

4200 Multi-function Transmitter

**For Tankside display and electronic transmission
of inventory management parameters**



Applications

The 4200 Multi-Function Transmitter provides extensive primary sensor support, while also executing complex hydrostatic or hybrid hydrostatic tank calculations.

Multiple process variables are supported through the local display including values for level, temperature, volume, mass, density, alarms and flow. The 4200 MFT can then calculate and display the required tank gauging information to allow your operator to manage his inventory safely and effectively.

Features & Benefits

- Executes complete HTG or hybrid HTG and standard tank calculations.
- Microprocessor controlled communications to host and slave devices.
- Tank database resident within MFT including API and strap tables.
- Supports up to three precision HART® HTG pressure transmitters and other HART® instruments.
- Communication modules to meet most user requirements.
- Built-in intrinsic safety barriers
- Painted steel mounting bracket with U-bolts.

Measuring system

The Multi-Function Transmitter

The Model 4200 is a Multi-function Transmitter (MFT) is specifically designed for inventory management applications. The 4200 MFT fully supports hydrostatic and hybrid tank gauging systems and interfaces when connected to various types of devices, such as level gauges, or pressure and temperature transmitters.

Operation

The 4200 MFT collects measurement information by polling the HART® compatible devices, such as the HART® Level Encoder, over the 2-wire intrinsically safe HART® bus. The 4200 MFT is able to provide power and communicate with up to eight HART® devices. The 4200 MFT processes and transmits this information to a host computer, MODBUS® master, or intermediary device over a field communications bus. An interface is provided for:

- One 3-wire Resistive Temperature Device (RTD). Copper and platinum DIN Resistive Temperature Devices are supported. 4-20 mA and HART compatible temperature devices are also supported.
- One 4-20 mA device. The 4-20 mA device interface can be used for a variety of measurement functions. When used with a secondary 4-20 mA level device, the interface can be used to check level measurements or calculations. A water interface sensor is available with 4-20 mA output.
- Two dry contact closure digital status inputs. These inputs are isolated from earth and signal ground and are provided with lightning and transient protection.

Two field communication options are available, Varec Mark/Space and EIA485. The 4200 MFT supports 2-wire EIA485 communications. The Mark/Space interface is compatible with existing Varec Mark/Space products including the Model 1800 and 1900 transmitters. The 4200 MFT is capable of being configured to emulate either the Model 1800 or 1900 transmitter.

The MODBUS® protocol is supported directly over the EIA485 interface when connected to a model 6850 Field Interface Unit. MODBUS® is also supported with the Mark/Space field bus through a Model 8130 Remote Terminal Unit.

The 4200 MFT uses measurement information from the variety of input devices to calculate product parameters. The HIU supports traditional tank calculations as well as hydrostatic (level and density calculated using measurements from tank pressure sensors) and hybrid (level obtained from a level encoder and density calculated using level and pressure measurements) tank calculations.

The 4200 MFT can be configured to identify tank alarm conditions. Alarm and/or caution conditions can be reported to a host over the field communications bus or displayed on the optional local display.

