INGOLD
Leading Process Analytics

M100 / M300 / M400 / M700 / M800

Transmitters

Reliable Measurement

Intelligent Diagnostics

Versatile and Tailorable

Easy Handling

ISM®
Intelligent Sensor Management

Intelligent Transmitter Series
Tailor the Measurement to Your Needs

METTLER TOLEDO

METTLER TOLEDO
Commitment to Innovation and Quality

METTLER TOLEDO Group

Our company specializes in providing precision instrument equipment and related services to industrial customers. In 2013, METTLER TOLEDO generated revenues of US$ 2.4 billion. The company's stock has been publicly traded on the New York Stock Exchange since 1997.

Worldwide presence

We have a worldwide distributor network and a workforce of more than 12,500 employees. We support our customers in industry by providing comprehensive solutions for each step of their manufacturing processes – from receipt of materials throughout all manufacturing stages, through to final packaging control, logistics and shipping.

METTLER TOLEDO instruments are used in research and development, manufacturing process control and for quality control. The pharmaceutical, biotech, chemical, food and beverage, and cosmetic industries are among the principal users.

Process Analytics Division

Within the METTLER TOLEDO Group, the Process Analytics Division concentrates on in-line analytical system solutions for industrial manufacturing processes. The Division consists of two business units, Ingold and Thornton, both internationally recognized leaders in their respective markets and technologies.

Innovation and quality

METTLER TOLEDO Process Analytics enjoys an excellent reputation as an innovator, demonstrated by R&D expenditure above the industry average. Our innovative transmitter portfolio exemplifies our commitment to continuous improvement in order to meet customer requirements. Among our recent developments, transmitter compatibility with traditional analog and advanced digital sensors paves the way for future oriented production facilities.

Intelligent Sensor Management

Our unique Intelligent Sensor Management® (ISM) technology is improving production processes in factories and plants across the world. ISM greatly simplifies sensor handling and enhances process reliability, leading to reduced maintenance and fewer unplanned shutdowns.

Biopharmaceutical Industry

Continuous monitoring of critical process parameters is central to maintaining optimal growth conditions during the manufacture of biopharmaceuticals. Transmitters with ISM technology contribute to batch-to-batch consistency by providing simple and reliable determination of whether a sensor can be safely used for the next production run.

Chemical Industry

Due to their profound influence on product quality, process performance and safety, control of parameters such as pH, ORP, conductivity and oxygen is vital in today's chemical industry. METTLER TOLEDO's transmitters with ISM technology offer the ultimate in sensor "health" monitoring, allowing continuous, uncompromised measurement availability.

Petrochemical Industry

Not only in process control, but also in maintaining equipment integrity and preventing corrosion, in-line analysis has proven to be of utmost importance in petroleum processing. Our ISM transmitters with intelligent diagnostics are invaluable for predicting maintenance requirements.

Food and Beverage Industry

Consistent product quality and superior plant efficiency are success factors in the highly competitive F & B environment. Being able to predict when sensor maintenance will need to be conducted and therefore prevent unscheduled downtime is of extreme value. This is precisely one function of METTLER TOLEDO's ISM concept which is integrated into ISM transmitters.

Powerful Players
## Select Your Access to the Process

METTLER TOLEDO provides tailorable transmitter solutions to meet the requirements of a wide range of applications. The transmitter series cover pH/ORP, oxygen, dissolved carbon dioxide and conductivity measurements. They are compatible with traditional analog and digital sensors with Intelligent Sensor Management (ISM).

