

Transmitters for All Parameters

Your Access to the Process

Constant information

Transmitters are the components that communicate to the user and translate sensor readings into displayed measurements. METTLER TOLEDO provides tailorable transmitter solutions to meet the needs of a wide range of applications and functional requirements. Intelligent diagnostics keep users informed of sensor "health".

Single- or multi-channel?

For simpler processes where only a single parameter requires measurement, a single-channel transmitter is the obvious choice, but for processes where more than one parameter must be monitored, multi-channel, multi-parameter transmitters offer

significant advantages. METTLER TOLEDO multi-channel transmitters combine operating flexibility with ease of use.

Transmitters for hazardous areas

Many of our transmitters have been designed specifically for hazardous



	M200 (p. 80–81)	M300 (p. 82–83)	M400 (p. 84–87)	M800 (p. 90–92)	
	4-Wire				
Channels	1/2	1/2	1	1/2/4*	
Plug and Measure	•	•	•	•	
Dynamic Lifetime Indicator (DLI)	–	•	•	•	
Adaptive Calibration Timer (ACT)	–	•	•	•	
Time To Maintenance (TTM)	–	•	•	•	
Calibration history	–	•	•	•	
CIP/SIP autoclaving counter	–	•	•	•	
iMonitor	–	•	•	•	
Communication	–	–	HART® FOUNDATION fieldbus*	Profinet*	
Panel Cutout	½ DIN, ¼ DIN	½ DIN, ¼ DIN	½ DIN	½ DIN	
Mixed-mode input	–	•	•*	•*	
PID controller	–	•	•	•	
Hold input	•	•	•	•	
Analog input	–	–	1	1	
Digital input	1/2	1/2	2	4/5/6	
Relays/open collectors (OC)	2	2	4	0/8*	
Outputs	2/4	2/4	4	4/8*	
Approvals	UL	UL	ATEX IECEx Zone 2 FM CI 1 Div 2 CSA CI 1 Div 2* NEPSI	FM CI 1 Div 2*	
Parameter compatibility (Ingold)					
pH/ORP/pNa	•	•	•	•	
Dissolved oxygen					
Amperometric sensors					
High (InPro 68xxi)	•	•	•	•	
Low (InPro 69xxi)	–	–	•*	•	
Optical sensors					
High (InPro 68xx)	–	–	•	•	
Low (InPro 69xx)	–	–	•*	•	
Gaseous oxygen					
High (InPro 68xx)	–	–	•*	•	
Low (InPro 69xx)	–	–	•*	•	
GPro 500	–	–	•*	–	
CO₂					
InPro 5000i	–	–	•	•	
InPro 5500i	–	–	•*	•	
Conductivity 2-e/4-e	•	•	•	•	
Inductive conductivity	–	–	•*	–	
Turbidity	–	–	–	•*	
Ozone	•	•	•	–	
EasyClean™ compatibility	•	•	•	•	

area use where there is a risk of explosive or toxic environments. Low-power, 2-wire units with ATEX/FM approvals ensure operating safety.

Digital communication

We offer transmitters for all common digital communication protocols for easy interface with your DCS or PLC. Intelligent Sensor Management (ISM) diagnostics data can also be accessed

on control systems to provide an overview of the performance of all measurement systems from one point.

The way forward

Use of digital sensors is becoming increasingly common in the process industries. Many of our transmitters accept traditional analog as well as ISM digital sensors, providing a future oriented investment in your plant.

Our latest transmitter developments include the M400 and M300 Process multi-parameter units. Their touch-screen display and intuitive menus save operating time, while predictive maintenance ensures reliability and reduced maintenance. The M100 series has been designed to provide the ultimate solution for measurement point simplicity. This displayless transmitter sets a new standard in measuring system simplicity and efficiency.



	M100 SM (p. 95)	M100 HM (p. 93)	M100 DR (p. 94)	M400 2(X)H (p. 98–101)	M400 FF (p. 98–101)	M400 PA (p. 98–101)
	2-Wire					
	1	1	1	1	1	1
	•	•	•	•	•	•
	•	•	•	•	•	•
	•	•	•	•	•	•
	•	•	•	•	•	•
	•	•	•	•	•	•
	–	–	–	–	–	–
	BT 4.0 MODBUSRTU	HART®	HART®	HART®	FOUNDATION fieldbus	Profibus PA
	–	–	–	½ DIN	½ DIN	½ DIN
	–	–	–	•	•	•
	–	–	–	•	•	•
	–	•	•	•	–	–
	–	1	1	1	1	1
	–	1	1	2	2	2
	–	–	–	2	–	–
	2	1	1	2	–	–
	–	ATEX IECEx Zone 1 CSA CI 1 Div 1 NEPSI	–	ATEX IECEx Zone 1* FM CI 1 Div 1/2* NEPSI*	ATEX IECEx Zone 1 FM CI 1 Div 1 NEPSI	ATEX IECEx Zone 1 FM CI 1 Div 1 NEPSI
	•	•	•	•	•	•
	•	•	•	•	•	•
	–	•	•	•	•	•
	•	–	–	–	•	•
	–	–	–	–	•	•
	–	–	–	•*	•	•
	–	–	–	•*	•	•
	–	–	–	–	–	–
	•	–	–	–	•	•
	–	–	–	–	–	•
	–	•	•	•	•	•
	–	–	–	•*	–	–
	–	–	–	–	–	–
	–	–	–	–	–	–
	–	–	–	•	•	•

* Model dependent

M200: Convenient and Reliable For Basic Process Applications



The M200 multi-parameter transmitter line covers pH, ORP, dissolved oxygen, ozone and conductivity measurements. Plug and Measure provides compatibility and reliable operation for ISM sensors as well as the complete digital easySense™ line. Convenient operation thanks to the large display, plain text interface, quick access menu and easily accessible wiring terminals. With the Transmitter Configuration Tool (TCT) provided for the M200 commissioning as well as maintenance becomes substantially easier.

Specifications

Measurement parameters	pH, ORP, dissolved oxygen, conductivity and ozone
ISM	Plug and Measure
Power supply	100V to 240VAC or 20 to 30VDC, 10 VA
AC Frequency	50 to 60 Hz
Current (analog) outputs	2 × or 4 × 0/4 – 20 mA, 22 mA alarm, galvanically isolated from input and from earth/ground
User interface	Backlit LCD, 4 lines
Languages	8 (English, German, French, Italian, Spanish, Portuguese, Russian and Japanese)
Ambient temperature	–10 to 50 °C (14 to 122 °F)
Relative humidity	0 to 95 % non-condensing
Rating	IP65
Hold input	yes
Control input	2 (1 for single channel)
Relays	2-SPDT (alarm delay 0 to 999 s)

Features Overview

- Plug and Measure for easy operation and maintenance
- Input for digital ISM sensor signals and easySense sensors
- Multi-parameter unit
- 1 or 2-channel version
- 2 configurable relays
- IP65 rated
- 8 languages: English, German, French, Italian, Spanish, Portuguese, Russian and Japanese

Other Highlights

- 4-wire installation
- Quick setup mode for fast commissioning
- Free Transmitter Configuration Tool (TCT) software

