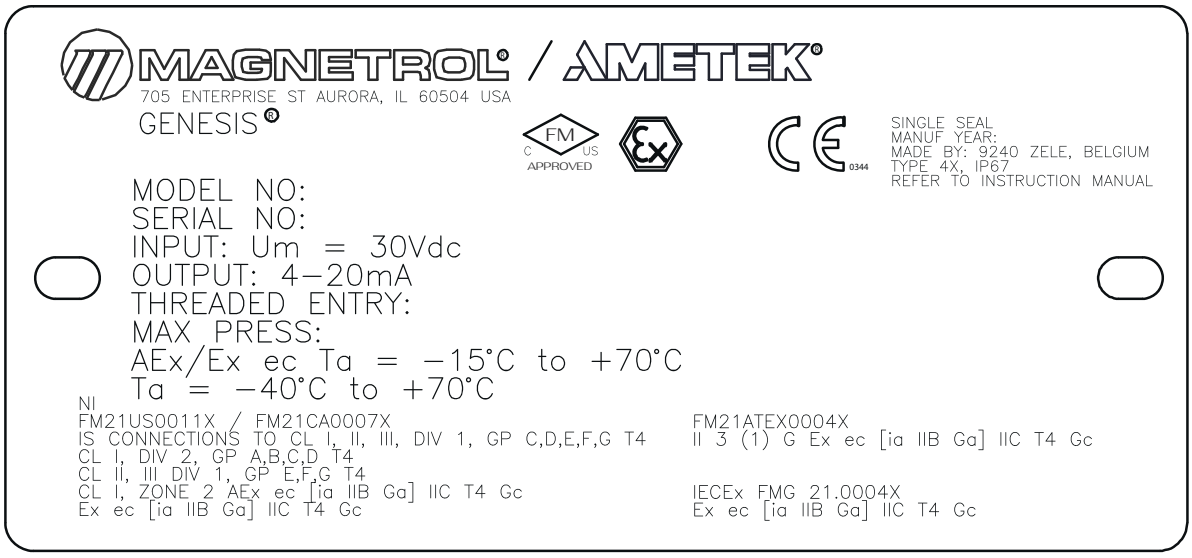
DETECTOR EDx-210x-xxx



Genesis: Aurora

Non Incendive - Increased Safetywith I.S. probe output

5th Digit: 1 = HART
8th Digit C = Non Incendive, Increased Safety with I.S. probe output