	M300 (p. 10–11)	M400 (p. 14–15)	M700 (p. 16–17)	M800 (p. 18–19)
			4-Wire	
Channels	1 or 2	1	1 or 2	1
Plug & Measure	●	●	●	●
Dynamic Lifetime Indicator (DLI)	–	●	●	●
Adaptive Calibration Timer (ACT)	–	●	●	●
Time To Maintenace (TTM)	–	●	●	●
Calibration history	–	●	●	●
CIP/SIP autoclaving counter	–	●	●	●
iMonitor	–	–	–	●
Communication	–	–	Profibus PA FOUNDATION fieldbus™	–
Panel Cutout	½ DIN, ¼ DIN	½ DIN	144 × 194 mm	½ DIN
Mixed-mode input	–	●	●	●
PID controller	●	●	●	●
Hold input	●	●	●	●
Analog input	–	1	2	1
Relays/open collectors (OC)	4 (6)	6	4	8
Outputs	2	4	2	4
Approvals	–	ATEX Zone 2 FM Cl 1 Div 2	ATEX Zone 1 FM Cl 1 Div 2 CSA Cl 1 Div 2	FM Cl 1 Div 2
Parameter compatibility (Ingold)				
pH/ORP/pNa	●	●	●	●
Dissolved oxygen				
Amperometric sensors				
High (InPro 68xx)	●	●	●	●
Low (InPro 69xx)	–	●	●	●
Optical sensors				
High (InPro 68xx)	–	●	–	●
Low (InPro 69xx)	–	●	–	●
Gaseous oxygen				
High (InPro 68xx)	–	●	●	●
Low (InPro 69xx)	–	●	●	●
GPro 500	–	●	–	–
CO_2				
InPro 5000 i	–	●	–	●
InPro 5500 i	–	●	–	●
Conductivity 2-e/4-e	●	●	●	●
Inductive conductivity	–	●	●	–
Turbidity	–	–	●	●
EasyClean compatibility	●	●	●	●

* in progress

	M800 (p. 18–19)	M100 (p. 8–9)	M400 2H (p. 12–13)	M400 (G) 2XH (p. 12–13)	M400 FF (p. 12–13)	M400 PA (p. 12–13)
				2-Wire		
	2 or 4	1	1	1	1	1
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	–	–	–	–
	●	–	–	–	–	–
	–	HART®	HART®	HART®	FOUNDATION fieldbus™	Profibus PA
	½ DIN	–	½ DIN	½ DIN	½ DIN	½ DIN
	–	–	●	●	●	●
	●	–	●	●	●	●
	●	●	●	●	–	–
	1	1	1	1	1	1
	4 (8)	–	2 OC	2 OC	–	–
	4 (8)	1	2	2	–	–
	FM Cl 1 Div 2	ATEX IECEx Zone 1 FM Cl 1 Div 1* NEPSI	FM Cl 1 Div 2	ATEX IECEx Zone 1 FM Cl 1 Div 1* NEPSI	ATEX IECEx Zone 1 FM Cl 1 Div 1* NEPSI	ATEX IECEx Zone 1 FM Cl 1 Div 1* NEPSI
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	●	●	●	●	●
	●	–	–	–	●	●
	●	–	–	–	●	●
	●	–	–	●	●	●
	●	–	–	●	●	●
	–	–	–	–	–	–
	●	–	–	–	●	●
	●	–	–	●	●	●
	●	–	●	●	●	●
	–	–	–	–	–	–
	●	–	●	●	●	●

Intelligent Sensor Management
for the Process Industries

METTLER TOLEDO provides tailorable transmitter solutions to meet the requirements of a wide range of applications. The transmitter series cover pH/ORP, oxygen, dissolved carbon dioxide and conductivity measurements. They are compatible with traditional analog and digital sensors with Intelligent Sensor Management (ISM).
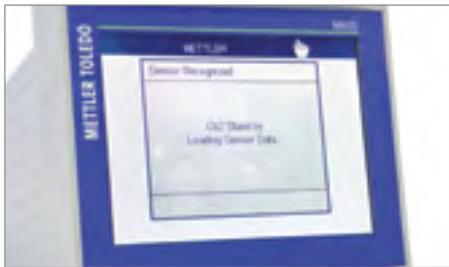
Plug and Measure™

The Plug and Measure feature significantly simplifies measurement point start up. Sensors can be accurately pre-calibrated in a workshop with our iSense tool and stored for later use. When connected to the transmitter, calibration data are automatically uploaded and the system is ready to measure in an instant.

Multi-parameter

As only one model of transmitter is required for different parameters, the benefits of multi-parameter functionality are clear: greater flexibility, less complexity, and less training and inventory.

iMonitor – advanced ISM functionality

ISM's predictive maintenance features provide you with sensor diagnostics data such as the Dynamic Lifetime Indicator, Adaptive Calibration Timer and Time To Maintenance. This information prevents unplanned shutdowns due to unforeseen sensor failure, resulting in increased process availability and reduced maintenance effort.