Installation

Construction

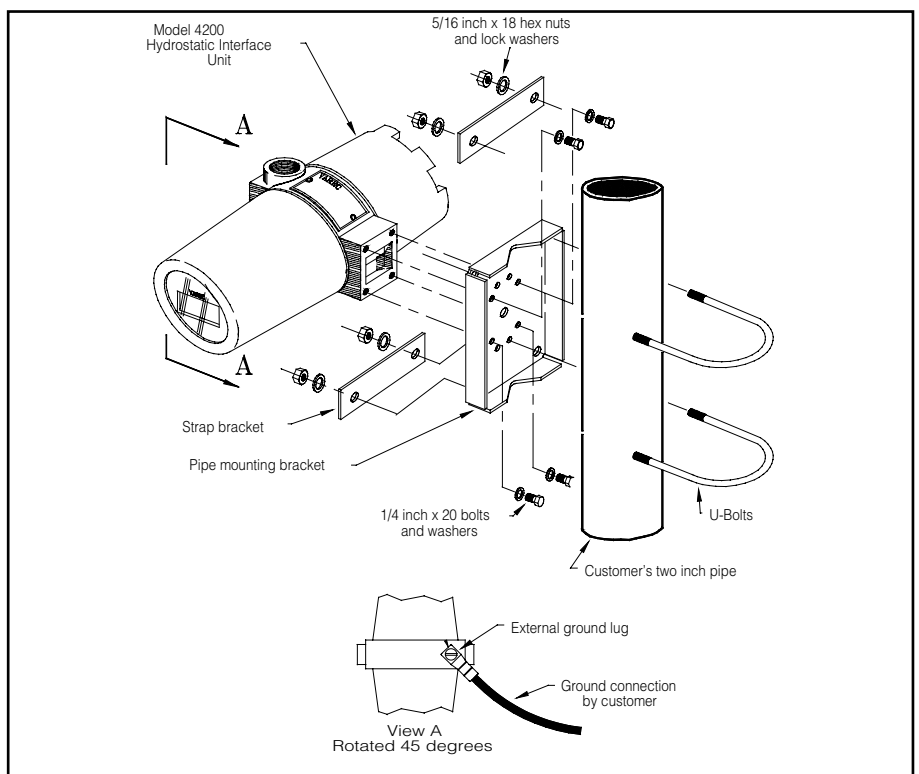
All components of the 4200 MFT are modular in design with internal connections facilitated by a plug-in design. The 4200 MFT system electronics and potted barrier assembly are housed within an explosion-proof enclosure, which is environmentally sealed to prevent internal exposure to contamination. The housing contains an integral intrinsically safe barrier for HART power and communications. The enclosure cover has an optional built-in window for the viewing of the optional display.

Two covers are provided to permit access to 4200 MFT electronics. One cover permits access to the potted terminal block assembly. The other cover permits access to the circuit boards and LCD display. "O" Ring seals are provided to prevent moisture from entering the termination or electronics compartments. The housing provides an external grounding lug and two 1/2-inch NPT plugs. The plugs permit access from both above and below for wiring.

Installing the Equipment

The 4200 MFT is mounted separately from the other equipment in the system. Although the 4200 MFT is typically attached to the gauge pipe extension at the tankside, it can be mounted up to 1000 feet away. A Mounting Bracket Assembly included with the Model 4200 MFT can be used for most installations.

The 4200 MFT mounting bracket kit.



Grounding the Equipment

The 4200 MFT must be grounded before communication and power connections are made. A connection from the ground lug to earth ground must be made before any other wiring connections are made. For adequate/proper operation of the 4200 MFT lightning arrestor, a ground strap must be attached to the 4200 MFT. Grounding through mounting kits or pipe coupling is not adequate.

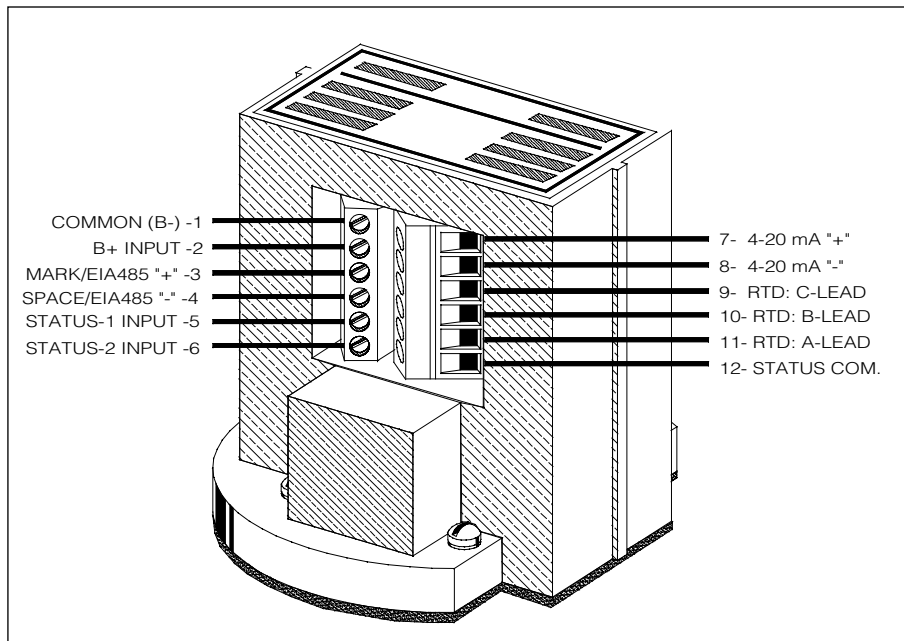
Properly seal all ports to prevent moisture or other contamination from entering the wiring compartment.