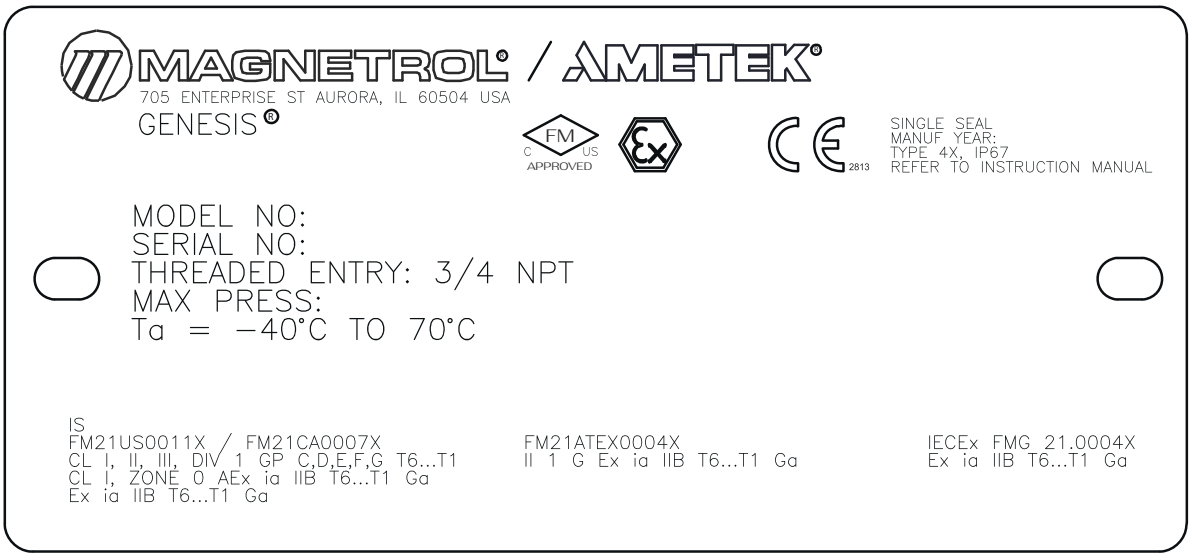


Genesis: Zele

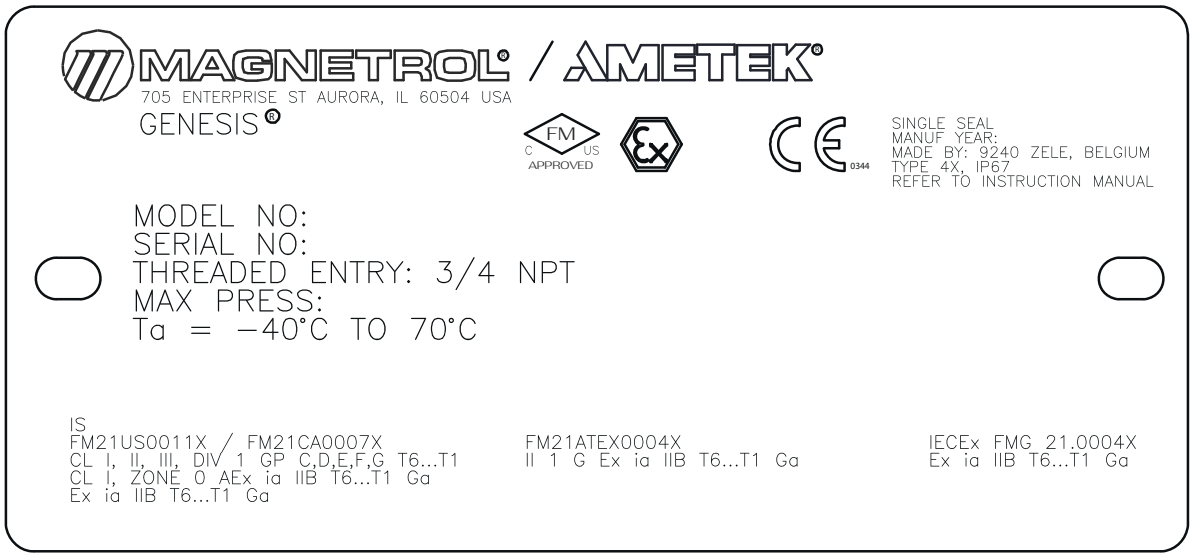
Non Incendive - Increased Safetywith I.S. probe output

5th Digit: 1 = HART
8th Digit C = Non Incendive, Increased Safety with I.S. probe output

PROBE Pxx-xxx0-A0x-xx-xxx



Genesis: Aurora
Intrinsically Safe



Genesis: Zele
Intrinsically Safe

2.5.1 Specific Conditions of Use

Transmitter:

1. The flamepaths of the equipment are not intended to be repaired. Consult the manufacturer if repair of the flamepath joints is necessary.
2. Refer to the manufacturer's instructions to reduce the potential of an electrostatic charging hazard on the equipment enclosure.
3. The transmitter shall be connected to a safety extra low-voltage circuit (SELV) with Um ≤ 30V

Probe:

1. Refer to the manufacturer's instructions to reduce the potential of an electrostatic charging hazard on the equipment enclosure.