ISM Diagnostics into Control and Asset Management Systems

Contrary to conventional analog sensors, digital ISM sensors offer flexible integration of key diagnostics data into respective systems. ISM therefore provides the most relevant, current sensor and maintenance information.

Easy Maintenance

Sensor reliability depends on the correct sensor calibration and maintenance. Save the cost of time consumption on learning sensor maintenance. Whether you are an expert or a first time user, iSense and its guiding animations will ensure each calibration and every maintenance procedure is performed reproducibly and without mistakes or missed steps.
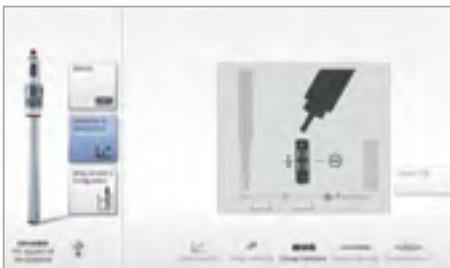
Mixed-mode input

The mixed-mode input accepts analog or ISM sensors. This feature offers a unique and smooth transition from analog to digital sensor technology and provides a future oriented investment in your facility.

M100: Compact and Robust
Unequalled Simplicity in Hazardous Areas

The well-proven head mount transmitter concept is now available for analytical parameters. With its small footprint the M100, single-channel, multi-parameter transmitter provides convenience, the highest reliability and excellent process safety in hazardous area environments. Advanced sensor diagnostics available over HART® result in reduced operating costs and help to improve productivity.

The M100 is the first transmitter for analytical measurements based on a compact, head mount design.

With its approvals for hazardous area use the M100 Head Mount transmitter provides operating assurance even in challenging environments.

The multi-parameter M100 with ISM technology covers measurement of pH/ORP, oxygen, and conductivity. Measurement data and advanced ISM sensor diagnostics such as the Dynamic Lifetime Indicator, Adaptive Calibration Timer, and Time To Maintenance can be output to control systems over HART. This smart communication capability enables more efficient maintenance and preventing unplanned shutdowns due to unforeseen sensor failure.

ISM's Plug and Measure feature minimizes the risk of installation troubles and simplifies sensor handling.

Low installation costs

Rugged construction and compact design allow direct installation next to the process. Thanks to its durability and approvals for use in hazardous areas the M100 Head Mount transmitter is the best choice for harsh environments.

Predictive maintenance

Easiest handling and on-site or remote access over HART to advanced ISM predictive diagnostics tools leads to reduced operating costs and increased process uptime.

Simple Plug and Measure operation
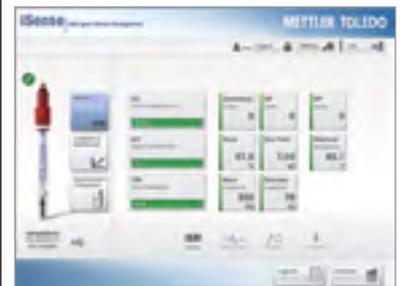
With iSense, the key tool of ISM, sensors can be precalibrated via a PC then connected to the M100. Therefore, a user interface in the field is no longer necessary. This new transmitter concept reduces the operation and wiring effort to a minimum.

Measurement parameters

pH/ORP

Dissolved oxygen

Conductivity

ISM®

HART
COMMUNICATION PROTOCOL

Key technical data for the M100 Head Mount transmitter

ISM features	Plug and Measure, advanced diagnostics tools
Housing material	Die cast aluminum
Enclosure	IP 66, NEMA 4X
Approvals	NEPSI, ATEX/IECEx Zone1, cFMus Cl1 Div1*
Analog inputs	1 × 4 to 20 mA (for pressure compensation)
Communication	HART
4 to 20 mA with HART	
Supply voltage	14 – 30 VDC
Current outputs	1 × 4 to 20 mA (loop powered), galvanically isolated
Digital inputs	1, galvanically isolated

* pending

Visit for more information
www.mt.com/m100

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M300: Convenient and Easy to Use
For Basic Process Applications

The M300 transmitter series combines robustness with ease of use. A wide model range with standard functionality makes instruments of this series the ideal choice for basic process applications. With the ISM option, configuration and commissioning become substantially easier.