Configuration

Hardware configuration

The Model 4200 MFT must be configured for the specific tank, attached sensors, and host interface. All configuration is performed using the Model 1200 Handheld Terminal (HHT) or a download from host computer software, such as FuelsManager. The 1200 HHT connects to the same HART® bus used to interconnect the other HART® devices, there are no switches or jumpers to configure.

The 4200 MFT terminal connections



Wiring Preparation

Remove the two thread protectors from the 1/2-inch NPT conduit entries at the top and bottom of the 4200 MFT. Remove the rear cover from the 4200 MFT housing.

Input Power Connection

WARNING

When connecting dc power leads to the 4200 MFT, make certain that power is OFF.

The input power connection to the 4200 MFT is accomplished in the following manner.

1. Run the 48 Vdc power wires into the 4200 MFT through the most convenient conduit entry.
2. Connect the common power return to terminal 1 of the field side terminal block assembly.
3. Connect the B+ power wire to terminal 2 of the field side terminal block assembly.

The power wiring can be run from the 48 Vdc power supply to a number of 4200 MFT's. The size of the wire required for distributing power is dependent on the total number of 4200 MFTs on the power bus as well as the total length of wire powering the system. The operation manual indicates the resistivity (in Ohms/1000 ft) of the wire commonly used for power distribution and also a formula for calculating the maximum permitted power wiring resistivity for a given distance and number of units.

Hardware Implementation

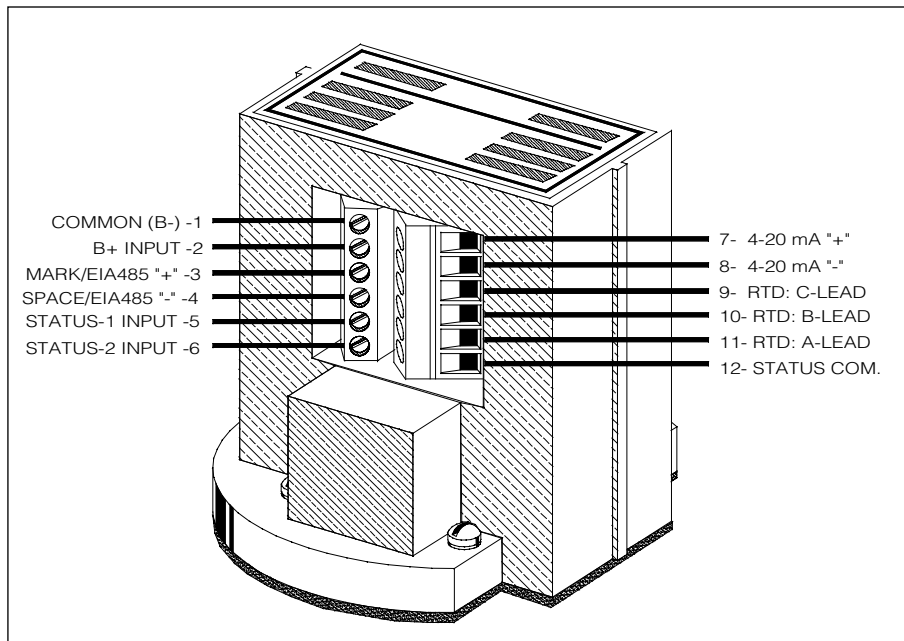
The 4200 MFT uses a 2-Wire EIA485 hardware interface to communicate with the MODBUS® master. EIA485 is a high speed differential communications network which allows up to 32 devices to operate on one network. The 4200 MFT and MODBUS® master share a twisted pair of wires to communicate.

