

Operation Manual 5000TOCi Sensor



**Total Organic Carbon
Measurement System**

5000TOCi Sensor
58 130 246

METTLER TOLEDO

Operation Manual

5000TOCi Sensor

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1 Introduction

Statement of intended use – The 5000TOCi sensor is a Total Organic Carbon sensor with ISM capabilities, designed to measure the concentration of organic substances in pure and ultra pure water applications. The 5000TOCi is a continuous-flowing, continuous-measurement instrument allowing detection of any TOC change regardless of the duration. The continuous design also allows rapid detection, with changes being recognized 60 seconds from the time the sample enters the sensor.

The M800 Transmitter, is a multiparameter, multi-channel instrument with a large, color touch-screen display which conveys measurement and setup information for the 5000TOCi sensor. The M800 is capable of controlling and monitoring the operation of up to 4 5000TOCi sensors.

When used in combination, the 5000TOCi sensor and M800 transmitter form a TOC measurement system which provides the design flexibility for full integration into water systems. The separate components allow for close positioning of the sensor to the sample point for fastest response, while allowing integration of the transmitter into the local control system.

This manual applies to the 5000TOCi sensor family, listed below. For more information on the features of the M800 Transmitter, please refer to the M800 Operating Manual.

5000TOCi Sensor Family

Designation	Order no.
5000TOCi Sensor, 110VAC, 50/60 Hz	58 036 031
5000TOCi Sensor, 220VAC, 50/60 Hz	58 036 032
5000TOCi Sensor, Low ppb calibration, 110VAC, 50/60 Hz	58 036 033
5000TOCi Sensor, Low ppb calibration, 220VAC, 50/60 Hz	58 036 034

The screen images in this manual are intended for general explanation, and can differ from the real display in your transmitter.

This description corresponds to the firmware release, version 1.1 of the M800 transmitter. Changes are taking place constantly, without prior notification.

2 Safety instructions

This manual includes safety information with the following designations and formats.

2.1 Definition of equipment and documentation symbols and designations



WARNING: RISK OF ELECTRICAL SHOCK.

CAUTION: possible instrument damage or malfunction.

NOTE: Important operating information.

On the instrument indicates: There is alternating current present.

The following is a list of general safety instructions and warnings. Failure to adhere to these instructions can result in damage to the equipment and/or personal injury to the operator.

- The 5000TOCi Sensor should be installed and operated only by personnel familiar with the sensor and who are qualified for such work.
- The 5000TOCi Sensor must only be operated under the specified operating conditions.
- Repair of the 5000TOCi Sensor must be performed by authorized, trained personnel only.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment against hazards may be impaired.
- Use only factory documented components for repair. Mettler-Toledo accepts no responsibility for damage caused by unauthorized modifications to the sensor.
- Follow all warnings, cautions, and instructions indicated on and supplied with this product.
- Protective covers must be in place unless qualified personnel are performing maintenance.
- Install equipment as specified in this instruction manual. Follow appropriate local and national codes.
- Protective covers must be in place at all times during normal operation.
- Prior to shipping sensor back to the factory for repair or re-calibration, water **MUST** be drained from sensor to avoid damage due to freezing.

**WARNINGS:**

- Installation of cable connections and servicing of this product require access to shock hazard voltage levels. Switch or circuit breaker shall be in close proximity to the equipment and within easy reach of the OPERATOR; it shall be marked as the disconnecting device for the equipment.
- Main power must employ a switch or circuit breaker as the disconnecting device for the equipment. Electrical installation must be in accordance with the National Electrical Code and/or any other applicable national or local codes. Safety and performance require that this sensor be connected and properly grounded through a three-wire power source.
- Ozone gas (O₃) is generated inside the 5000TOCi Sensor enclosure during normal operation. The smell of ozone may be apparent when opening the front cover of the enclosure and caution should be taken when opening. Prolonged exposure to ozone gas is hazardous and may cause health problems.



NOTE! PROCESS UPSETS: Because process and safety conditions may depend on consistent operation of this sensor, provide appropriate means to maintain operation during sensor maintenance, replacement or sensor or instrument calibration.