The M300 is available as a single- or dual-channel unit. The dual-channel, multi-parameter solution offering a combination of pH/ORP, oxygen, and conductivity, makes the transmitter ideal for many applications.

A user-friendly Quick Setup routine, together with the harmonized menu structure for all parameters, facilitates navigation and ensures easy operation.

Simplified sensor handling with the Plug and Measure functionality of-

fers pre-calibration of ISM sensors in the lab and swift exchange in the field.

The PC-based configuration tool allows complete transmitter programming at a convenient location – even in an office.

Fast configuration

Quick Setup routine and unified menus across all parameters ensure fast configuration.

Simplified sensor handling

Plug and Measure feature offers pre-calibration of sensors and, in combination with the auto-recognition function, greatly simplifies sensor handling.

Wide model range

A choice of single- and dual-channel models in ¼ DIN and ½ DIN sizes for analog sensors, or as a multi-parameter model for ISM sensors, means the right solution is available for a wide range of applications.

Measurement parameters

pH / ORP

Dissolved oxygen

Conductivity

ISM®

Key technical data for the M300 transmitter series (single- and dual-channel)

ISM features	Plug and Measure
Power	AC (100 – 240 V) or DC (20 – 30 V)
Enclosure	IP 65
Approvals	UL (cULus) Type 4
Current outputs	4 × 0/4 to 20 mA (2 for single-channel model), galvanically isolated
Relays	6 (4 for single-channel model)
Digital inputs	2 (1 for single-channel model)
Multi-level password protection	Yes
User interface	2 values + 2 lines, 24 characters, backlit display
Service interface	USB port

Visit for more information
www.mt.com/m300

M400: Versatile and Intelligent
Advanced Process Control

Advanced predictive diagnostics technology is one of the main benefits of the M400 transmitter series. Along with its multi-parameter capabilities the M400 is the state-of-the-art transmitter for your most demanding applications.

The M400 is a single-channel, multi-parameter transmitter. The same unit can handle different parameters depending on the model chosen.

This transmitter series features advanced ISM functionality and provides real-time status information from the sensor for true predictive maintenance.

− The Dynamic Lifetime Indicator (DLI) tells you when the sensor will need to be replaced
− The Adaptive Calibration Timer (ACT) monitors the time to next calibration
− Time to Maintenance (TTM) indicates when maintenance will next be required

The M400's unique mixed-mode input allows the connection of analog or innovative ISM sensors, smoothing the transition from analog to digital sensor technology.

Plug and Measure functionality means measurement point start up is fast and error free.

Predictive maintenance

DLI, TTM, ACT

Remaining lifetime

Stress in process
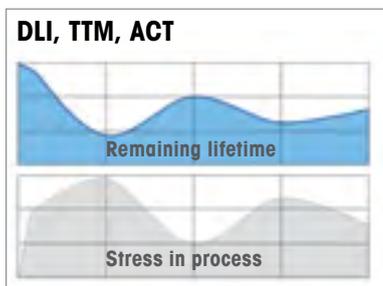
With tools such as the DLI, TTM and ACT, ISM technology on the M400 offers true predictive maintenance, resulting in fewer unscheduled shutdowns.

Future oriented investment

The mixed-mode input support a fluid transition from conventional analog to advanced, digital ISM technology.

Easy handling of measuring loops

Fast commissioning and easy handling of measuring systems thanks to ISM's sensor calibration in the lab and Plug and Measure features.

Measurement parameters

pH / ORP

Dissolved oxygen

Gas phase oxygen

Conductivity

Dissolved carbon dioxide

Key technical data for the M400 transmitter series

ISM features	Plug and Measure, advanced diagnostics tools
Power	AC (100 – 240 V) or DC (20 – 30 V)
Enclosure	IP 65
Approvals	Type 1, Type 2, Type 3: ATEX Zone2, cFMus CI1 Div2
	Type 1 Cond Ind: ATEX Zone2*, FMus CI1 Div2*
Current outputs	4 × 0/4 to 20 mA, galvanically isolated
Relays	6
Digital inputs	2
Analog inputs	1 (for pressure compensation in combination with ISM O$_2$ sensor)
Multi-level password protection	Yes
User interface	2 values + 2 lines, 24 characters, backlit display
Service interface	USB port

* pending

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

The M400 2-wire, single-channel, multi-parameter transmitter provides highest reliability and process safety in hazardous area environments. Advanced sensor diagnostics tools available over FOUNDATION fieldbus™, PROFIBUS® PA or HART® result in reduced operating costs and help improve productivity.