► www.mt.com/M200

Parameter Specifications

pH/ORP

Measurement parameters	pH, mV and temperature
pH range	-2.00 to 16.00 pH
ORP input range	-1500 to 1500 mV
pH resolution	Auto/0.01/0.1/1 (can be selected)
pH accuracy	±1 digit
Temperature measuring range	-30 to 130 °C (-22 to 266 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C/°F (can be selected)
Temperature accuracy	±1 digit
Calibration	1-point (offset), 2-point, process
Sensor maximum distance	80 m (260 ft)

Dissolved oxygen

Measurement parameters	Dissolved oxygen (DO) saturation or concentration and temperature
DO concentration range	0.00 to 50.00 ppm (mg/L)
DO saturation range	0 to 500 %, air, 0 to 0 to 200 % O ₂
DO resolution	Auto/0.001/0.01/0.1/1 (can be selected)
DO accuracy	±1 digit
Temperature measuring range	-10 to +80 °C (14 to 176 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C/°F (can be selected)
Temperature accuracy	±1 digit
Calibration	1-point (slope or offset), process (slope or offset)
Sensor maximum distance	80 m (260 ft)

Conductivity

Measurement parameters	Conductivity and temperature
Cond range 2-electrode sensor	0.1 to 40000 mS/cm (25 Ω × cm to 100 MΩ × cm)
Cond range 4-electrode sensor	0.01 to 650 mS/cm (1.54 Ω × cm to 0.1 MΩ × cm)
Cond / Res resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Cond / Res accuracy	± 1 digit
Temperature measuring range	-40 to 200 °C (-40 to 392 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C/°F (can be selected)
Temperature accuracy	±1 digit
Chemical concentration curves	NaCl 0–26 % @ 0 °C to 0–28 % @ +100 °C NaOH 0–12 % @ 0 °C to 0–16 % @ +40 °C to 0–6 % @ +100 °C HCl 0–18 % @ -20 °C to 0–18 % @ 0 °C to 0–5 % @ +50 °C HNO ₃ 0–30 % @ -20 °C to 0–30 % @ 0 °C to 0–8 % @ +50 °C H ₂ SO ₄ 0–26 % @ -12 °C to 0–26 % @ +5 °C to 0–9 % @ +100 °C H ₃ PO ₄ 0–35 % @ +5 °C to 80 °C TDS ranges NaCl, CaCO ₃
Calibration	1-point (slope), 2-point, process
Sensor maximum distance, DS 4-e	80 m (260 ft)
Sensor maximum distance ISM 2-e	90 m (300 ft)

Ordering Information

Transmitter	Order Number
M200, ¼ DIN, single-channel	52 121 554
M200, ½ DIN, single-channel	52 121 555
M200, ¼ DIN, dual-channel	52 121 556
M200, ½ DIN, dual-channel	52 121 557

Accessories

	Order Number
Pipe mounting kit for ½ DIN	30 300 480
Panel mounting kit for ½ DIN	52 500 213
Protective hood	52 500 214
Terminal blocks for M200, M300, M400	52 121 504

Detailed description and order information for easySense sensors and fittings see pages 203–204.

M300 Process: Versatile and User-Friendly For a Wide Range of Applications and Industries



The multi-parameter M300 Process transmitter line for pH/ORP, dissolved oxygen and conductivity measurements offers exceptional measurement performance as well as excellent user ergonomics.

The high contrast black and white touchscreen together with the harmonized menu structure for all parameters, facilitates navigation and ensures easy and user friendly operation.

On-line diagnostics information allows you to schedule sensor maintenance or replacement. The clearly visible diagnostic information lets you know when it's time to do maintenance or calibration of sensors equipped with Intelligent Sensor Management (ISM) technology.

The integrated USB interface allows you to use it for data logging or to store the configuration on a USB stick.

Specifications

Power supply	100 to 240 VAC, or 20 to 30 VDC, 10 VA
Frequency for AC	50 to 60 Hz
Current output	2 × 0/4 to 20 mA (4× for dual channel), 22 mA alarm (according to Namur NE43)
Display	4.0" b/w touchscreen, 320 × 240 pixel
Languages	10 (English, German, French, Italian, Spanish, Portuguese, Russian, Japanese, Korean and Chinese)
Ambient temperature	-10 to 50 °C (14 to 122 °F)
Relative humidity	0 to 95% non-condensing
Rating	¼ DIN: IP65 (front) ½ DIN: IP65
PID controller	Yes
Control input (Hold)	1 or 2 (dual channel version)
Relays	2 × SPDT, 2 × reed
Approvals and certificates	cULus
USB interface	1 × USB Host: Data logging and configuration storage on USB stick 1 × USB Device: Software update interface

Features Overview

- 4.0" touchscreen
- Multi-parameter transmitter for pH/ORP, O₂ and cond
- Available as single-channel or dual-channel version
- PID controller with pulse length, pulse frequency or analog control
- User management available

Other Highlights

- Mixed-mode functionality allows the connection of analog or digital ISM sensors
- Full ISM diagnostics available
- 4-wire installation
- Also communicates with EasyClean systems for automatic sensor cleaning

▶ www.mt.com/M300

Parameter Specifications

pH Performance

Measurement parameters	pH, mV, and temperature
pH, ORP input range*	-1500 to 1500 mV
pH display range	-2 to 16 pH
pH resolution	Auto/0.01/0.1/1 (can be selected)
Relative accuracy**	±0.02 pH; ±1 mV
Temperature input*	Pt1000 (Pt100 with adapter)
Temperature measuring range	-30 to 130 °C (-22 to 266 °F)
Temperature accuracy**	±0.25 °C (±0.45 °F)
Sensor maximum distance	Analog: 10 to 20 m (33 to 65 ft) ISM: 80 m (260 ft)
Calibration	1 or 2 point, process

* not required for ISM sensors ** for analog input signal (ISM signal causes no additional error)

DO Performance

Measurement parameters	DO saturation or concentration and temperature
Measuring current range	0 to 900 nA
DO concentration range	0.00 to 50.00 ppm (mg/L)
DO accuracy	±0.5% of full scale reading
DO resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature input*	NTC 22
Temperature measuring range	-10 to 80 °C (14 to 176 °F)
Temperature accuracy**	±0.25 °C (±0.45 °F)
Sensor maximum distance	Analog: 20 m (65 ft). ISM: 80 m (260 ft)
Calibration	1-point (slope or offset), process (slope or offset)

* not required for ISM sensors ** for analog input signal (ISM signal causes no additional error)

Conductivity Performance

Measurement parameters	Conductivity, and temperature
Conductivity/resistivity ranges	2-electrode sensor display range: 0 to 40,000 mS/cm (25 Ω × cm to 100 MΩ × cm) 4-electrode sensor display range: 0.01 to 650 mS/cm (1.54 Ω × cm to 0.1 MΩ × cm)
Temperature input*	Pt1000
Temperature measuring range	-40 to 200 °C (-40 to 392 °F)
Sensor maximum distance	Analog 2-e: 61 m (200 ft); analog 4-e: 15 m (50 ft) ISM 2-e: 90 m (300 ft); ISM 4-e: 80 m (260 ft)
Cond/Res accuracy**	±0.5% of reading or 0.25 Ω, whichever is greater
Cond/Res repeatability	±0.25% of reading or 0.25 Ω, whichever is greater
Cond/Res resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C (°F) (can be selected)
Temperature accuracy**	±0.25 °C (±0.45 °F)
Temperature repeatability**	±0.13 °C (±0.23 °F)