Configuration

Hardware configuration

The Model 4200 MFT must be configured for the specific tank, attached sensors, and host interface. All configuration is performed using the Model 1200 Handheld Terminal (HHT) or a download from host computer software, such as FuelsManager. The 1200 HHT connects to the same HART® bus used to interconnect the other HART® devices, there are no switches or jumpers to configure.

The 4200 MFT terminal connections



Wiring Preparation

Remove the two thread protectors from the 1/2-inch NPT conduit entries at the top and bottom of the 4200 MFT. Remove the rear cover from the 4200 MFT housing.

Input Power Connection

WARNING

When connecting dc power leads to the 4200 MFT, make certain that power is OFF.

The input power connection to the 4200 MFT is accomplished in the following manner.

1. Run the 48 Vdc power wires into the 4200 MFT through the most convenient conduit entry.
2. Connect the common power return to terminal 1 of the field side terminal block assembly.
3. Connect the B+ power wire to terminal 2 of the field side terminal block assembly.

The power wiring can be run from the 48 Vdc power supply to a number of 4200 MFT's. The size of the wire required for distributing power is dependent on the total number of 4200 MFTs on the power bus as well as the total length of wire powering the system. The operation manual indicates the resistivity (in Ohms/1000 ft) of the wire commonly used for power distribution and also a formula for calculating the maximum permitted power wiring resistivity for a given distance and number of units.

Hardware Implementation

The 4200 MFT uses a 2-Wire EIA485 hardware interface to communicate with the MODBUS® master. EIA485 is a high speed differential communications network which allows up to 32 devices to operate on one network. The 4200 MFT and MODBUS® master share a twisted pair of wires to communicate.

Configuration

Mark/Space Wiring

For an 4200 MFT using the Mark/Space field communications option, the following additional wiring connections must be made.

1. Run two twisted pairs of 18 AWG wire (Mark/Space wires) into the 4200 MFT through the conduit entry along with the 48 Vdc power wiring.
2. Connect wires to terminal 3 (Mark) and terminal 4 (Space) of the field terminal block assembly.

EIA485 Wiring

For an 4200 MFT using the EIA485 field communications option, the following wiring connections must be made.

1. Using one twisted pair of 18 AWG wire connect LINE+ signal to terminal 3 and LINE-signal to terminal 4 of the field terminal block assembly.
2. Terminate the EIA485 bus at the 4200 MFT most distant from the host computer by placing a 120 Ohm 1/2 Watt resistor between the LINE+ and LINE- connections.

The 4200 MFT B- wire is the return reference for EIA485 communications. The EIA485 power return should be tied to the 4200 MFT B- wire at the host computer interface.

Digital Status Inputs

To use the 4200 MFT digital status inputs, the following wiring connections must be made.

1. Run two (for one status input) or three (for two status inputs) 18 AWG wires into the 4200 MFT through the most convenient conduit entry.
2. Connect the digital status common return to terminal 12 of the field terminal block assembly.
3. Connect the digital status 1 input to terminal 5 of the field terminal block assembly.
4. When using the second digital status input, connect the digital status 6 input to terminal 12 of the field terminal block assembly.

Wiring Completion

Properly seal the 1/2-inch NPT conduit entry. Install cover and tighten to ensure that the O-ring seal is adequately compressed. Proper sealing of all ports is necessary to prevent moisture or other contamination from entering the wiring compartment.