2.5.2 Temperature Code

For Probe: T6…T1 temperature code are defined by the following table:

Process Temperature (PT)	Temperature Code-TCG (GAS)
≤ 75 °C	T6
75 to 90 °C	T5
90 to 120 °C	T4
125 to 185 °C	T3
185 to 285 °C	T2
285 to 435 °C	T1

2.6 Specifications

2.6.1 Functional/Physical

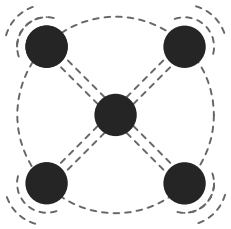
System Design		
Measurement Principle		TDR based electronics combined with patented, proprietary software algorithm
Input		
Measured Variable		Level, as determined by time of flight
Span		60 centimeters to 6 meters (2 to 20 feet)
Output		
Type		Four (4) “active” 4–20 mA analog outputs, one (1) with HART;
		3.8–20.5 mA useable (per NAMUR NE43)
Resolution	Analog:	.003 mA
	Digital Display:	1 mm
Diagnostic Alarm		Selectable: 3.6 mA, 22 mA (meets requirements of NAMUR NE 43), or HOLD last output
Diagnostic Indication		Meets requirements of NAMUR NE107
Damping		Adjustable 0–30 seconds
User Interface		
Keypad		4-button menu-driven data entry
Display		Graphic liquid crystal display
Digital Communication/Systems		HART Version 7— with Field Communicator, AMS, or FDI
		DTM (PACT*ware*™), EDDL
Menu Languages	LCD:	English
	HART DD:	English
Power (at wiring board terminals)		Explosion-proof with Instrinsically Safe probe
		24 VDC (±10%), 10 Watt maximum, Um ≤ 30V DC (SELV)
Housing		
Main Electronics		
	Material / Net/Gross Weight:	IP67 aluminum A413 (<0.4% copper) / 2.75 kg (6 lbs.)
		Stainless steel / 5.7 kg (12.5 lbs.)
Probe Electronics		
	Material / Net/Gross Weight:	Aluminum / 1.4 kg (3 lbs.)
		Stainless steel / 3.2 kg (7 lbs.)
Cable Entry		¾" NPT or M20 × 1.5

2.6.1 Functional/Physical

Environment	
Operating Temperature	-40 to +70 °C (-40 to +160 °F); LCD viewable -20 to +70 °C (-5 to +160 °F)
Storage Temperature	-45 to +85 °C (-50 to +185 °F)
Humidity	0 to 99%, non-condensing
Electromagnetic Compatibility	Meets CE requirement (EN 61326) and NAMUR NE 21 ①
Surge Protection	Meets CE EN 61326 (1000V)
Shock/Vibration	ANSI/ISA-S71.03 Class SA1 (Shock); ANSI/ISA-S71.03 Class VC2 (Vibration)
Performance	
Reference Conditions	Reflection from liquid with a 3 meter (10 foot) probe at +20 °C (+70 °F)
Linearity	Application dependent
Accuracy	Application dependent
Response Time	Approximately 15 seconds
Initialization Time	Less than 30 seconds

① Pentarod probes must be used in metallic vessel or stillwell to maintain CE noise immunity.

2.6.2 Pentarod Probe



Pentarod Probe							
Probe①	**Description**	**Application**	**Installation**	**Dielectric Range**	**Temperature Range**	**Max. Pressure**	**Viscosity cP (mPa.s)**
PxF	5-Conductor	Interface	Tank or Chamber	ε_r 1.4–100	-40 to +200 °C (-40 to +400 °F)	1000 psi (70 bar)	10000

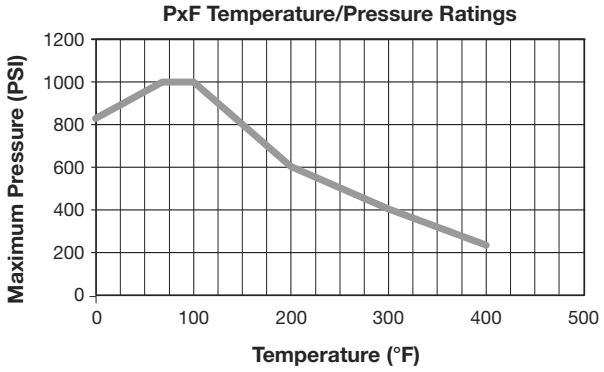
① 2nd digit E=English, M=Metric

2.6.3 Probe Specifications

Model	5-Conductor. (PxF)
Materials	316/316L SS (Hastelloy C) TFE spacers, Viton® O-rings
Diameter	1.75" (44 mm) diameter
Process Connection	3" NPT, 3" BSP 3" ASME or EN flanges
Transition Zone (Top and Bottom)	200 mm (8")

NOTE: Top Transition Zone: The detector may still operate but levels reading may become non-linear. Bottom Transition Zone: Detector will not measure levels in this area.

