

CERTIFICATE OF CONFORMITY



1. **HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT PER US REQUIREMENTS**
2. **Certificate No:** FM16US0216X
3. **Equipment:
(Type Reference and Name)** M400 Series, Multi-parameter Transmitter
4. **Name of Listing Company:** Mettler-Toledo GmbH
5. **Address of Listing Company:** Im Hackacker 15 (Industrie Nord)
CH-8902 Urdorf, Canton of Zurich
Switzerland
6. The examination and test results are recorded in confidential report number:

3046275 dated 30th October 2015
7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

FM Class 3600:2011, FM Class 3610:2015, FM Class 3611:2004, FM Class 3810:2005,
ANSI/IEC 60529:2004, ANSI/ISA-60079-0:2013, ANSI/ISA-60079-11:2012, ANSI/ISA-61010-1:2004,
NEMA 250:1991
8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

Certificate issued by:



J.E. Marquedant
VP, Manager – Electrical Systems

9 January 2020

Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

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10. Equipment Ratings:

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire HART electronics) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Group E, F and G, Class III, Division 1, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's Control Drawing, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -20 °C to +60 °C, indoor and outdoor (Type 4X; IP66) environments.

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire FF/PA and FISCO FF/PA electronics) equipment is certified to the following classification(s).

Intrinsically safe apparatus for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Group E, F and G, Class III, Division 1, in accordance with manufacturer's Control Drawing; intrinsically safe apparatus with fieldbus intrinsically safe concept wiring for use in Class I, Division 1, Groups A, B, C and D, Class II, Division 1, Groups E, F and G, Class III, Division 1, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's Control Drawing; equipment protection by intrinsic safety AEx ia with fieldbus intrinsically safe concept wiring for use in Class I, Zone 0, Group IIC, in accordance with manufacturer's Control Drawing, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -20 °C to +60 °C, indoor and outdoor (Type 4X; IP66) environments.

In type of protection nonincendive equipment, the multi-parameter transmitter (M400 Series, 2-Wire electronics) equipment is certified to the following classification(s).

Nonincendive equipment for use in Class I, Division 2, Groups A, B, C and D; nonincendive for use in Class I, Zone 2, Group IIC, hazardous (classified) locations; and ordinary (unclassified) locations with an ambient temperature rating of -20 °C to +60 °C, indoor and outdoor (Type 4X; IP66) environments.

11. The marking of the equipment shall include:

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire HART electronics) equipment is labelled with the following marking(s).

Intrinsically Safe

Class I, II, III, Division 1, Groups A, B, C, D, E, F, G T4

Class I, Zone 0, AEx ia IIC T4 Ga

Ta = -20 °C to +60 °C

Control Drawing No. 12112601/12112602/12112604; Entity; Type 4X; IP66

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

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In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire FF/PA and FISCO FF/PA electronics) equipment is labelled with the following marking(s).

Intrinsically Safe

Class I, II, III, Division 1, Groups A, B, C, D, E, F, G T4

Class I, Zone 0, AEx ia IIC T4 Ga

Ta = -20 °C to +60 °C

Control Drawing No. 12112602/12112603/12112604; Entity; FISCO Field Device; Type 4X; IP66

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

In type of protection nonincendive equipment, the multi-parameter transmitter (M400 Series, 2-Wire electronics) equipment is labelled with the following marking(s).

Class I, Division 2, Groups A, B, C, D T4A

Class I, Zone 2, Groups IIC T4

Ta = -20 °C to +60 °C

Type 4X; IP66

WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

WARNING – SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR DIVISION 2

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT

12. Description of Equipment:

General – The M400 Series Multi-parameter Transmitter is designed for industrial and hazardous (classified) location applications. Collecting physical signals such as pH, dissolved oxygen, electrical conductivity (resistivity), process temperature, and process voltage, etc., it converts those signals into a standard 4-20 mA HART electrical signal, or Foundation Fieldbus™/Profibus (FF/PA) communication signal. It is powered by 2-wire and can be connected to analog sensor or digital sensor to delivers 4-20 mA HART output signal or FF/PA BUS communication signal, representing pH, dissolved oxygen, electrical conductivity (resistivity), process temperature, and process voltage, etc. The consuming current running on the extent permitted does not depend on supply voltage, but depends on the measured value.