* not required for ISM sensors ** for analog input signal (ISM signal causes no additional error)

Ordering Information

For Analog Sensors

	Order Number
M300 Process, ¼ DIN, single-channel, multi-parameter	30 280 770
M300 Process, ½ DIN, single-channel, multi-parameter	30 280 771
M300 Process, ¼ DIN, dual-channel, multi-parameter	30 280 772
M300 Process, ½ DIN, dual-channel, multi-parameter	30 280 773

Installation Accessories for ½ DIN Version

	Order Number
Pipe mount kit for ½ DIN	30 300 480
Panel mount kit for ½ DIN	30 300 481
Wall mounting kit for ½ DIN	30 300 482
Protective hood	30 073 328

M400: Reliable and Intelligent Advanced Process Control



Features Overview

- 4" touchscreen plus soft-key operation
- Advanced ISM diagnostics, incl. iMonitor
- Communication protocol: 4 to 20 mA (with HART)
- Multi-parameter measurement
- Aluminum die cast enclosure (coated)
- 4-wire installation

The multi-parameter M400 transmitter series features Intelligent Sensor Management (ISM) technology and covers pH/ORP, oxygen (for measurement of dissolved oxygen or in gas), dissolved carbon dioxide, dissolved ozone, conductivity or GPro 500 TDL, depending on the type you choose.

The high-contrast black and white touchscreen together with four soft keys, allows you to operate the transmitter even in the harshest applications without compromising user ergonomics. The online diagnostic information with harmonized menu display lets you know when it is time to do maintenance or calibration of sensors equipped with ISM technology. The HART or FOUNDATION fieldbus communication protocol provides easy integration of sensor diagnostics into process control systems.

Specifications

General

Power supply	100 to 240VAC, or 20 to 30VDC, 10VA
Frequency for AC	50 to 60 Hz
Current output	4 × 0/4 to 20 mA, 22 mA alarm (according to Namur NE43)
Display	4.0" TFT b/w touchscreen, 320 × 240 pixels
Languages	10 (English, German, French, Italian, Spanish, Portuguese, Russian, Japanese, Korean and Chinese)
Ambient temperature	-20 to +50 °C (-4 to 122 °F)
Relative humidity	0 to 95 % non-condensing
Rating	IP66 NEMA 4X
Approvals	Type 1, 2, 3: cCSAus Class I Division 2, ATEX IECEX Zone 2, cFMus Class I Division 2, NEPSI Zone 2 Type 1 Cond Ind: cFMus Class I Division 2, ATEX Zone 2
PID process controller	Yes
Control input (Hold)	2
USB interface	1 × USB Host: Data logging and configuration storage on USB stick 1 × USB Device: Software update interface

Other Highlights

- Plug and Measure functionality
- IP 66 rated
- Graphic trending
- Transmitter configuration tool



Did You Know

With tools such as the Dynamic Lifetime Indicator, Time To Maintenance and Adaptive Calibration Timer, ISM technology on the M400 offers true predictive maintenance, resulting in fewer unscheduled shutdowns.

► www.mt.com/M400

Parameter Specifications

pH/ORP (incl. pH/pNa)

Measurement parameters	pH, mV and temperature
pH display range	-2.00 to +16.00 pH
pH resolution	Auto/0.001/0.01/0.1/1 (can be selected)
pH accuracy ¹⁾	Analog: ±0.02 pH
mV range	-1500 to +1500 mV
mV resolution	Auto/0.001/0.01/0.1/1 mV (can be selected)
mV accuracy ¹⁾	Analog: ±1 mV
Temperature input ²⁾	Pt 1000/Pt 100/NTC 22k
Temperature measuring range	-30 to +140 °C (-22 to +284 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature accuracy ¹⁾	Analog: ±0.25 °C (±0.45 °F)
Temperature compensation	Automatic/Manual
Max. sensor cable length	Analog: 10 to 20 m (33 to 65 ft) depending on sensor ISM: 80 m (260 ft)
Calibration	1-point, 2-point or process

1) ISM input signal causes no additional error.

2) Not required on ISM sensors

Amperometric oxygen

Measurement parameters	Dissolved oxygen (DO): Saturation or concentration and temperature Oxygen in gas: Concentration and temperature
Measuring current range	Analog: 0 to -7000 nA
Oxygen display ranges	Dissolved oxygen Saturation: 0 to 500 % air, 0 to 200 % O ₂ -sat Concentration: 0 ppb (µg/L) to 50.00 ppm (mg/L) In gas Saturation: 0 to 100 vol-% O ₂ Concentration: 0 to 9999 ppb O ₂ gas
Oxygen accuracy ¹⁾	Dissolved oxygen: Saturation ±0.5 % of the measured value or ±0.5 %, depending on which is larger. Concentration at high values: ±0.5 % of the measured value or ±0.050 ppm/±0.050 mg/L, depending on which is larger. Concentration at low values: ±0.5 % of the measured value or ±0.001 ppm/±0.001 mg/L, depending on which is larger In gas: ±0.5 % of the measured value or ±5 ppb, depending on which is larger for ppm O ₂ gas. ±0.5 % of the measured value or ±0.01 %, depending on which is larger for vol-% O ₂ .
DO resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Polarization voltage	O ₂ High: Cal/Meas: -675 mV (configurable) O ₂ Low: Cal: -675 mV, Meas: -500 mV (configurable)
Temperature input	Pt 1000/Pt 100/NTC 22k
Temperature compensation	Automatic
Temperature measuring range	-10 to +80 °C (+14 to +176 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C (°F) (can be selected)
Temperature accuracy ¹⁾	±0.25 °C (±0.45 °F)
Max. sensor cable length	Analog: 20 m (65 ft) ISM: 80 m (260 ft)
Calibration	1-point (slope and offset) or process (slope and offset)

1) ISM input signal causes no additional error.