4200 MFT Resistive Temperature Device

To use the 4200 MFT Resistive Temperature Device (RTD) input, the following wiring connections must be made.

1. Run the three 18 AWG wires for the RTD into the 4200 MFT through the most convenient conduit entry.
2. Connect RTD wire A to terminal 11 of the field terminal block assembly.
3. Connect RTD wire B to terminal 10 of the field terminal block assembly.
4. Connect RTD wire C to terminal 9 of the field terminal block assembly.

4-20 mA Device Input

The 4200 MFT is able to supply power to one (1) 4-20 mA device. To use the HIU 4-20 mA device input, the following wiring connections must be made.

1. Run the two 18 AWG wires for the 4-20 mA device into the 4200 MFT through the most convenient conduit entry.
2. Connect the plus side (+) wire to terminal 7 of the field terminal block assembly.
3. Connect the minus side (-) wire to terminal 8 of the field terminal block assembly.

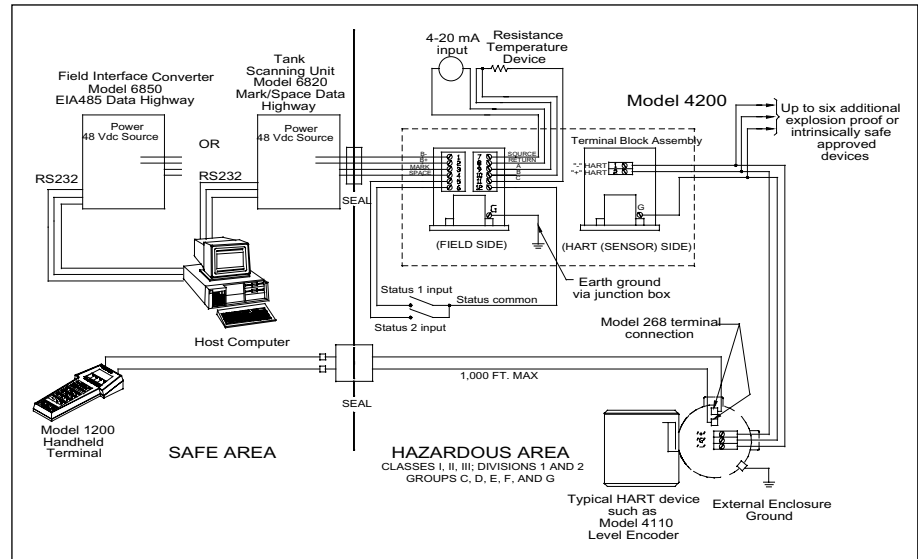
4200 MFT HART® Bus Wiring

The HART® bus connection to the 4200 MFT is accomplished in the following manner.

1. Run the two HART® bus wires into the 4200 MFT through the most convenient conduit entry.
2. Connect the minus side (-) wire to terminal 1 of the intrinsically safe HART® side terminal block assembly.
3. Connect the plus side (+) wire to terminal 2 of the intrinsically safe HART® side terminal block assembly.
4. For I.S. installations, connect a green #18 AWG wire from the HART® ground (G) terminal to the ground of the Level Encoder (or other) HART® device case ground.

Configuration

System wiring diagram



The Model 4200 Hydrostatic Interface Unit (HIU) must be configured for the specific tank, attached sensors, and host interface. The HIU can be configured with a Model 1200 Handheld Terminal or a host program such as FuelsManager.

Configuration parameters

Configuration parameters associated with 4200 MFT operation can be divided into the following functional areas:

- Quick Configuration
- Units Configuration
- Sensor Configuration
- Product Configuration
- Tank Vessel Configuration
- Local Display Configuration
- Alarm Set Point Configuration
- Host Communications Configuration

For the specific steps needed to configure the 4200 MFT please see the operation manual.

Technical Data

Specifications and Physical Characteristics

The following specifications apply to the Model 4200 Multi-Function Transmitter assembly over the normal operating temperature range.