Depending on the model, the transmitter can be configured with the software or keys, for different parameter measurement or several separate measurements combined together.

The M400 2-Wire Multi-parameter Transmitter exists in three versions, but has identical hardware. They are all 2-wire 4-20 mA loop powered transmitters with a second (passive) current output, analog and ISM (digital) sensor input, analog 4-20 mA current input for pressure compensation of oxygen measurement, two digital inputs for e.g. HOLD, two open collector outputs for alarm, set points, etc.

The M400 FF/PA Multi-parameter Transmitter exists in two versions, but has identical hardware. They are all 2-wire FF or PA BUS loop powered transmitters with analog and ISM (digital) sensor input, analog 4-20 mA current input for pressure compensation of oxygen measurement.

The transmitter is powered by 2-wire and can be connected to analog sensor or digital sensor to deliver 4-20 mA HART or Foundation Fieldbus™/Profibus (FF/PA) output signal, representing electrical conductivity (resistivity), pH, dissolved oxygen, process temperature, and process voltage, etc.

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Construction – The multi-parameter transmitter enclosure is constructed of an aluminum alloy, ADC12, housing (front cover and base) with an additional internal plastic housing incorporating the electronics sub-assembly attached to the rear/inside of the enclosure front cover.

On the outside/external front cover, there is one LCD video graphics array color touch screen display and five membrane buttons which conveys measuring data and setup information.

The enclosure base is equipped with five 0.75 in. diameter smoothly well-rounded openings for field wiring (M20 x 1.5 and NPT cable glands, hazardous (classified) location certified plugs, and 1/2 in. NPT conduit connections), provided for external field wiring connections. The enclosure front cover and base are internally bonded together. The enclosure base is equipped with an internal and external threaded ground terminal for installation practices.

The internal threaded ground terminal is equipped with a factory-installed fixed 6 in. flying leadwire for installation practices when using metallic raceways, metallic cable glands or metallic rigid conduit.

The electronics assembly of the vibration level switch is constructed from one of two designs. The C300KK-HART indicates the electronics version for the 2-Wire 4-20 mA HART electrical signal design. The C300KK-FF/PA indicates the electronics version for the 2-Wire Foundation Fieldbus™/Profibus (FF/PA) communication signal design.

For more specifics concerning construction and description details of the multi-parameter transmitter, reference the manufacturer's sales literature and specification sheets.

Ratings – The equipment is certified to the following ratings.

The ambient operating temperature range is -20 °C to +60 °C in types of protection intrinsically safe apparatus and nonincendive equipment; each when properly mounted and installed.

The equipment is marked for appliance protection class I, designated for installation transient overvoltages up to levels of overvoltage category I, and environmentally classified as pollution degree 3.

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire HART electronics) equipment is connected to a certified intrinsically safe linear circuit with the following maximum entity parameter values.

Digital-In1 Terminals (1, 2) are:

$V_{max}(U_i) = 30 \text{ VDC}$, $I_{max}(I_i) = 100 \text{ mA}$, $C_i \approx 0$, $L_i \approx 0$, $P_i = 0.8 \text{ W}$

Digital-In1 Terminals (3, 4) are:

$V_{max}(U_i) = 30 \text{ VDC}$, $I_{max}(I_i) = 100 \text{ mA}$, $C_i \approx 0$, $L_i \approx 0$, $P_i = 0.8 \text{ W}$

Analog-Out1 Terminals (10, 11) are:

$V_{max}(U_i) = 30 \text{ VDC}$, $I_{max}(I_i) = 100 \text{ mA}$, $C_i \approx 0$, $L_i \approx 0$, $P_i = 0.8 \text{ W}$

Analog-Out2 Terminals (12, 13) are:

$V_{max}(U_i) = 30 \text{ VDC}$, $I_{max}(I_i) = 100 \text{ mA}$, $C_i \approx 0$, $L_i \approx 0$, $P_i = 0.8 \text{ W}$

OC-Out1 Terminals (6, 7) are:

$V_{max}(U_i) = 30 \text{ VDC}$, $I_{max}(I_i) = 100 \text{ mA}$, $C_i = 15 \text{ nF}$, $L_i \approx 0$, $P_i = 0.8 \text{ W}$

OC-Out2 Terminals (8, 9) are:

$V_{max}(U_i) = 30 \text{ VDC}$, $I_{max}(I_i) = 100 \text{ mA}$, $C_i = 15 \text{ nF}$, $L_i \approx 0$, $P_i = 0.8 \text{ W}$

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In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire FF/PA electronics) equipment is connected to a certified intrinsically safe linear circuit with the following maximum entity parameter values.