With its rugged design and approvals for hazardous area use, the M400 2-wire transmitter series provides operating assurance even in the most challenging environments. In combination with METTLER TOLEDO's advanced ISM technology, this means the M400 2-wire unit offers greater process reliability and safety in the chemical and pharmaceutical industries.

Measurement data and sensor diagnostics tools such as the Dynamic Lifetime Indicator, Adaptive Calibration Timer and Time To Maintenance can be output to control systems over FOUNDATION fieldbus, PROFIBUS PA, HART or the transmitter's second analog output.

This smart communication capability means system integration with the M400 is easily achieved, enabling more efficient maintenance and preventing unplanned shutdowns due to unforeseen sensor failure.

ISM's Plug and Measure feature minimizes the risk of installation troubles and simplifies sensor handling.

The unique mixed-mode input allows the connection of analog or innovative ISM sensors.

Outstanding reliability and safety

Thanks to the rugged design and approvals for use in hazardous areas the M400 2-wire transmitter is the best choice for operational reliability and process safety.

Predictive maintenance

DLI, TTM, ACT

Remaining lifetime

Stress in process
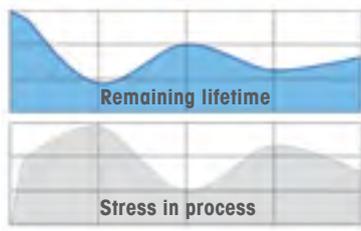
ISM technology enables predictive maintenance and avoids unscheduled plant shutdowns. Advanced sensor diagnostics tools are available over FOUNDATION fieldbus, PROFIBUS PA, HART or via the transmitter's second analog output.

Communication standards

Compatibility to the standard protocols of HART, FOUNDATION fieldbus and PROFIBUS PA.

Measurement parameters

pH / ORP

Dissolved oxygen

Gas phase oxygen

Conductivity

Dissolved carbon dioxide

ISM®

HART COMMUNICATION PROTOCOL

Fieldbus Foundation

PROFI BUS

Key technical data for the M400 2-wire transmitter series

ISM features	Plug and Measure, advanced diagnostics tools
Housing material	Die cast aluminum
Enclosure	IP 66, NEMA 4X
Approvals	NEPSI Ex, ATEX/IECEx Zone1, cFMus Cl1 Div1*
Analog inputs	1 × 4 to 20 mA (for pressure compensation)

4 to 20 mA with HART

Supply voltage	14 – 30 VDC
Current outputs	2 × 4 to 20 mA (loop powered), galvanically isolated
Digital outputs	2 × open collectors
Digital inputs	2, galvanically isolated

	FOUNDATION fieldbus	PROFIBUS PA
Physical interface	According to IEC 61158-2	According to IEC 61158-2
Profile	FF_H1	PA
Version	6.0.1	3.02
Supply voltage	Non hazardous area (Non-IS): 9 to 32 VDC Linear barrier: 9 to 24 VDC FISCO: 9 to 17.5 VDC	
Current	22 mA	22 mA

* pending,

M700: Modular and Adaptive
Seamless Integration

Flexible use of plug-in modules means the M700 transmitter allows combined measurements from analog and digital ISM sensors, as well as later expansion or modifications. Fieldbus communication capabilities ensure seamless integration of measurement data and sensor diagnostics into process control systems.

Up to three plug-in modules for process measurement and communication can be connected in the M700's robust stainless steel housing. Thanks to this flexible concept the M700 can be easily adapted to new application requirements.

PROFIBUS® PA, FOUNDATION fieldbus™ and extended output modules fully integrate the M700 into all major control systems. Augmented data storage is possible with the SMARTMEDIA™ card capability which allows transfer of data to a personal computer.

The polished stainless steel version is designed for hygienic applications in the pharmaceutical, biotechnology and food and beverage sectors. A second version in a coated stainless steel enclosure is designed for applications in harsh environments, such as in the chemical, and pulp and paper industries.

