

# SURFACE PROBE FOR MOISTURE MEASUREMENT



**MESA TRIME GW3 MOISTURE TRANSMITTER AND GS-1 SURFACE PROBE HEAD**

## OVERVIEW

MESA TRIME GW3 Transmitter can be configured with a GS-1 or GS-2 Surface Probe, for continuous process moisture measurement of materials at temperatures up to 150°C, when flush-mounting of the probe is required. The GS probes are available in a coated or uncoated version, for different applications. A PEEK-coated version of the GS probe is suitable for wetter and higher conductivity materials. An un-coated GW probe head is suitable for hotter or dryer materials. Once a probe head is selected, it must be paired with a MESA TRIME GW transmitter, for operation. An integrated temperature sensor located behind the probe's face, measures the temperature of the material, for calibration compensation if required.

Each moisture MESA TRIME GW3 transmitter has a serial interface. The digital interface, allows for extensive setting and adjustment to each module, for flexible setup options, in a process environment. To compliment the digital interface up to 16 transmitters can be connected serially to a MESA M-PIM-0212 Process Interface Module. The M-PIM can multiplex measured data and communicate with most common PLCs or SCADA systems using a RS-232 interface or Ethernet protocol and our library of drivers. The M-PIM communicates product specific or individual selectable settings with each and all connected GW transmitters, including product calibrations, averaging rates, offset adjustment, and other convenient process management and setup variables. Configuration of the M-PIM and transmitters setting are from and PC with a standard TCP/IP Ethernet connection and a browser like Internet Explorer. The serial interface can be connected to a notebook computer, running our free utility software, for setup if the analog output will be connected to a PLC.

## TDR MEASUREMENT TECHNOLOGY

The MESA TRIME GW is based on proven TDR (Time -Domain-Reflectometry) measurement principle, that measures the dielectric constant of water in and on a material. The probe head's stainless steel rods or plates are used as wave-guides for the transmission of the TDR signal. The TRIME electronics generates a high frequency pulse (up to 1GHz) that propagates along the cable to the wave-guides creating an electromagnetic field around the rods or plates of a probe head. At the termination of the wave-guides, the pulse is reflected back to the source electronics. The resulting transit time is dependent on the moisture content of the material.

The moisture content of a material is calculated based the transit time relationship to reference calibration samples. This material specific calibrations are stored inside the transmitter and selected as required. The MESA TRIME-GW measuring method supplies exact data about the percent water content of the material regardless of the temperature.

### The MESA TRIME-GW technical data for organic materials

Moisture measurement range %:	0-70% (Gravimetric, wet weight)
Repeatability:	+/- 0.1% of reading
Accuracy, Moisture:	+/- 0.5% (range 2 to 20%) +/- 1.0% (range 20 to 45%) +/- 2.0% (range 45 to 70%)
Probe operating range:	-20 to 150°C, (-4 to 305°F)
Transmitter sensor operating range:	-20 to 60°C, (-4 to 140°F)
Measurement rate:	0.5-sec. (averaging adjustable)
Temperature sensor operating range: Accuracy by range: -10°C (+14°F) up to +85°C (+185°F): -55°C (-67°F) up to +125°C (+257°F):	-55°C (-67°F) up to +125°C (+257°F) +/- 0.5°C (+/-0.9°F) accuracy +/- 1.0°C (+/-1.8°F) accuracy
Digital Interface:	IMPbus and RS-232 (moisture and temperature)
Analog output:	0-20 mA or 4-20 mA (moisture only)
Power / current:	9 to 24 V dc, / 250 mA @ 24 V dc
Probe Cable length:	2.5-meters maximum (8.2-feet)
Environmental Ratings GW transmitter housing/Probe body:	Di-cast aluminum IP65 (NEMA 4) / PEEK IP68 (NEMA 6P)