Barrier Terminals (10, 11) are:

$V_{max}(U_i) = 24$ VDC, $I_{max}(I_i) = 200$ mA, $C_i = 3$ nF, $L_i \approx 0$, $P_i = 1.2$ W

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire FISCO FF/PA electronics) equipment is connected to a certified intrinsically safe linear circuit with the following maximum fieldbus intrinsically safe concept parameter values.

Field Device Terminals (10, 11) are:

$V_{max}(U_i) = 17.5$ VDC, $I_{max}(I_i) = 380$ mA, $C_i = 3$ nF, $L_i \approx 0$, $P_i = 5.32$ W

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire HART, FF/PA and FISCO FF/PA electronics) equipment is connected to a certified intrinsically safe linear circuit with the following maximum entity parameter values.

Conductivity Sensor Terminals (A, B, E, G) are:

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 29$ mA, $C_a(C_o) = 2.5$ μ F, $L_a(L_o) = 1$ mH, $P_o = 43$ mW

Inductive Conductivity Sensor Terminals (D, E, F, G, H) are:

$V_{oc}(U_o) = 5.36$ VDC, $I_{sc}(I_o) = 17.2$ mA, $C_a(C_o) = 3.2$ μ F, $L_a(L_o) = 1$ mH, $P_o = 23$ mW

pH Sensor Terminals (A, E, G) are:

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 1.3$ mA, $C_a(C_o) = 2.1$ μ F, $L_a(L_o) = 5$ mH, $P_o = 1.9$ mW

Dissolved Oxygen Sensor Terminals (B, D, H) are:

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 29$ mA, $C_a(C_o) = 2.5$ μ F, $L_a(L_o) = 1$ mH, $P_o = 43$ mW

Temperature Sensor Terminals (I, J, K) are:

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 5.4$ mA, $C_a(C_o) = 2$ μ F, $L_a(L_o) = 5$ mH, $P_o = 8$ mW

Temperature Sensor Terminals with Inductive Conductivity (I, J, K) are:

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 4.9$ mA, $C_a(C_o) = 2$ μ F, $L_a(L_o) = 5$ mH, $P_o = 6.6$ mW

One-Wire Sensor Terminal (L) are:

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 22$ mA, $C_a(C_o) = 2.8$ μ F, $L_a(L_o) = 1$ mH, $P_o = 32$ mW

RS485 Sensor Terminals (N, O) are:

$V_{max}(U_i) = 30$ VDC, $I_{max}(I_i) = 100$ mA, $C_i = 0.7$ μ F, $L_i \approx 0$, $P_i = 0.8$ W

$V_{oc}(U_o) = 5.88$ VDC, $I_{sc}(I_o) = 54$ mA, $C_a(C_o) = 1.9$ μ F, $L_a(L_o) = 1$ mH, $P_o = 80$ mW

Analog-In Terminals (P, Q) are:

$V_{max}(U_i) = 30$ VDC, $I_{max}(I_i) = 100$ mA, $C_i = 15$ nF, $L_i \approx 0$, $P_i = 0.8$ W

In type of protection nonincendive equipment, the multi-parameter transmitter (M400 Series, 2-Wire electronics) equipment is connected to limited output Class 2 circuits and power source with the following nominal external supply values.

Power Supply and Signal Circuit Terminals (1, 2) are:

$V_{max}(U_i) = 14-30$ VDC, $I_{max}(I_i) = 100$ mA, $P_i = 0.8$ W

$U_m = 250$ V maximum

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Model Codes – The equipment is identified with the following model code structure.

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire HART electronics) equipment is designated with the following model code(s).