Environmental

Temperature	-40 °C to +85 °C (-40 °F to +185 °F) (operating)
Humidity	0 to 95% (non-condensing)
Transient Lightning	Meets ANSI/IEEE C62.41
EMI	Meets SAMA 33.1C
Vibration Shock	Meets SAMA PMC 31.1

Physical

Housing	Aluminum NEMA 4X, NEMA 7
Bolts	Plated carbon steel per ASTM A449, Grade 2
Paint	Epoxy-polyester

Input Power

Input Voltage	22 to 65 Vdc
Fusing	Internal
Efficiency	85% minimum
Earth Isolation	2500 VRMS
Short Circuit Protection	Infinite Duration (any/all outputs)

RTD Temperature Measurement

RTD Type	100 Ohm, Platinum DIN or Copper
Measure Type	3-Wire
Wiring Resistance	20 Ohm per lead, max. leads matched to +/- 0.1 Ohm
Accuracy at Ambient	+/- 0.2 °F
Display/Data Units	Fahrenheit or Celsius
Calibration	none

4 - 20 mA Measurement

Termination Resistance	20 Ohm
Source Voltage	18 - 25 Vdc
Current Limit	25 mA
Hardware Calibration	none
Calibration Accuracy	+/- 0.01 mA
Sensor Calibration	268 Hand Held Terminal Method
Resolution	0.005 mA

Digital Status

Number of Inputs	2
"ON" Contact Resistance	500 Ohm maximum
Earth Isolation	2500 VRMS

Field Communications

RS-485 MODBUS	300, 600, 1200, 2400, 4800 or 9600 Baud
Varec Mark/Space	High and low speed supported
Earth Isolation	2500 VRMS

LCD Display

Non-Destructive	
Temperature Range	-40 °C to +85 °C (-40 °F to +185 °F)
Normal Operating	
Temperature Range	-20 °C to +70 °C (-4°F to +158°F)
Backlight Supply	5 Vdc @ 40 mA
Backlight "ON" Time	10 to 20 minutes
Configurable Display	Level/ Temperature/ 4-20 mA/ Alarms/ Hydrostatic/ Hybrid/ Update Period