Optical oxygen

Measurement parameters	Dissolved oxygen (DO): Saturation or concentration and temperature Oxygen in gas: Concentration and temperature
Oxygen display ranges	Dissolved oxygen Saturation: 0 to 500 % air, 0 to 200 % O ₂ -sat Concentration: 0 ppb (µg/L) to 50.00 ppm (mg/L) In gas Saturation: 0 to 100 vol-% O ₂ Concentration: 0 to 9999 ppb O ₂ gas
Oxygen accuracy	±1 digit
Oxygen resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature compensation	Automatic
Temperature measuring range	-30 to +150 °C (-22 to +302 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C (°F) (can be selected)
Temperature accuracy	±1 digit
Max. sensor cable length	80 m (260 ft)
Calibration	1-point (depending on sensor model) 2-point or process, process scaling

Dissolved carbon dioxide

Measurement parameters	Dissolved carbon dioxide and temperature
CO ₂ display range	0 to 5000 mg/L 0 to 200% sat 0 to 1500 mm Hg 0 to 2000 mbar 0 to 2000 hPa
CO ₂ accuracy	± 1 digit
CO ₂ resolution	Auto/0.001/0.01/0.1/1 (can be selected)
mV range	-1500 to +1500 mV
mV resolution	Auto/0.01/0.1/1 mV (can be selected)
mV accuracy	± 1 digit
Total pressure range	0 to 4000 mbar
Temperature measuring range	-30 to +150 °C (-22 to +302 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C (°F) (can be selected)
Temperature accuracy	± 1 digit
Max. sensor cable length	80 m (260 ft)
Calibration	1-point (offset), 2-point (slope and offset) or process (offset)

CO₂ hi (thermal conductivity)

Measurement parameters	Dissolved carbon dioxide and temperature
CO ₂ display ranges	0 to 10 bar p (CO ₂)/0 to 145 psi p (CO ₂) 0 to 15 g/L 0 to 7 V/V CO ₂
Accuracy in fluids ¹⁾	± 1 % of reading (within ± 5 % of calibration temperature) ± 2 % of reading over temperature range 0 to 50 °C (32 to 122 °F)
Calibration	1-point or process

1) Complete loop of sensor and transmitter

GPro 500 TDL

Measurement parameters	O ₂ , O ₂ and temperature, CO (ppm), CO (%) , H ₂ O, CO ₂ (%), H ₂ S, HCl
Gas display ranges	0 to 100 %
Gas accuracy, resolution, repeatability and low detection limit	Depending on sensor model
Linearity	Better than 1 %
Drift	Negligible (< 2 % of measurement range between maintenance intervals)
Sampling rate	1 second
Response time (t ₉₀)	Depending on sensor model
Process pressure ranges	Depending on sensor model
Process temperature ranges	0 to 250 °C (32 to 482 °F) optional (for probe installation) 0 to 600 °C (32 to 1112 °F) with additional thermal barrier 0 to 150 °C (32 to 302 °F) (white cell)
Max. sensor cable length	40 m (130 ft) (FM version)
Calibration	1-point (offset) or process (slope or offset)

Dissolved ozone

Measurement parameters	Concentration and temperature
Display range for current	Analog: 0 to -7000 nA
Ozone measuring range	0 to 5000 ppb (µg/L) O ₃
Ozone accuracy	± 1 % (or 0.4 ppb) up to 2000 ppb ± 2.5 % (or 50-125 ppb) from 2000 to 5000 ppb
Resolution	± 1 digit
Temperature compensation	Automatic
Temperature measuring range	5 to +50 °C (+41 to +122 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature accuracy 1)	Analog: ± 0.25 °C (± 0.45 °F)
Max. sensor cable length	80 m
Calibration	1-point (offset) or process (slope and offset)

Conductivity 2-e/4-e

Measurement parameters	Conductivity/resistivity and temperature
Conductivity ranges	See sensor specification
Chemical concentration curves (used with 4-e sensors)	NaCl: 0–26 % @ 0 °C to 0–28 % @ +100 °C NaOH: 0–12 % @ 0 °C to 0–16 % @ +40 °C to 0–6 % @ +100 °C HCl: 0–18 % @ –20 °C to 0–18 % @ 0 °C to 0–5 % @ +50 °C HNO ₃ : 0–30 % @ –20 °C to 0–30 % @ 0 °C to 0–8 % @ +50 °C H ₂ SO ₄ : 0–26 % @ –12 °C to 0–26 % @ +5 °C to 0–9 % @ +100 °C H ₃ PO ₄ : 0–35 % @ +5 °C to +80 °C
TDS ranges	NaCl, CaCO ₃
Cond/Res accuracy ¹⁾	Analog: ±0.5 % of reading or 0.25 Ω, whichever is greater
Cond/Res repeatability ¹⁾	Analog: ±0.25 % of reading or 0.25 Ω, whichever is greater
Cond/Res resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature input	PT1000
Temperature measuring range	–40 to +200 °C (–40 to +392 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature accuracy (±0.90 °F) outside	Analog: ±0.25 °C (±0.45 °F) within –30 to +150 °C (–22 to +302 °F); ±0.50 °C
Max. sensor cable length	Analog: 2-e sensors: 61 m (200 ft); 4-e sensors: 15 m (50 ft) ISM: 2-e sensors: 90 m (300 ft); 4-e sensors: 80 m (260 ft)
Calibration	1-point, 2-point or process

1) ISM input signal causes no additional error.

Ordering information

Transmitter	Order Number
M400 Type 1 ISM	30 490 171
M400 Type 2 ISM	30 490 172
M400 Type 1 Cond Ind	52 121 495
M400 Type 1	30 374 111
M400 Type 2	30 374 112
M400 Type 3	30 374 113
M400 FF 4-wire	30 374 121

Installation Accessories

	Order Number
Pipe mounting kit for ½ DIN	30 300 480
Panel mount kit for ½ DIN	30 300 481
Wall mounting kit for ½ DIN	30 300 482
Protective hood	30 073 328

Parameter Fit Guide

	M400 Type 1		M400 Type 2 M400 4-wire FF		M400 Type 3	
	Analog	ISM	Analog	ISM	Analog	ISM
pH/ORP	•	•	•	•	•	•
pH/pNa	–	•	–	•	–	•
UniCond 2-e/4-e	–	•	–	•	–	•
Conductivity 2-e	•	–	•	–	•	–
Conductivity 4-e	•	•	•	•	•	•
Amp. dissolved oxygen ppm/ppb/trace	–	–	•/• ¹⁾ 2)/–	•/• ¹⁾ 2)/–	•/•/•	•/•/•
Opt. dissolved oxygen ppm/ppb	–	–	–/–	•/• ¹⁾	–/–	•/•
Amp. O ₂ gas ppm/ppb/trace	–	–	–/–/–	–/–/–	•/•/•	•/•/•
Opt. O ₂ gas ppm	–	–	–	–	–	•
Dissolved ozone	–	–	•	•	•	•
Dissolved carbon dioxide	–	–	•	•	•	•
CO ₂ hi	–	–	–	–	–	•
GPro 500 TDL	–	–	–	–	–	•

1) Thornton high performance dissolved oxygen and pure water optical sensors only

2) M400 4-wire FF supports Ingold Amp. DO ppb sensors

M800: Multi-Parameter, Multi-Channel Transmitter

Touch the Future



Features Overview

- Color touchscreen
- Intuitive operation
- Premium ISM functionality
- Multi-parameter measurement
- 1-/2-/4-channel versions
- iMonitor™
- User management and logbook

Other Highlights

- 8 current outputs
- 8 output relays
- Traffic light coded sensor information
- IP 66 rated
- 2 PID process controllers

► www.mt.com/M800

The M800 transmitter series features premium Intelligent Sensor Management (ISM) technology measuring pH/ORP, optical DO, amperometric oxygen (DO as well as O₂ gas), dissolved carbon dioxide, turbidity and conductivity. The multi-parameter transmitter accepts any compatible combination of ISM sensors. Up to four channels of process measurement provides immediate Plug and Measure installation and operation, predictive sensor maintenance and dynamic lifetime status. The color touchscreen ensures intuitive operation, with user selectable control and alarm management.