M400, 2-Wire HART Transmitter

Reference Control Drawing No. 12112601/12112602/12112604 for Entity Parameter values

Part Number	Type
30 025 515	M400/2XH Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter for Dissolved Measurement
30 025 516	M400G/2XH Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter for Dissolved and Gas Measurement
30 256 307	M400/2XH Multi-parameter (Conductivity Ind) 1-Channel Analog Transmitter for Conductivity Measurement
30 256 317	M400/2XH Type 1 Multi-parameter (pH, Conductivity) 1-Channel ISM & Analog Transmitter with Limited Functionality
30 568 985	M400/2XH Type 2 Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter with Limited Functionality
30 568 986	M400/2XH Type 3 Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter with Limited Functionality

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire FF/PA and FISCO FF/PA electronics) equipment is designated with the following model code(s).

M400, 2-Wire FF/PA Transmitter

Reference Control Drawing No. 12112602/12112603/12112604 for Entity Parameter values

Reference Control Drawing No. 12112602/12112603/12112604 for FISCO Parameter values

Part Number	Type
30 026 616	M400 FF Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter for Dissolved Measurement
30 026 617	M400 PA Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter for Dissolved and Gas Measurement
30 256 309	M400 FF Multi-parameter (Conductivity Ind) 1-Channel Analog Transmitter for Conductivity Measurement
30 256 310	M400 PA Multi-parameter (Conductivity Ind) 1-Channel Analog Transmitter for Conductivity Measurement

In type of protection nonincendive equipment, the multi-parameter transmitter (M400 Series, 2-Wire electronics) equipment is designated with the following model code(s).

M400, 2-Wire Transmitter

Part Number	Type
30 025 514	M400/2H Multi-parameter (pH, O2, Conductivity) 1-Channel ISM & Analog Transmitter for Dissolved Measurement
30 256 312	M400/2H Multi-parameter (Conductivity Ind) 1-Channel Analog Transmitter for Conductivity Measurement

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13. Specific Conditions of Use:

In type of protection intrinsically safe apparatus, the multi-parameter transmitter (M400 Series, 2-Wire HART, FF/PA and FISCO FF/PA electronics) equipment is designated with the following specific conditions of use.

1. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth.
2. The overlay switch of the multi-parameter transmitter shall be protected from high risk of mechanical danger and ultraviolet light.
3. The panel mount gasket has not been tested for type of protection Type 4X, IP66 or Class II and III. Type of protection Type 4X, IP66 and Class II and III refers to the transmitter enclosure only.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

In type of protection nonincendive equipment, the multi-parameter transmitter (M400 Series, 2-Wire electronics) equipment is designated with the following specific conditions of use.

1. Potential Electrostatic Charging Hazard – To prevent the risk of electrostatic sparking, the non-metallic surface should only be cleaned with a damp cloth.
2. The overlay switch of the multi-parameter transmitter shall be protected from high risk of mechanical danger and ultraviolet light.
3. The panel mount gasket has not been tested for type of protection Type 4X, IP66 or Class II and III. Type of protection Type 4X, IP66 and Class II and III refers to the transmitter enclosure only.
4. Enclosures containing aluminum constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

14. Test and Assessment Procedure and Conditions:

This Certificate has been issued in accordance with FM Approvals US Certification Requirements.

15. Schedule Drawings:

A copy of the technical documentation has been kept by FM Approvals.

16. Certificate History:

Details of the supplements to this certificate are described below:

Date	Description
30 th October 2015	Original Issue.
15 th July 2016	<u>Supplement 2:</u> Report Reference: RR205767, dated 15 th July 2016. Description of the Change: Addition of the new sensor printed circuit board for adaption to the existing communication printed circuit boards (HART, FF/PA); the new sensor printed circuit board has larger copper field and does not introduce any new component package. Assembly document and model code updates – the actual change is made to the entire certificate and the full document is issued to the holder.

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Date	Description
9 th January 2020	<u>Supplement 3:</u> Report Reference: RR221779, dated 9 th January 2020. Description of the Change: Addition of the new M400/2XH 2-wire transmitter, firmware variant of existing part number 30025515, with restrictions in sensor types. Nameplate document and model code update.

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