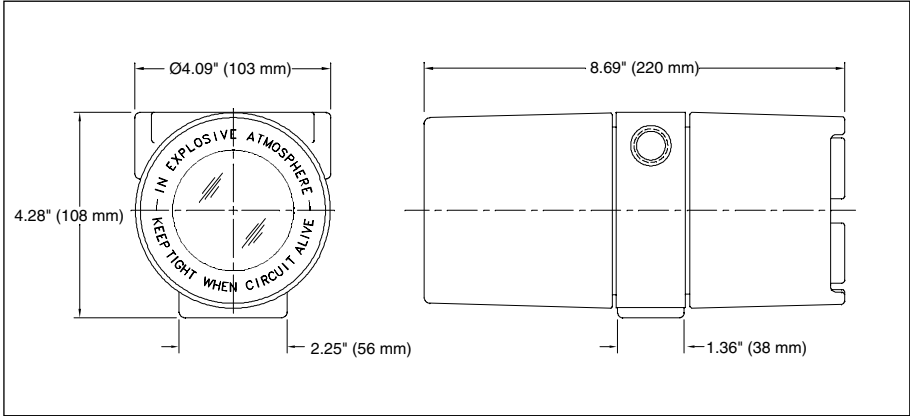
Technical Data

Safety Certifications and Approvals

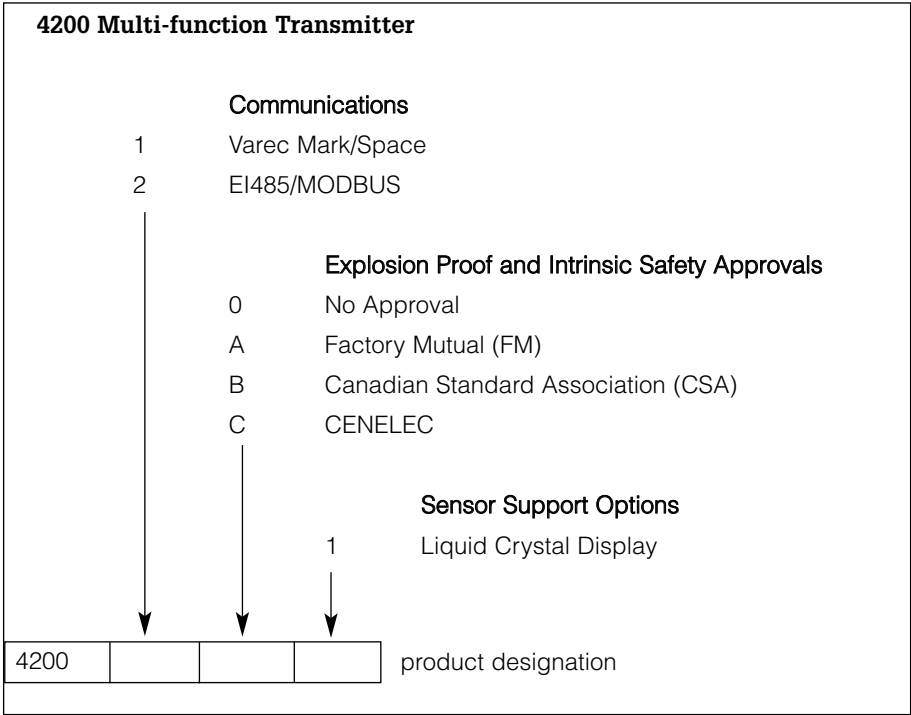
Explosion Proof
(FM) Factory Mutual Approval Standard Class 3600, 3615, 810
(CSA) Canadian Standards Standard C22.2 Association No. 0.0, 0.2, 0.4, 0.5, 14, 30, 94, 142
(LCIE) CENELEC CENELEC Standard EN50014, EN50018

Intrinsic Safety
(FM) Factory Mutual Approval Standard Class 3600, 3615, 810
(CSA) Canadian Standards Standard C22.2 Association No. 0.0, 0.2, 0.4, 0.5, 14, 30, 94, 142
(LCIE) CENELEC CENELEC Standard EN50014, EN50018

Dimensional of the
4200 MFT



Order Codes



4200 Multi-Function Transmitter

Supplementary Documentation

- † □ 4200 Multi-function Transmitter
System Information Si 008G/03/en/05.00
- † □ 4200 Multi-function Transmitter
Instruction Manual

Locations			Systems & Gauging Headquarters
Endress+Hauser Systems & Gauging Ltd. Heighington Lane Newton Aycliffe Co Durham DL5 6XZ United Kingdom Tel: +44 (0)1325 321111 Fax: +44 (0)1325 300840	Endress+Hauser Systems & Gauging S.A. Rue de Bitche 62100 Calais France Tel: +33 - (0)321-96-49-93 Fax: +33 - (0)321-34-36-12	Sakura Endress Co., Ltd. 862-1 Mitsukunugi Sakaigawa-mura Higashi-Yatsushiro-Gun Yamanashi Prefecture 406-0846 Japan Tel: +81 (0)552-66-4964 Fax: +81 (0)552-66-4969	Endress+Hauser Systems & Gauging, Inc. 5834 Peachtree Corners East Norcross (Atlanta), GA 30092 USA Tel: +1 (770) 447-9202 Fax: +1 (770) 662-8939 http://www.systems.endress.com
Endress+Hauser Systems & Gauging, Inc 2901 W. Sam Houston Parkway North Houston, TX 77043 USA Tel: +1 (832) 590-6200 Fax: +1 (832) 590-6201	Endress+Hauser Systems & Gauging, Inc. 1800 Diagonal Road Suite 300 Alexandria, VA 22314 USA Tel: +1 (703) 837-9202 Fax: +1 (703) 837-9209		