2.2 Correct disposal of the unit

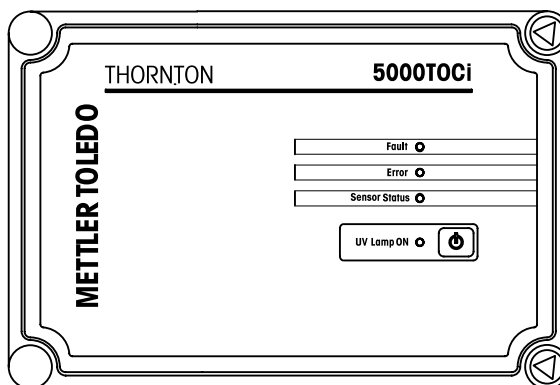
When the sensor is finally removed from service, observe all local environmental regulations for proper disposal. Please note the UV lamp supplied with the 5000TOCi contains mercury.

3 5000TOCi Sensor Overview

The 5000TOCi Sensor is a Total Organic Carbon sensor designed for use with the M800 transmitter. The M800 will automatically identify the 5000TOCi Sensor when it is connected, and all factory calibration data is automatically read and used for operation and indication.

The 5000TOCi Sensor and M800 transmitter are configured with factory default settings to minimize measurement setup time. These default settings allow for sensor operation with minimal configuration at system start up. The 5000TOCi Sensor has more features than other sensors and may require additional configuration dependant upon the operational setup. Once these parameters are set, the TOC sensor will function automatically, and will require user interface only for periodic service and maintenance. Measurements available from the 5000TOCi Sensor include TOC, Conductivity/Resistivity (compensated and uncompensated), Temperature, Average TOC and Peak TOC.

The 5000TOCi Sensor is designed with four local LED indicators and a UV Lamp control key on the front panel, as shown in the illustration below. The LEDs are designed to provide local indication of sensor status. The operation of the LEDs is synchronized with the M800 fault and error status messages and indications.



Function	Color	Operation
Fault	Red	Flashes during Fault condition, sensor operation stopped
Error	Amber	Illuminates during Error condition, sensor remains operational
Sensor Status	Green	Illuminates whenever AC Power is on and the 5000TOCi is connected to an operating M800
UV Lamp On	Green	Illuminates whenever the UV Lamp is on

The UV Lamp control key is designed to provide a local On/Off control for the UV lamp to allow for quick lamp replacement and to assist the operator during troubleshooting, if necessary.



NOTE: Once the UV Lamp Key is pressed to turn the UV Lamp off, the UV Lamp cannot be turned on from the M800, it can only be turned on by pressing the sensor key again. This function is intended to avoid accidental activation during maintenance.

The front cover of the sensor is hinged on the left side. Located at the top and bottom right corners of the sensor enclosure are two triangle-shaped door fasteners. The installation kit provided with the Sensor includes the special tool needed to loosen these fasteners and open the front door to the enclosure. Periodic access will be required to perform routine service and maintenance. Additional

front cover tools are available from Mettler-Toledo Thornton, Inc. See the spare parts listing in this manual for part numbers and descriptions.

3.1 High Pressure Applications

For installations with process pressure above 85 psig (5.9 bar), the High Pressure Regulator (p/n 58 091 552) is required. Refer to Sample Tubing Connections for additional information. Detailed installation instructions are supplied with the High Pressure Regulator.

3.2 Potential Condensation Applications

Certain ambient and process temperatures may cause condensation to occur inside the 5000TOCi Sensor. The Mettler-Toledo Thornton Sample Conditioning Coil provided with the sensor installation kit is designed to reduce condensation conditions by allowing the sample temperature to partially equalize with the ambient temperature.

3.3 High Temperature Applications

For water temperatures from 70°C to 100°C (158°F to 212°F), the Sample Conditioning Coil (p/n 58 071 518) is required. In high pressure applications, the High Pressure Regulator (p/n 58 091 552) must be installed upstream of the Sample Conditioning Coil.