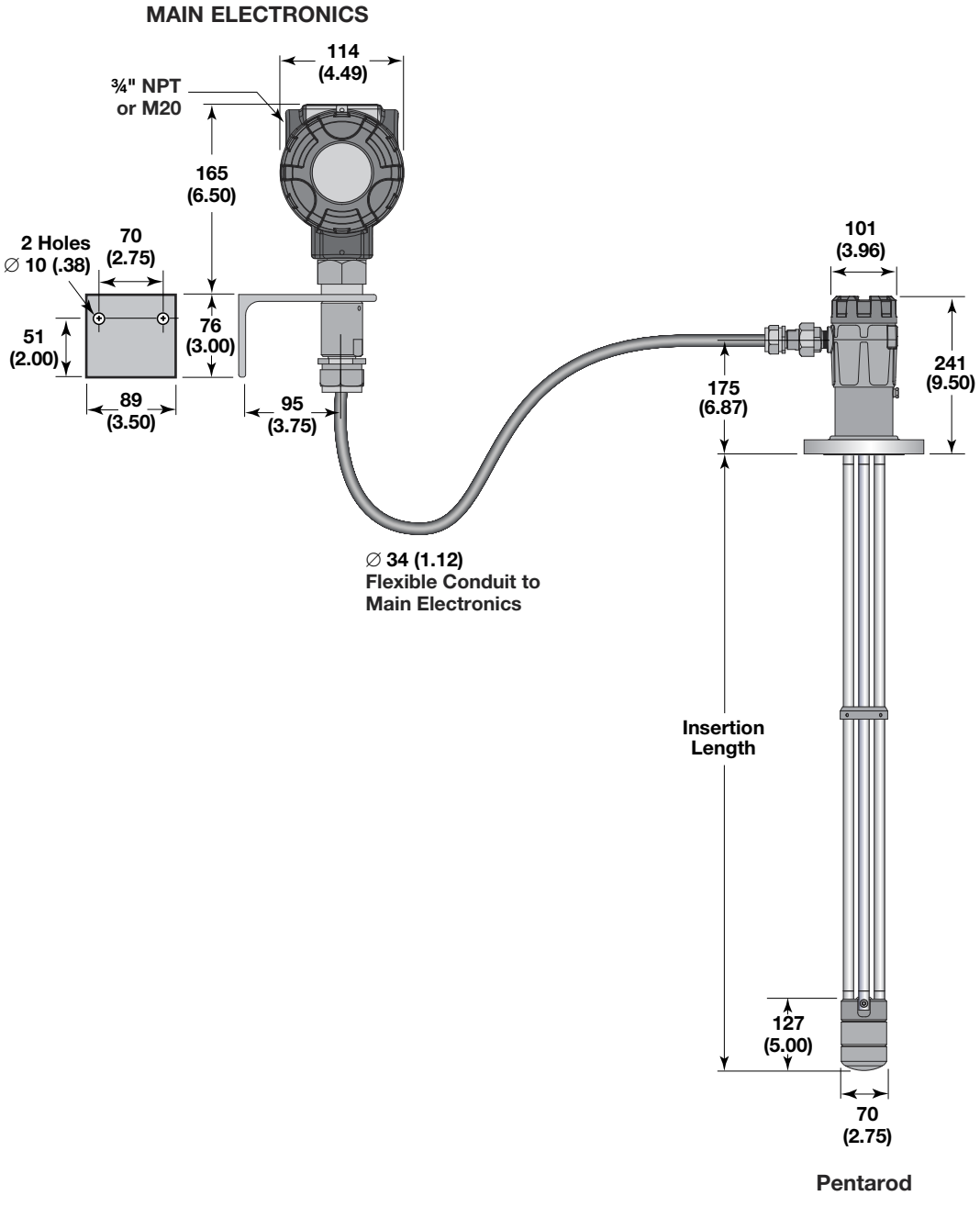
Temperature/Pressure Charts



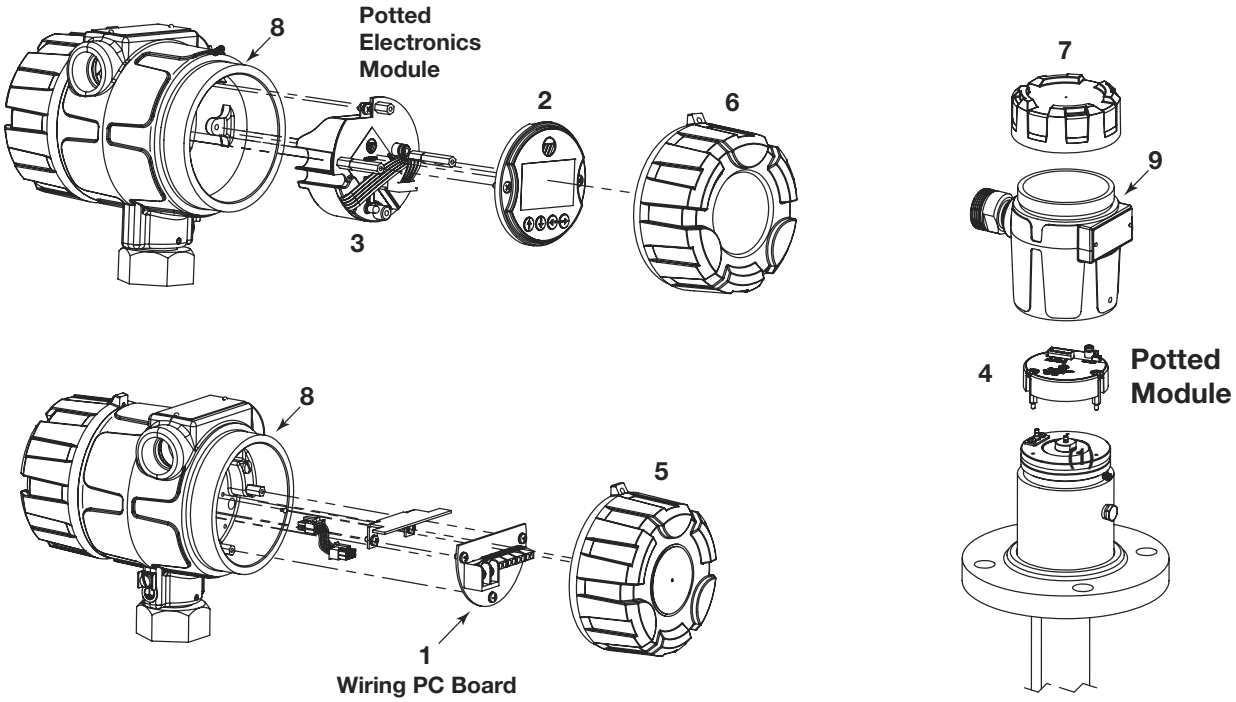
Temperature °C (°F)	Pressure (316 SS) bar (psi)
-40 (-40)	52 (750)
21 (+70)	70 (1000)
38 (+100)	70 (1000)
93 (+200)	45 (650)
149 (+300)	28 (400)
204 (+400)	19 (270)

2.6.4 Physical Specifications

millimeters (inches)



2.7 Replacement Parts



Electronics:

Digit: 1 2 3 4 5 6 7 8 9 10

Part Number: [ ][E][D][ ]–[2][1][ ][ ]–[ ][ ][ ]

X = product with a non-standard customer requirement

Serial Number: [ ][ ][ ][ ][ ][ ]–[ ][ ]–[ ][ ][ ]

See nameplate, always provide complete part number and serial number when ordering spares.