Specifications

General Specification

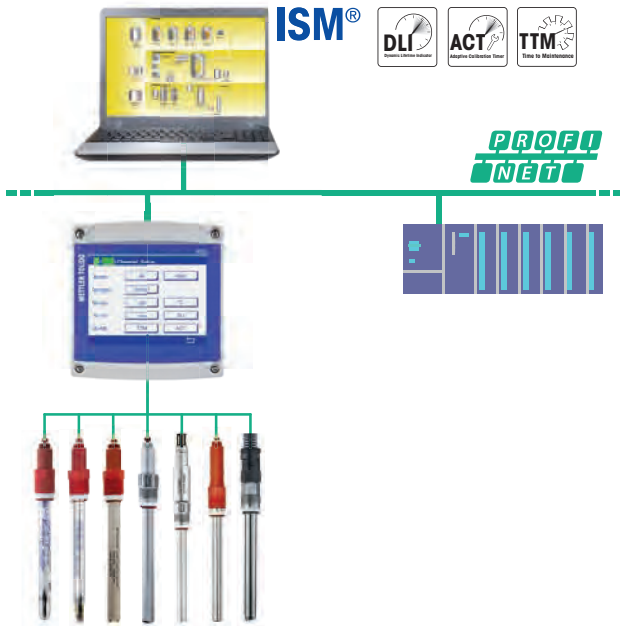
Measurement parameters	pH/ORP, amperometric and optical oxygen, conductivity, dissolved carbon dioxide, turbidity and temperature
ISM	Plug and Measure, advanced diagnostics (Dynamic Lifetime Indicator, Adaptive Calibration Timer, CIP/SIP counter etc.), iMonitor
Power supply	100 to 240VAC, or 20 to 30VDC, 12 VA
AC frequency	50 to 60Hz
Current (analog) outputs ¹⁾	8 × 0/4 to 20 mA, 22 mA alarm
User interface	Color touchscreen 5.7", resolution 320 × 240 px, 256 colors
Languages	10 (English, German, French, Italian, Spanish, Portuguese, Russian, Japanese, Korean and Chinese)
Ambient temperature	–20 to 50 °C (–4 to 122 °F)
Relative humidity	0 to 95 %, non-condensing
Rating	IP 66
PID process controller	2
Control input (Hold)	Yes
Analog input	Yes
Alarm contact	Yes (alarm delay 0 to 999 s)
Measuring range	Parameter and sensor depending
Measuring accuracy	± 1 digit (sensor depending)
Measuring repeatability	± 1 digit (sensor depending)
Measuring resolution	Auto/0.001/0.01/0.1/1 (can be selected)

1) Not supported on Profinet model.



Did You Know

The M800 1-channel transmitter with mixed mode functionality supports analog and digital ISM sensors.



M800 Profinet series is multi-parameter transmitter featuring Intelligent Sensor Management technology. It covers ISM sensors for pH/ORP, optical DO, amperometric oxygen (DO as well as O₂ gas), dissolved carbon dioxide and conductivity, provide all ISM measurements and diagnostics information to a centralized control system for data management including predictive diagnostics. It has 1-channel and 2-channel models. Besides the intuitive operation and alarm management that provided by exist M800, the Profinet interface provides easy integration of sensor diagnostics tools into process control systems, minimum commissioning time and engineering support, saves the integration efforts and costs.

Pure digital communication within loop and real-time measurements, sensor diagnostics and monitoring provides greater process reliability, lower maintenance costs.

Profinet Specifications

Data transmission rate	10/100 MBd
Connector	RJ45, M12 optional
IP address	DCP(default) or configuration via menu

Other Highlights

- Pure digital communication within loop and real-time sensor aging monitoring provides greater process reliability
- Easy integration of measurement and diagnostics data from the sensor up to the process control level
- Advanced diagnostic settings for efficient and reliable plant management

M800 Profinet Parameter fit guide

Version	Process 1-ch	Process 2-ch
Part no.	30 530 021	30 530 022
pH/ORP	•	•
pH/pNa	•	•
UniCond 2e/4e	•	•
Cond 4e	•	•
Amp. DO ppm/ppb/trace	•/•/•*	•/•/•*
Amp. O₂ gas ppm/ppb/trace	•/•/•*	•/•/•*
Optical DO	•**	•**
Dissolved Carbon Dioxide	•	•
CO₂ hi (thermal conductivity)	•**	•**
Dissolved O₃	–	–
Flow	–	–

* INGOLD sensors

** One optical DO or thermal conductivity CO₂ sensor can be used together with 2-channel transmitter.

Ordering Information

Transmitters	Order Number
M800 Process 1-channel	30 026 633
M800 Process 2-channel	52 121 813
M800 Process 4-channel	52 121 853
M800 1-channel, stainless steel enclosure	30 246 551
M800 2-channel, stainless steel enclosure	30 246 552
M800 4-channel, stainless steel enclosure	30 246 553
M800 Profinet 1-channel Process	30 530 021
M800 Profinet 2-channel Process	30 530 022

Installation Accessories

Installation Accessories	Order Number
Pipe mounting kit for ½ DIN	30 300 480
Panel mounting kit	52 500 213
Protective hood	30 073 328

Parameter Fit Guide

Description	Analog Sensors (M800 1-channel only)	ISM Sensors
M800 Process 1-channel / 2-channel / 4-channel	pH/ORP, Cond 2-e/4-e Amp. DO (high), Amp. O ₂ Gas (high), Turbidity (backscatter)	pH/ORP, UniCond 2-e, Cond 4-e, Amp. DO (high/low/trace), Amp. O ₂ Gas (high/low), Optical DO*, CO ₂ high*, CO ₂ Turbidity (only M800 1-channel)

* One (two) optical DO or thermal conductivity CO₂ sensor(s) can be used with 2-channel (4-channel) transmitter.

M800 parameter fit guide for 2-channel and 4-channel versions

These versions are compatible with the following (digital) ISM sensors.

Parameter	Process 1)	
	2-channel	4-channel
pH/ORP	•	•
pH/pNa	•	•
UniCond 2-e	•	•
Conductivity 4-e	•	•
Amp. dissolved oxygen ppm/ppb/trace	•/•/• ²⁾	•/•/• ²⁾
Amp. oxygen gas ppm/ppb/trace	•/•/• ²⁾	•/•/• ²⁾
Optical dissolved oxygen	• ^{2), 3)}	• ^{2), 3)}
Dissolved carbon Dioxide (InPro 5000 i)	•	•
CO ₂ hi (InPro 5500 i)	• ³⁾	• ³⁾
TOC/Dissolved ozone/Flow	-/-/-	-/-/-

1) Process models are provided in polycarbonate or stainless steel housing or stainless steel housing. 2) Ingold sensors.

3) 2-channel: An opt. dissolved sensor or a CO₂ hi sensor has to be connected to channel 2. 4-channel: Optical dissolved sensors and CO₂ hi sensors have to be connected to channel 2 and/or to channel 4.

M800 parameter fit guide for 1-channel

This version is compatible with the following (digital) ISM and analog sensors.