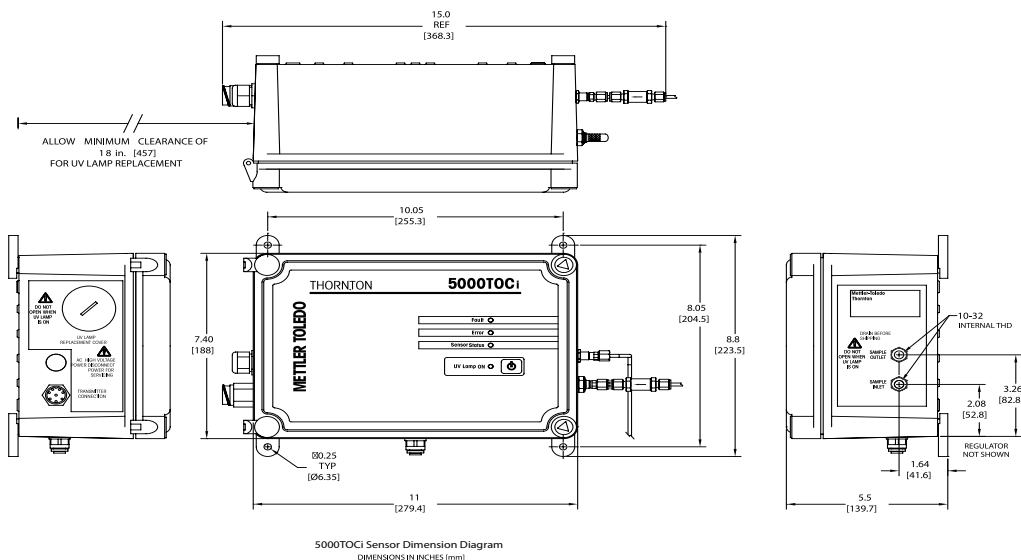
4 5000TOCi Installation Instructions

4.1 Unpacking and inspection of the 5000TOCi

Carefully unpack the 5000TOCi sensor. The box contains the following items:

- 5000TOCi Sensor
- 5000TOCi Sensor Instruction Manual CD
- 5000TOC iStart-up Booklet (Included with CD)
- Certificate of Calibration
- Installation Kit includes:
 - One Sample Inlet Tube - 6 foot (2 m) length of PTFE tubing, 0.125 inch (3 mm) O.D.
 - One Safety Drain Tube - 5 foot (1.5 m) length of tubing, 0.31 inch (8 mm) O.D.
 - One stainless steel outlet tube
 - One - Plastic 30 cc Syringe
 - One - Tool, TOC Cover
 - One - High Capacity Inlet Filter Assembly
 - One - Adapter, 0.25 inch (6 mm) O.D. to 0.125 inch (3 mm) O.D. Tubing Reducer
 - One – Sample Conditioning Coil

4.2 Installation of the 5000TOCi



Shown above are the case dimensions for the 5000TOCi Sensor. Mount the 5000TOCi Sensor as close to the sample point of your system as possible. Shorter sample tubing length between the sampling point and the 5000TOCi Sensor will provide a faster response time. As shown above, the 5000TOCi Sensor is supplied with wall-mounting tabs for wall or panel mount.

The 5000TOCi Sensor can be mounted to a pipe using a pipe-mount accessory (See Accessories section in this manual). Sudden shock or excessive vibration can result in sensor damage. When pipe-mounting this sensor, be sure the pipe is securely fastened.

The 5000TOCi Sensor can also be placed on a bench-top or table. In this type of installation, the mounting tabs must be removed from the bottom of the sensor enclosure in order for the sensor to

stand on its own. The bottom safety drain fitting should also be removed for bench top installation, leaving the small opening in the bottom of the enclosure open.

Some of the internal components for the sensor are made of fragile materials; therefore precautions should be taken to avoid damage due to improper handling. The 5000TOCi Sensor requires routine maintenance; therefore it is beneficial to mount the sensor in an easily accessible location.