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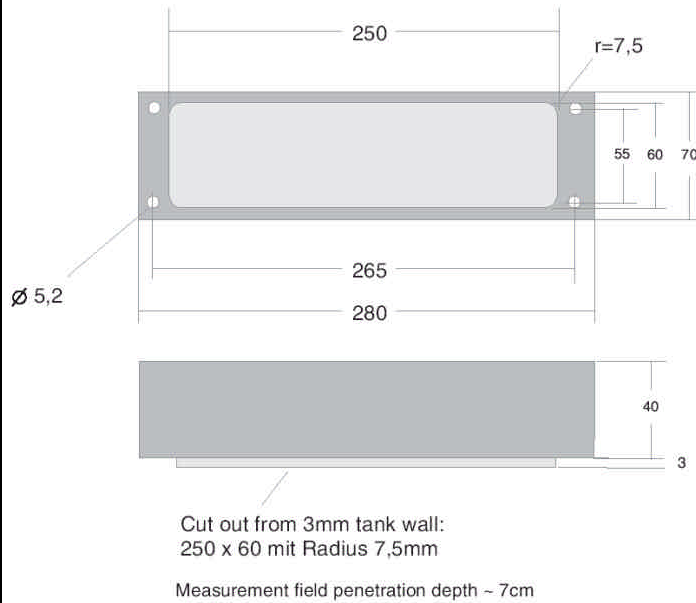
## Important Features and Benefits

Every dryer or kiln has a unique process environment. The MESA TRIME GW can be adapted to most process by using a wide selection of rugged probe heads, process interfaces and adjustable setting. Some of the most commonly used features are as follows:

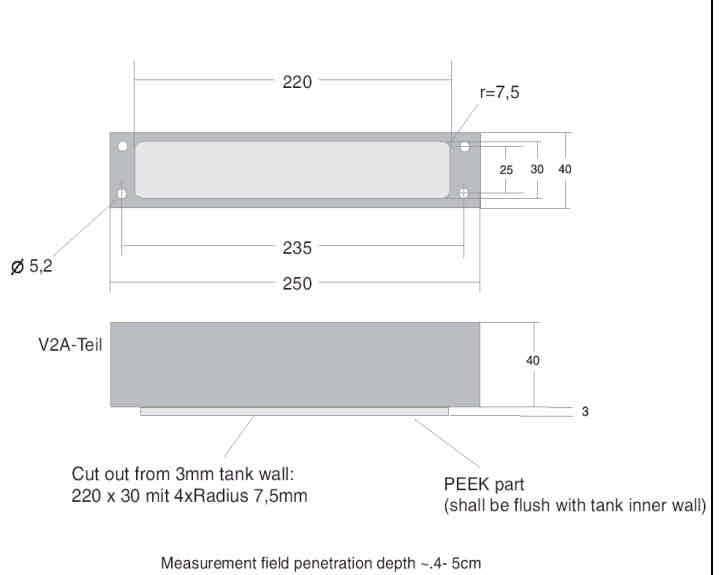
FEATURES	BENEFITS
<p>Wide Range of Probe head configurations:</p> <ol style="list-style-type: none"> <li>1. Rod-type (stainless steel and PEEK):</li> <li>2. Coated rod-type probe:</li> <li>3. Surface probes (flat face):</li> <li>4. Radius-formed (for Allan Screw conveyors):</li> <li>5. Special probe designs (for new applications):</li> </ol>	<p>Each probe head has unique features and requires a TRIME GW transmitter to operate.</p> <p>Standard probe for grains (&lt; 40% Moisture).</p> <p>For material with surface moisture of High EC</p> <p>For material where a flat probe is needed</p> <p>For Allan Screw conveyers</p> <p>For your unique application environment</p>
<p>Moisture measurement <u>averaging time</u> is adjustable:</p>	<p>Easy adjustment of the averaging time from a few seconds to minutes base on the drying rate allows for precise control or change in moisture.</p>
<p><u>Calibration curves for different types of products</u> can be programmed into each transmitter. Additional calibration can be uploaded on the fly without any down time:</p>	<p>Select up to 15 unique or similar material calibrations when using different recipes or drying a range of products. Digital communication allows for on-line selection of a calibration and continuous verification of the selected calibration setting.</p>
<p><u>Adjustable offset</u> for high accuracy:</p>	<p>Based on the mechanical mounting of the probe head in the dryer, auger or kiln a large of small offset may be required. Each transmitter has adjustment setting to 0.01% moisture.</p>
<p><u>Intelligent measure error and statistical information reporting</u> is important when controlling a dryer, auger or kiln:</p>	<p>Detecting the presents of material in the probes measurement field, the stability or rate of change of the measurement and the control over error reporting rates offer wide many options and flexibility when process moisture is being controlled.</p>
<p>The MESA TRIME GW detects when a probe is in contact with the material being measured . We refer to this as the <u>Queue-filling time and Queue-discharge time settings</u>:</p>	<p>When working with a batch process, the filling and emptying of the material is detected and the measured moisture readings are paused and started using the Queue-filling time and Queue-discharge time. The moisture data output available for process control is an uninterrupted signal.</p>
<p><u>HaltM</u>– external control of measurement data:</p>	<p>Using a binary input to the transmitter it is possible to interrupt moisture measurements based on a desired event. This is used to maintain an uninterrupted average.</p>
<p><u>2-Wire IMPbus (Databus)</u> wiring for long distance wiring:</p>	<p>The parallel IMPbus (Databus) wiring between transmitters and the M-PIM helps to reduce wiring complexity and cost.</p>