Parameter	Process 1)	
	Analog	ISM
pH/ORP	•	•
pH/pNa	-	•
UniCond 2-e/UniCond 4-e	-/-	•/•
Conductivity 2-e/Conductivity 4-e	•/•	-/•
Amp. dissolved oxygen ppm/ppb/trace	•/•/• ²⁾	•/•/• ²⁾
Amp. oxygen gas ppm/ppb/trace	•/•/• ²⁾	•/•/• ²⁾
Optical dissolved oxygen	-	• ²⁾
Dissolved carbon dioxide (InPro 5000 i)	-	•
CO ₂ hi (InPro 5500 i)	-	•
Turbidity	• (backscatter)	•

1) Process models are provided in polycarbonate or stainless steel housing or stainless steel housing. 2) Ingold sensors.

M100 Head Mount: Compact and Robust

Small Footprint Installation for Hazardous Areas



The M100 Head Mount (HM) is a single-channel, multi-parameter transmitter compatible with ISM sensors for measuring pH/ORP, pH/pNa, oxygen and conductivity. Thanks to its compact head mount design the M100 HM 2-wire requires only a small footprint in the plant. With its explosion proof/flameproof enclosure and intrinsically safe electronics the M100 HM offers the most versatile measurement solution for both hazardous and non-hazardous area installation. Featuring ISM functionality the M100 HM greatly reduces maintenance efforts, resulting in significant cost savings. Carrying the HART protocol the M100 HM allows easy transmitter configuration and integration of sensor diagnostics into asset management platforms.

Specifications

General

Supply voltage	14 to 30VDC
Number of outputs	1 × 4 to 20mA (loop powered)
Ambient temperature	-20 to 60 °C (-4 to 140 °F)
Relative humidity	0 to 95 % non-condensing
Enclosure rating	IP 66/NEMA 4X
Housing material	Stainless steel
Approvals	M100 HM/2XH: ATEX/IECEx Zone 1, CSA Class I; II, III Div 1, Class 1, Zone 0, NEPSI Ex Zone 1
Hold input	Yes
Analog input	Yes
Communication	HART
Asset management tool compatibility	AMS versions 10 and 11, Simatic™ PDM version 6/8, FDT frame applications

Features Overview

- CSA approval
- Explosion proof/flameproof housing (a barrier is required)
- Intrinsically safe
- Multi-parameter unit
- HART communication
- IP 66/NEMA 4X rated
- Configuration via asset management tools

ISM Highlights

- Plug and Measure functionality
- CIP/SIP/Autoclaving counter
- Dynamic Lifetime Indicator
- Adaptive Calibration Timer
- Easy installation and fast commissioning



Did You Know

The support of all major asset management tools through the M100 ensures maximum compatibility, and easy integration of sensor diagnostics.

M100 DIN Rail: High Performance and Minimal Space Requirement Compact Design for Simplified Installation



The M100 DIN Rail (DR) is a single-channel, 2-wire multi-parameter transmitter with HART communication capability for analytical measurements. It is compatible with ISM sensors for measuring pH/ORP, pH/pNa, oxygen and conductivity. The ISM's Plug and Measure feature minimizes the risk of installation troubles and simplifies sensor handling and LEDs clearly indicate transmitter and sensor status, alarms, and warnings.

Thanks to its compact design the M100 DR requires only a small installation space in the plant.

The transmitter configuration and integration of sensor diagnostics into asset management tools is possible thanks to the integrated HART protocol. The support of all major asset management tools ensures maximum compatibility and easy integration of sensor diagnostics.

Specifications

General

Supply voltage	14 to 30VDC
Number of outputs	1 × 4 to 20 mA (loop powered)
Ambient temperature	- 10 to 60 °C (14 to 140 °F)
Relative humidity	0 to 95 % non-condensing
Enclosure rating	IP 20
Housing material	PA-FR
Hold input	Yes
Analog input	1 × 4 to 20 mA (for pressure compensation)
Communication	HART
Asset management tool compatibility	AMS versions 10, 11, 12, Simatic 6,8x, FDT frame applications

Features Overview

- DIN rail mounting, suitable for 35 mm wide DIN rail systems
- Compact housing, 22.5 mm width
- Displayless
- Multi-parameter transmitter
- 1 analog output (4 to 20 mA with HART)
- HART communication as standard
- Configuration via HART handheld or other HART asset management tools

ISM Highlights

- Plug and Measure functionality
- Dynamic Lifetime Indicator
- Adaptive Calibration Timer
- Time To Maintenance
- CIP/SIP/Autoclaving counter
- Easy installation and fast commissioning

► www.mt.com/M100

M100 Sensor Mount Transmitter: Digital Sensor Integration for Analog and Digital Biocontrollers Smallest Footprint for Simplified Installation



The M100 Sensor Mount (SM) is a single-channel, multi-parameter transmitter. It allows the connection on biocontrollers of 1-wire ISM sensors for measuring pH, ampDO and CO₂ or ISM RS 485 optical oxygen sensors. The M100 SM has a Bluetooth 4.0 interface which is compatible with the PC-based and mobile versions of iSense software. Two independent interfaces are implemented: two configurable 4/20 mA analog outputs and one digital MODBUS RTU. LEDs clearly indicate sensor status, alarms and warnings. ISM's Plug and Measure feature minimizes the risk of installation trouble and simplifies sensor handling.

Specifications

ISM features	Plug and Measure, DLI, ACT, TTM
Enclosure	IP67
Mounting	On head of 1-wire sensor: AK9 On head of RS485 sensor: VP8
Supply voltage	24 VDC
Analog output	Active 2 × 4 to 20 mA, galvanically isolated to passive DCS card
Communication	Wireless: BT 4.0 iSense PC-based and iSense mobile (Android, iOS) Wired: Digital interface RS485 MODBUS RTU
Sensor compatibility	ISM 1-wire pH, amperometric DO and carbon dioxide sensors. ISM RS485 optical DO sensors

Features Overview

- Configurable alarms
- Device naming
- MODBUS communication
- ISM functionality
- Multi-parameter unit
- Configuration via iSense/iSense Mobile
- Process calibration with iSense/iSense mobile or MODBUS
- Color LED indication of sensor status
- Intuitive operation with iSense
- iMonitor

Other Highlights

- CIP/SIP counter
- Dynamic Lifetime Indicator
- Adaptive Calibration Timer
- Easy installation
- Error-free operation: configuration stored in transmitter
- Electronic Data Management with iSense

M80 Sensor Mount Transmitter

ISM Solution for Benchtop Controllers



The M80 Sensor Mount (SM) Transmitter is a compact single-channel, multi-parameter transmitter designed especially for biocontroller manufacturers. Its small footprint allows mounting on ISM sensors used in benchtop bioreactors with a typical volume of 1–20 liters. A MODBUS RTU interface enables straightforward and digital integration of sensor measurement data, ISM diagnostic information, and calibration routines into the biocontroller firmware. In addition, visualization of ISM features on the controller’s graphical user interface becomes possible. The M80 SM is compatible with METTLER TOLEDO pH/ORP, amperometric dissolved oxygen, dissolved CO₂, and conductivity sensors.