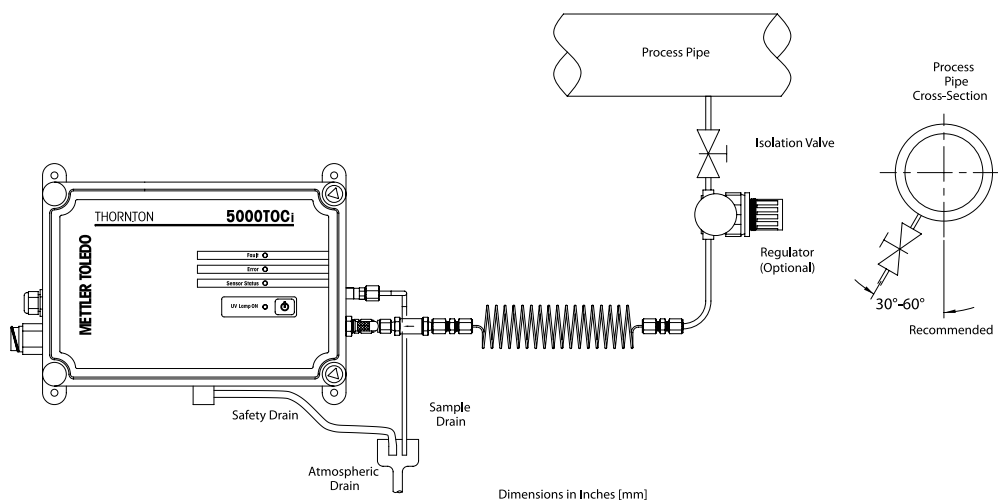
4.3 Sample Tubing Connections

The installation kit provided with the sensor includes sample tubing consisting of one 5-foot (1.5 m) length of 0.31 inch (8 mm) O.D. safety drain tubing, one stainless steel outlet drain tube, and one 6-foot (2 m) length of PTFE sample inlet tubing is included for the supply. A 0.25 inch (6 mm) O.D. to 0.125 inch (3 mm) O.D. tubing reducer is also included and can be used where applicable.

The following items are necessary to ensure the proper installation of the sensor:

- Sample isolation valve (not provided with sensor).
- 0.125 inch compression tube fitting for sample point (common tube fitting adapters are available from Thornton; see accessories for details).

NOTE: The sample isolation valve is required to isolate the sensor when necessary. Proper installation guidelines should be followed when installing this valve to reduce the possibility of air entrapment or sediment in the sample line.



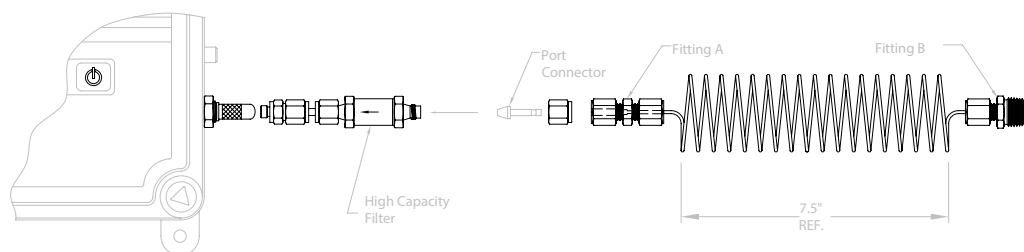
- 1 Remove the protective covers from the sample connections on the sensor.
- 2 Attached the open tube end of the PTFE tubing to the sample isolation valve. Cut excess tubing to minimize sample tubing length. Be sure all fittings are properly fastened to avoid leaks and the possibility of air ingress.
- 3 Flush the sample inlet tubing to remove any particles that may be in the line or fittings before connecting it to the 5000TOCi Sensor, or prior to initial sensor startup.
- 4 Connect the stainless steel drain tube to the Sample Outlet connection. The fitting is attached to the tube; therefore thread the fitting into the Sample Outlet connection on the sensor. Do not over tighten.

- 5 Locate the High Capacity Inlet Filter Assembly provided in the sensor installation kit. The male-threaded end of the assembly is screwed into the female-threaded sample inlet fitting. Secure the assembly with a wrench to ensure the connection is tight. Do not over tighten.
- 6 Connect the 0.125 inch (3mm) PTFE tubing to the high capacity inlet filter by securing the tubing in the compression fitting on the assembly. Do not over tighten.
- 7 Run the safety drain tubing to an atmospheric drain located close to the sensor. See the illustration in the sensor installation section for dimensional detail of the drain location. Take note of the 6" (15cm) to 36" (90cm) drain requirement.



NOTE: The stainless steel drain tube must be fed to a nearby standpipe or drain sump to create an air gap and prevent siphoning. Installation must adhere to the dimensions shown in the installation diagram for proper sensor operation.

4.4 Sample Conditioning Coil



- 1 Remove compression fitting from filter assembly. As shown, insert port connector into compression fitting that was removed from filter. Reconnect compression fitting to the filter assembly and tighten to crimp. Do not over tighten.
- 2 Connect Fitting A (1/8"-1/8") of Sample Conditioning Coil to the port connector and tighten to crimp. Do not over tighten.
- 3 Attach Fitting B (1/8" X 1/4" NPT) of Sample Conditioning Coil to an appropriate connection on the process pipe or sample supply line..
- 4 Ensure that excessive force is not applied to the inlet fittings. If necessary, support the Sample Conditioning Coil in an appropriate manner.



NOTE: The Sample Conditioning Coil can be stretched to extend the length up to 3m (10') maximum.