**Selecting a Probe Head:** The GS1 and GS2 probe heads are flush mounted and require a flowing sample of material across the probe's face. The depth of the material flowing past the probe face should be a minimum of 7cm (2.75") for the GS1 probe and 4-5cm (1.6-2.0") for the GS2 probe.

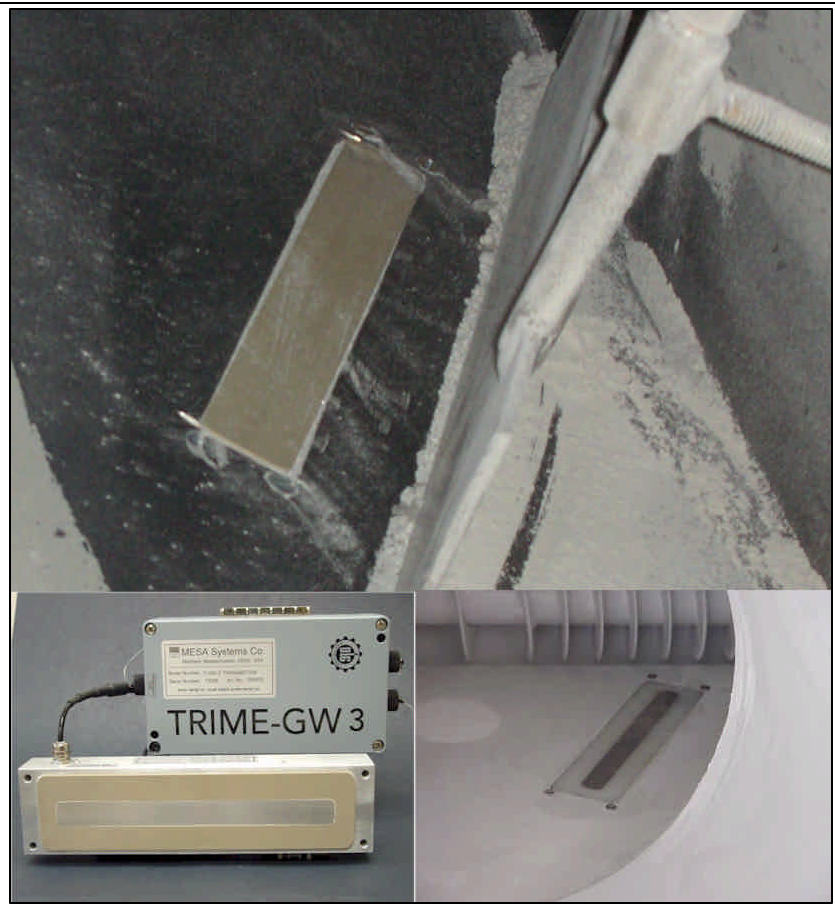
**Dimensions of the GW1 probe head**



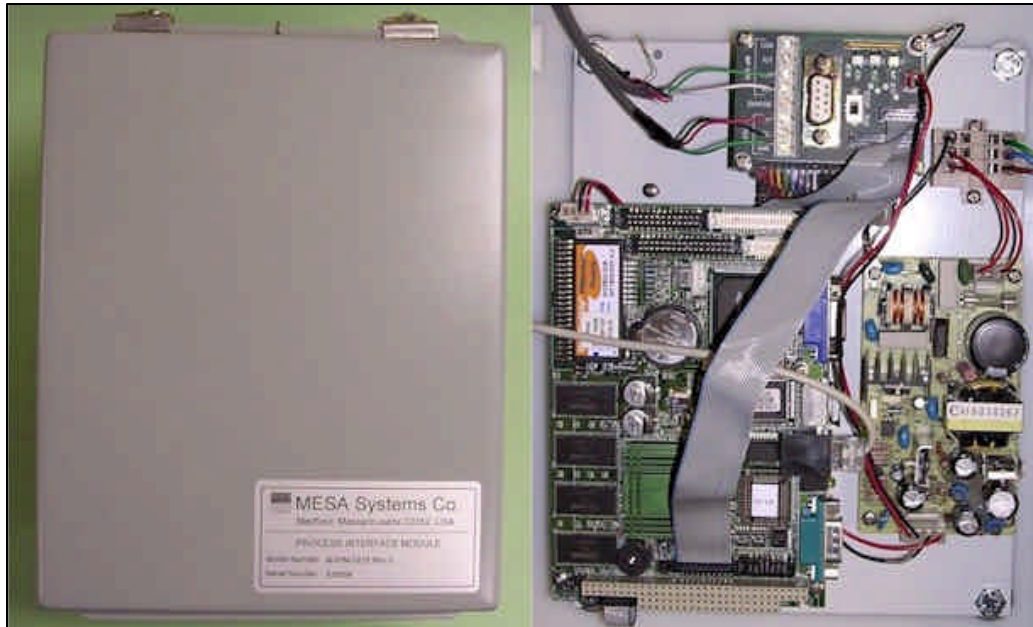
**Dimensions of the GS2 probe head**



The GS probes perform extremely well in granular or pelletized materials. We have had success with coated and uncoated organic and inorganic materials. For assistance in selecting the most appropriate probe type and installation location for your application, please contact MESA's technical support staff.



## M-PIM 0212 PROCESS INTERFACE MODULE



### *M-PIM Process Interface Module (housing and electronics)*

The MESA M-PIM-0212 Process Interface Module (M-PIM) is designed to interfacing a network of TRIME GW moisture and temperature measurement transmitters to a process control systems. Up to 16-MESA TRIME-GW Moisture Transmitters can be connected using the 2-wire, parallel-wired Databus.

The measured moisture and temperature data is transmitted to the process control system via one of two methods: push or pull. The "push" method is used with all common PLCs. The M-PIM writes the measured moisture and temperature data directly to the PLC data table via a client protocol (such as Allen-Bradley DF1, Ethernet or Modicon Modbus, etc). The "pull" method is used with SCADA systems, such as Wonderware and Honeywell DCS, etc. The M-PIM emulates a Modicon PLC at its Ethernet and/or serial port and the external process polls the M-PIM for the data it wants.

The M-PIM has two separate operator interface systems: a video screen interface for diagnostics and troubleshooting and a Web-based interface for configuration and monitoring.

The M-PIM control software runs on an internal IBM-compatible Single Board Computer (SBC). The SBC has all the functions of a full-sized PC, except that it has no rotating media – it uses an 8 Mb MSystems DiskOnChip instead of a hard drive. The M-PIM-SBC has 2 serial ports, an Ethernet port, a mouse port and a VGA video port.