Probe:

Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Part Number: [ ][P][ ][F]–[ ][ ][ ][0]–[A][0][ ]–[ ][ ]–[ ][ ][ ]

X = product with a non-standard customer requirement

(1) Wiring PC Board
Replacement Part
Z30-9809-001

(2) Display Module
Replacement Part
031-2850-003

(3) Main Electronic Module
Replacement Part
Z31-2880-001

(4) Probe Module
Replacement Part
Z31-2881-001

(5) Wiring Compartment Housing Cover	
Digit 9	**Replacement Part**
1	004-9206-010
2	004-9206-015

(6) Electronics Compartment Housing Cover	
Digit 9	**Replacement Part**
1	036-4411-004
2	036-4411-005

(7) Probe Housing Cover	
Digit 12	**Replacement Part**
1	004-9225-002
2	004-9225-003

	Replacement Part
(8) O-ring	012-2601-240
(9) O-ring	012-2601-237

2.8 Model Number

2.8.1 Detector

While both versions of Genesis are robust designs capable of performing similar functions, the Model ED1 is the full-featured detector that comes standard with all (4) analog outputs; an enhanced DTM for dynamic viewing of all levels; and was the basis for developing the sophisticated algorithms that allow us to measure the most difficult levels found in the process industries.

The Model ED1 is particularly suited for the down-stream Oil & Gas market (Petroleum Refining) where it outperforms traditional technologies while going head-to-head with nucleonic devices (e.g., Profilers) at a more competitive total cost of ownership.

The Model ED2 benefits from the heavy algorithms developed for the ED1 but allows two, three, or four analog output configurations that are better suited for the upstream Oil & Gas market (E&P).

1 2 3 | BASIC MODEL NUMBER

E D 1	Genesis High Performance Multiphase Detector
E D 2	Genesis Standard Multiphase Detector

4 | POWER

2	24 VDC (SELV)

5 | SIGNAL OUTPUT

1	4–20 mA with HART

6 | OPTIONS

0	None (Model ED1 only – Four (4) 4-20mA outputs included as standard)
2	Two (2) 4-20mA outputs (Model ED2 only)
3	Three (3) 4-20 mA outputs (Model ED2 only)
4	Four (4) 4-20 mA outputs (Model ED2 only)

7 | ACCESSORIES/MOUNTING

A	3 meter (10 foot) remote
B	6 meter (20 foot) remote
C	15 meter (50 foot) remote
D	30 meter (100 foot) remote

8 | CLASSIFICATION

3	Explosion/Flame proof with I.S. probe output
C	Non-Incendive, Increased Safety with I.S. probe output

9 | HOUSING

1	Aluminum
2	316 Stainless steel

10 | CONDUIT CONNECTION

0	¾" NPT
1	M20 × 1.5

E	D		—	2	1			—			
1	2	3		4	5	6	7		8	9	10

2.8.2 Probe

1 | TECHNOLOGY

P	Genesis TDR Probe

2 | MEASUREMENT SYSTEM

E	English (inches)
M	Metric (centimeters)

3 | CONFIGURATION

F	Pentarod (+200 °C/+400 °F)

4 5 | PROCESS CONNECTION – SIZE/TYPE (consult factory for other process connections)

Threaded

5 1	3"	NPT
5 2	3"	BSP (G 3)

ASME Flanges

5 3	3"	150# ASME RF
5 4	3"	300# ASME RF
5 5	3"	600# ASME RF
5 6	3"	900# ASME RF
5 K	3"	600# ASME RTJ
5 L	3"	900# ASME RTJ

6 3	4"	150# ASME RF
6 4	4"	300# ASME RF
6 5	4"	600# ASME RF
6 6	4"	900# ASME RF
6 K	4"	600# ASME RTJ
6 L	4"	900# ASME RTJ