Specifications

ISM	Plug and Measure, DLI, ACT, TTM
Power supply	24 VDC (min. 100 mA), 8–30 VDC (min. 2 W)
Operating temperature	–15 to +60 °C (5 to 140 °F)
Relative humidity	5 ... 95 % rH (non-condensing)
Mounting	AK9 connector on head of 1-wire sensor
Cable connection	M12/5-pin for RS485 interface and power supply
Communication	MODBUS RTU protocol
Dimensions	Height: 94 mm (3.7"), Maximum diameter: 22 mm (0.87")
Protection class	IP65

Features Overview

- Small footprint on bioreactor head plate
- Enables ISM functionality in biocontroller software
- Access to sensor calibration routines via the biocontroller
- No sensor configuration necessary due to internal storage of installation point specific data (MODBUS parameters)
- Trouble-free sensor integration thanks to Plug and Measure
- Configurable with M80 SM Transmitter Configuration Tool PC software and Transmitter Configuration Box

Other Highlights

- Robust digital sensor integration
- Ideal for ISM solutions in R&D environment and down-scaling applications
- Pre-batch sensor diagnostics for more robust processes
- Enables electronic traceability of sensors used in different batches
- Less electronic waste compared to pH sensors with permanently integrated transmitter electronics



Parameter Fit guide

Parameter	M100 HM/2XH	M100 DR	M100 SM 1-wire	M100 SM RS485	M80 SM
pH/ORP	•	•	•	–	•
pH/pNa	•	•	•	–	–
Conductivity 4-e	•	•	–	–	•
Amp. DO ppm/ppb/trace	•/•/•	•/•/•	•/•/•	–	•/–/–
Opt. DO ppm	–	–	–	•	–
Amp. O ₂ gas ppm	•	–	–	–	–
Dissolved carbon dioxide	–	–	•	–	•

Ordering Information

Transmitter	Order Number
M100 HM/2XH M20, 1-channel multi-parameter	30 026 578
M100 HM/2XH NPT ¾", 1-channel multi-parameter	30 246 352
M100 DR/2H, 1-channel multi-parameter	30 127 720
M100 SM, 1-wire	30 365 366
M100 SM, RS485	30 365 367
M80 SM Transmitter	30 530 566

Accessories	Order Number
iSense	30 130 614
iSense CFR	30 283 620
iSense dongle	30 371 387
iLink Multi	30 130 631
iLink Multi cable/set oDO (RS485)	30 355 582
M100SM adapter and power supply	30 404 002
CalBox (upgraded with temperature sensor)	52 300 400
Transmitter Configuration Box (cable set included) (M80)	30 530 567
5-pin data cable 2 m (6.6 ft)	52 300 379
5-pin data cable 5 m (16.4 ft)	52 300 380
5-pin data cable 10 m (32.8 ft)	52 300 381

M400 2-Wire: Reliable and Intelligent For Hazardous and Non-Hazardous Area Applications



Features Overview

- NEPSI Ex/ATEX/FM approved
- Mixed-mode input (analog or ISM sensors accepted)
- Multi-parameter unit
- 4 to 20 mA (with HART) or FOUNDATION fieldbus version or PROFIBUS PA
- Compatible with ODO sensors
- IP 66/NEMA 4X rated

Other Highlights

- Plug and Measure functionality
- CIP/SIP/Autoclaving counter
- Dynamic Lifetime Indicator
- Adaptive Calibration Timer
- Quick set up mode for fast installation

The M400 2-wire, single-channel, multi-parameter transmitter for pH/ORP, dissolved oxygen, gas phase oxygen, conductivity and dissolved carbon dioxide provides highest reliability and process safety in hazardous and non-hazardous area environments. Advanced ISM functionality enables predictive maintenance resulting in reduced operating costs and helps to improve productivity. The HART, FOUNDATION fieldbus (FF) or PROFIBUS PA interface provides easy integration of sensor diagnostics tools into process control systems.

Specifications

General

Display	Backlit LCD, 4 lines
Languages	8 (English, German, French, Italian, Spanish, Portuguese, Russian and Japanese)
Ambient temperature	-20 to 60 °C (-4 to 140 °F)
Relative humidity	0 to 95 % non-condensing
Enclosure rating	IP 66/NEMA 4X
Housing material	Aluminum die cast

Certificates and Approvals

M400/2H:	FM cFmus Cl.I Div.2
M400(G)/2XH:	ATEX/IECEx Zone 1, FM cFmus Cl.I Div.1 NEPSI Ex Zone 1, TIIS, KCS
M400FF:	ATEX / IECEx Zone 1, FM cFmus Cl.I Div.1 NEPSI Ex Zone 1
M400PA:	ATEX / IECEx Zone 1, FM cFmus Cl.I Div.1 NEPSI Ex Zone 1

PID process controller	Yes (except M400 PA)
Analog input	Yes

4 to 20 mA with HART

Power voltage	14 to 30 VDC
Number of outputs	2 x 4 to 20 mA (loop powered)
Hold input	Yes
Alarm contact	Yes (alarm delay 0 to 999 s)
Asset management tool compatibility	AMS versions 10 and 11, Simatic PDM version 6/8, FDT frame applications

Fieldbus Interface

Current	22 mA
Max. current in case of fault (FDE)	<28 mA
Number of current inputs	1 for pressure compensation
Supply voltage	Non-hazardous area (Non-IS): 9 to 32 VDC Linear Barrier: 9 to 24 VDC FISCO: 9 to 17.5 VDC

PROFIBUS PA

Physical interface	According to ICE 61 158-2
Profile	PROFIBUS PA 3.02
ITK version	6.0.1

FOUNDATION fieldbus

Profile	FF_H1
---------	-------

► www.mt.com/M400-2wire

Parameter Specifications**pH, pH/pNa and ISFET Performance**

Measurement parameters	pH, mV, and temperature
pH, ORP input range*	-1500 to 1500 mV
pH display range	-2 to 16 pH
Resolution	0.001/0.01/0.1/1 (can be selected)
Relative accuracy	±0.02 pH; ±1 mV
Temperature input	Pt 1000, Pt 100, NTC 22 kΩ
Temperature compensation	Automatic/manual
Temperature measuring range	-30 to 130 °C (-22 to 266 °F)
Temperature resolution	0.001/0.01/0.1/1 °C/°F (can be selected)
Temperature measurement error*	±0.25 °C (±0.45 °F)
Max. length sensor cable	analog: 20 m (65 ft), depending on sensor; ISM 80 m (260 ft)
Calibration	1 or 2 point calibration, process calibration

* For analog input signal (ISM input signal causes no additional error)