Seamless integration of sensor diagnostics

M700 transmitters with ISM technology allow seamless integration of online sensor diagnostics into process control systems over PROFIBUS PA and FOUNDATION fieldbus.

Cost savings through modularity

Dual-channel measurement reduces total costs per measuring loop, for example in fermentation processes (pH/DO) or a redundant measurement in chemical processes (pH/pH).

Application oriented design

Different versions with polished and coated stainless steel enclosure designs cover different application environments.

Measurement parameters

pH / ORP

Dissolved oxygen

Gas phase oxygen

Conductivity

Dissolved carbon dioxide

ISM®

Key technical data for the M700 transmitter series

ISM features	Plug and Measure, advanced diagnostics tools
Power	AC (100 – 240 V) or AC/DC (24V – 15%, +10%)
Housing material	Stainless steel (polished or coated)
Enclosure	IP 65
Approvals	ATEX Zone1, FM Cl1 Div2, CSA Cl1 Div1
Current outputs	2 × 0/4 to 20 mA, galvanically isolated
Relays	4
Analog inputs	1 × 0/4 to 20 mA (for pressure compensation)
Digital inputs	2, galvanically isolated
Communication	Profibus PA, FOUNDATION fieldbus
Multi-level password protection	Yes
User interface	Monochrome graphic backlit display, resolution 240 × 160 pixels

M800: Powerful and Flexible
Touch the Future

For the highest installation flexibility, operational safety and complete control at your fingertips look no further than the M800 multi-parameter, multi-channel transmitter platform. Intuitive touchscreen operation saves time, and predictive maintenance ensures reliability and reduced maintenance.

The advantages of the M800 multi-parameter, multi-channel transmitter are clear: high flexibility, less complexity, and reduced training and inventory. M800 1-channel allows mixed mode (analog / ISM) inputs possibility.

Models for two and four channels lower the cost per measurement point by providing multiple measurements from a single transmitter.

The large, button-free front panel and simple menu structure simplify use and result in time savings in all transmitter configuration and sensor maintenance tasks.

iMonitor is an "at a glance" sensor diagnostics ISM utility. It anticipates maintenance requirements based on real-time sensor performance information and tells you how to bring a sensor back to peak efficiency before measurement is affected.

With the M800 the same transmitter platform can be confidently deployed across a diverse range of applications.

Intelligent diagnostics utility
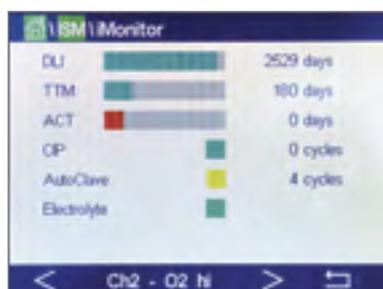
With its unique iMonitor diagnostics utility, the M800 predicts sensor maintenance and details corrective actions – before issues arise.

Intuitive touchscreen control

Touchscreen display provides simple, convenient operation, and any menu function can be reached in only three touches. Traffic light color coding means process or sensor issues are visible from a distance.

Information at a glance

A configurable display allows the highest flexibility to view the most important values. The Wizard set-up allows the definition of favorites to directly reach any menu.

Measurement parameters

pH/ORP

Dissolved oxygen

Gas phase oxygen

Conductivity

Dissolved carbon dioxide

Turbidity *

* only available on M800 1-channel

ISM®

c(UL)us LISTED

Key technical data for the M800 transmitter series

ISM features	Plug and Measure, advanced diagnostics tools, iMonitor		
Power	AC (100–240 V) or DC (20–30 V)		
Enclosure	IP66		
Approvals	FM Cl1 Div2*		
Current outputs galvanically isolated	M800 1-channel: 4 × 0/4 to 20 mA	M800 2-channel: 8 × 0/4 to 20 mA	M800 4-channel: 8 × 0/4 to 20 mA
Relays	8		
Analog inputs galvanically isolated	1 × 4 to 20 mA (for pressure compensation)		
Digital inputs	M800 1-channel: 4	M800 2-channel: 5	M800 4-channel: 6
Multi-level password protection	Yes		
User interface	Color touchscreen, 5.7", 320 × 240 pixels, 256 colors		
Service interface	USB port		

* M800 1-channel pending

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