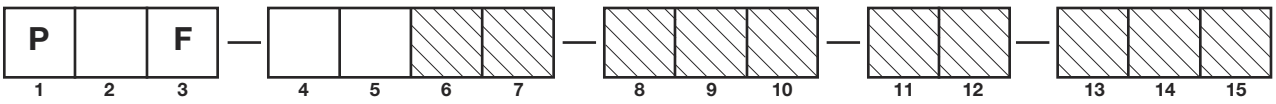
7 3	6"	150# ASME RF
7 4	6"	300# ASME RF
7 5	6"	600# ASME RF
7 K	6"	600# ASME RTJ

EN Flanges

E A	DN 80, PN 16	EN 1092-1 TYPE A
E B	DN 80, PN 25/40	EN 1092-1 TYPE A
E D	DN 80, PN 63	EN 1092-1 TYPE B2
E E	DN 80, PN 100	EN 1092-1 TYPE B2
E F	DN 80, PN 160	EN 1092-1 TYPE B2
E W	DN 80, PN 16	EN 1092-1 TYPE B1
E Z	DN 80, PN 25/40	EN 1092-1 TYPE B1
F A	DN 100, PN 16	EN 1092-1 TYPE A
F B	DN 100, PN 25/40	EN 1092-1 TYPE A
F D	DN 100, PN 63	EN 1092-1 TYPE B2

F E	DN 100, PN 100	EN 1092-1 TYPE B2
F F	DN 100, PN 160	EN 1092-1 TYPE B2
F W	DN 100, PN 16	EN 1092-1 TYPE B1
F Z	DN 100, PN 25/40	EN 1092-1 TYPE B1
G A	DN 150, PN 16	EN 1092-1 TYPE A
G B	DN 150, PN 25/40	EN 1092-1 TYPE A
G D	DN 150, PN 63	EN 1092-1 TYPE B2
G E	DN 150, PN 100	EN 1092-1 TYPE B2
G W	DN 150, PN 16	EN 1092-1 TYPE B1
G Z	DN 150, PN 25/40	EN 1092-1 TYPE B1

Confirm mounting conditions/nozzle diameter to ensure sufficient clearance.



6 | CONSTRUCTION CODES

0	Industrial
K	ASME B31.1
L	ASME B31.3
M	ASME B31.3 & NACE MR0175/MR0103
N	NACE MR0175/MR0103

7 | FLANGE OPTIONS

0	None

8 | MATERIAL OF CONSTRUCTION - FLANGE/NUT/ROD

A	316 SS/316L SS (PFA coated center rod)

9 | OPTIONS

0	None

10 | O-RING MATERIALS/SEAL OPTIONS

0	Viton® VX065
2	Kalrez® 4079
8	Simriz SZ485 (formerly Aegis PF128)
A	Kalrez 6375

11 | OPTIONS

0	None
1	Flushing Port

12 | Remote Housing Material

1	Aluminum
2	316 Stainless Steel

13 14 15 | INSERTION LENGTH
See page 40

X X X	inches (20 – 240) cm (50 – 610)

unit of measure determined by 2nd digit of model number

P		F	—			0	—	A	0		—			—			
1	2	3		4	5	6	7	8	9	10		11	12		13	14	15

Service Policy

Owners of AMETEK LMS 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. AMETEK LMS 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 the AMETEK LMS 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.

Maintenance Policy

With proper probe selection, there is virtually no maintenance required for a Genesis system. As explained in Section 2.3.5, application-related issues, such as coating or bridging on the probe can occur. Therefore, although internal diagnostics can be utilized to proactively display overall system degradation, a periodic visual inspection of he probe is recommended. Refer to Section 2.7 for replacement parts.

24/7 Technical Support assistance is available at 1-630-723-6730 or fieldservice.magnetrol@ametek.com.

Genesis transmitters may be protected by one or more of the following U.S. Patent Nos. US9,546,895; US2,886,391; US9,360,361;
May depend on model. Other patents pending.

MAGNETROL® / AMETEK®

705 Enterprise Street • Aurora, Illinois 60504-8149 USA
630.969.4000 • info.magnetrol@ametek.com • ametek-measurement.com

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SUPERCEDES: October 2023