Oxygen Performance

Measurement parameters	- Dissolved oxygen: Saturation or concentration and temperature - Oxygen in gas: Concentration and temperature
Current range	0 to 7000 nA
Oxygen measuring ranges	- Dissolved oxygen: Saturation 0 to 500 % air, 0 to 200 % O ₂ Concentration 0.1 ppb (µg/L) to 50.00 ppm (mg/L) - In gas: 0 to 9999 ppm O ₂ gas, 0 to 100 Vol-% O ₂
Oxygen accuracy*	
- Dissolved oxygen saturation	±0.5 % of the measured value or ±0.5 % air, whichever is greater. Concentration at high values: ±0.5 % of the measured value or ±0.050 ppm/±0.050 mg/L, whichever is greater. Concentration at low values: ±0.5 % of the measured value or ±0.001 ppm/±0.001 mg/L, whichever is greater.
- In gas:	±0.5 % of the measured value or ±5 ppb, whichever is greater for ppm O ₂ gas. ±0.5 % of the measured value or ±0.01 %, whichever is greater for Vol-% O ₂ .
Resolution current	6 pA
Polarization voltage	- 1000 to 0 mV for analog sensors - 550 mV or - 674 for ISM sensors (configurable)
Temperature input	Pt 1000
Temperature compensation	Automatic
Temperature measuring range	-30 to 150 °C (-22 to 302 °F)
Temperature accuracy*	±0.25 K in the range of -10 to +80 °C (14 to +176 °F)
Max. length sensor cable	analog: 20 m (65 ft); ISM 80 m (260 ft)
Calibration	1-point (slope or offset) calibration, process calibration (slope or offset) calibration

* For analog input signal (ISM input signal causes no additional error)

Conductivity Performance

Measurement parameters	Conductivity, and temperature
Conductivity ranges (2-e/4-e)	2-electrode sensor: 0.02 to 2000 µS/cm (500 Ω × cm to 50 MΩ × cm) 4-electrode sensor: 0.01 to 650 mS/cm (1.54 Ω × cm to 0.1 MΩ × cm)
Temperature input	Pt 1000
Temperature measuring range	-40 to 200 °C (-40 to 392 °F)
Max. length sensor cable	60 m (196.9 ft) with 2-electrode sensor, 15 m (50 ft) with 4-electrode sensor 80 m (260 ft) with ISM sensor
Cond/Res accuracy*	±0.5 % of reading or 0.25 Ω, whichever is greater, up to 18 MΩ × cm
Cond/Res repeatability*	±0.25 % of reading or 0.25 Ω, whichever is greater
Cond/Res resolution	0.001/0.01/0.1/1 (can be selected)
Temperature resolution	0.001/0.01/0.1/1 °C/°F (can be selected)
Temperature accuracy*	±0.25 °C (±0.45 °F)
Temperature repeatability*	±0.13 °C (±0.23 °F)
Chemical concentration curves	NaCl, NaOH, HCl, HNO ₃ , H ₂ SO ₄ , H ₃ PO ₄ User-defined concentration table (5 × 5 matrix) TDS ranges NaCl, CaCO ₃
Calibration	1 or 2 point calibration, process calibration

* For analog input signal (ISM input signal causes no additional error)

Parameter Specifications (continued)

Optical Oxygen Performance

Measurement parameters	DO saturation or concentration and temperature
DO saturation range	0 to 500%, 0 to 100% O ₂
DO resolution	Auto/0.001/0.01/0.1/1 (can be selected)
DO accuracy	± 1 digit
Temperature resolution	Auto/0.001/0.01/0.1/1 °C (°F) (can be selected)
Temperature accuracy	± 1 digit
Temperature compensation	Automatic
Max. length sensor cable	15 m (50 ft)
Calibration	1 point (depending on sensor model), 2 point, process calibration

Dissolved Carbon Dioxide Performance

Measurement parameters	Dissolved carbon dioxide and temperature
Dissolved carbon dioxide range	0 to 5000 mg/L, 0 to 200% sat, 0 to 1500 mmHg, 0 to 2000 mbar, 0 to 2000 hPa
mV range	-1500 to 1500 mV
Total pressure range	0 to 4000 mbar
Dissolved carbon dioxide accuracy	± 1 digit
Resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature range	-30 to 150 °C (-22 to 302 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 °C/°F (can be selected)
Temperature accuracy	± 1 digit
Temperature repeatability	± 1 digit
Max. length sensor cable	80 m (260 ft)
Calibration	1 or 2 point calibration, process calibration

Inductive Conductivity (M400 Cond Ind transmitter only)

Measurement parameters	Conductivity and temperature
Display range	0 to 2,000 mS/cm
Chemical concentration curves	NaCl: 0-26% @ 0 °C to 0-28% @ +100 °C NaOH-1: 0-13% @ 0 °C to 0-24% @ +100 °C NaOH-3: 15-50% @ 0 °C to 35-50% @ +100 °C HCl-1: 0-18% @ -20 °C to +50 °C HCl-2: 22-39% @ -20 °C to +50 °C HNO ₃ -1: 0-30% @ -20 °C to +50 °C HNO ₃ -2: 35-96% @ -20 °C to +50 °C H ₂ SO ₄ -1: 0-26% @ -12 °C to 0-37% @ +100 °C H ₂ SO ₄ -2: 28-88% @ 0 °C to 39-88% @ +95 °C H ₂ SO ₄ -3: 94-99% @ -12 °C to 89-99% @ +95 °C H ₃ PO ₄ : 0-35% @ +5 °C to +80 °C User-defined concentration table (5 × 5 matrix)
TDS ranges	NaCl, CaCO ₃
Conductivity accuracy	± 1.0 % of reading or ± 0.005 mS/cm
Conductivity repeatability	± 1.0 % of reading or ± 0.005 mS/cm
Conductivity resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature input	PT1000/PT100/NTC22K
Temperature measuring range	-40 to +200 °C (-40 to +392 °F)
Temperature resolution	Auto/0.001/0.01/0.1/1 (can be selected)
Temperature accuracy	± 0.25 K (± 0.45 °F) within -30 to +150 °C (-22 to +302 °F); ± 0.50 K (± 0.90 °F) outside
Temperature repeatability	± 0.13 K (± 0.23 °F)
Max. sensor cable length	10 m (32.8 ft)
Calibration	1-point, zero point or process

Ordering Information

Transmitter	Order Number
M400/2H, 1-channel multi-parameter	30 025 514
M400/2XH, 1-channel multi-parameter	30 025 515
M400/2XH 1-channel Cond Ind	30 256 307
M400G/2XH, 1-channel multi-parameter	30 025 516
M400FF, 1-channel multi-parameter	30 026 616
M400PA, 1-channel multi-parameter	30 026 617

Accessories

Accessories	Order Number
Pipe mounting kit for 1/2 DIN	30 300 480
Panel mounting kit for 1/2 DIN	52 500 213
Protective hood	52 500 214

Transmitter Fit Guide

Parameter	M400/2(X)H		M400 2XH Cond Ind	M400G/2XH		M400FF		M400 PA	
	Analog	ISM	Analog	Analog	ISM	Analog	ISM	Analog	ISM
pH/ORP	•	•	–	•	•	•	•	•	•
Conductivity 2-e	•	–	–	•	–	•	–	•	–
Conductivity 4-e	•	•	–	•	•	•	•**	•	•**
Amp. DO* ppm/ppb/trace	•/•/•	•/•/•	–	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•	•/•/•
Amp. O ₂ gas	–	–	–	•	•	•	•	•	•
Optical oxygen ppm/ppb	–	•/•	–	–	•/•	–	•/•	–	•/•
Dissolved carbon dioxide (low)	–	•	–	–	•	–	•	–	•
Inductive conductivity	–	–	•	–	–	–	–	–	–

* Ingold and Thornton sensors

** Ingold sensors