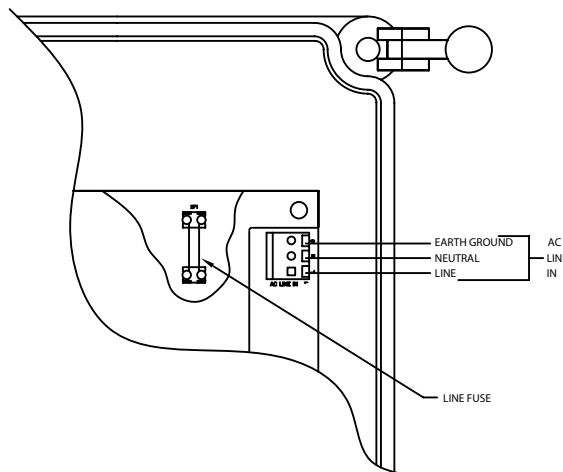
4.5 AC Power Connection

As shown in the left side view provided in the installation diagram, there is a bulkhead cable gland located on the left-hand side of the sensor enclosure labeled 'AC POWER' to allow for the passage of the AC power cable (not provided with sensor). If the installation requires use of hard conduit for AC power, this fitting may be removed and the hole can be used to terminate a conduit fitting.



NOTE: For conduit installation, use a watertight fitting and hub that comply with the requirements of UL514B. Connect the conduit hub to the conduit before attaching the fitting to the analyzer (UL508-263.16). The opening accepts a 3/8" (9mm) NPT conduit fitting with nut.

The terminal connections for AC power are located on the printed circuit board mounted to the front cover of the sensor, as shown in the illustration provided below. Keep AC power separated from all other internal wiring. Use the fasteners provided as part of the AC terminal to secure the power wires. Ensure there is adequate cable length to avoid putting mechanical stress on the wiring when the front door is fully opened. The diagram below shows the terminal connections for AC power. Be sure the line fuse is properly installed when making electrical connections. A spare fuse kit is available from Thornton. See the spares parts list at the end of this manual for more details.



4.6 Sensor Connection

Also located on the left-hand side of the sensor enclosure is the connection for the M800 Transmitter, labeled 'Transmitter Connection'. The M800 patch cables listed in the accessory section attach directly to this connector. To secure the patch cable, align the keys of the two connectors and thread the cable mating connector until finger tight. Refer to the table below for details on connecting the patch cable to the M800 Transmitter.

Once the transmitter and AC power connections are secured, and AC power is applied to the 5000TOCi, the sample isolation valve can be opened and the sensor flushed with sample water.

TB2 and TB4 – Terminal Assignment for 5000TOCi

	TB2	TB4	5000TOCi
Term.	Function	Function	Sensor wire
1	DI2+	DI6+	–
2	DI2–	DI6–	–
3	1-Wire_Ch1	1-Wire_Ch3	–
4	GND5V_Ch1	GND5V_Ch3	–
5	RS485B_Ch1	RS485B_Ch3	black
6	RS485A_Ch1	RS485A_Ch3	red
7	GND5V_Ch1	GND5V_Ch3	white
8	5V_Ch1	5V_Ch3	blue
9	24V_Ch2	24V_Ch4	–
10	GND24V_Ch2	GND24V_Ch4	–
11	1-Wire_Ch2	1-Wire_Ch4	–
12	GND5V_Ch2	GND5V_Ch4	–
13	RS485B_Ch2	RS485B_Ch4	black
14	RS485A_Ch2	RS485A_Ch4	red
15	GND5V_Ch2	GND5V_Ch4	white
16	5V_Ch2	5V_Ch4	blue

5 5000TOCi Sensor Operation

5.1 Initial Startup


Initial start-up refers to the condition where a 5000TOCi Sensor is installed and operated for the first time. Factory default settings for a 5000TOCi Sensor are designed to minimize setup time for this sensor and allow the sensor to measure automatically.

5.2 Initiate Sample Flow

The 5000TOCi Sensor is designed to operate optimally at a flow rate of 20 mL/min. The flow rate through the sensor is controlled by a solenoid-operated automatic flow control valve which is designed to compensate for supply pressure variations.


To establish sample flow, ensure that the 5000TOCi is connected to an M800 Transmitter, and that AC power is supplied to the 5000TOCi and M800. Slowly open the sample line isolation valve. Once sample flow is established, the 5000TOCi sensor will automatically establish a 20 ml/min flow rate. Allow 3-5 minutes for the sensor to fill, and observe flow at the drain tube. Once there is flow, check that there are no leaks inside the sensor enclosure. The sensor is now ready for normal operation.

5.3 5000TOCi Guided Setup

Once sample flow is established, the 5000TOCi is ready to begin taking measurements. Access the Guided Setup menu in the M800 by pressing the Configure (*) icon on the M800 transmitter. For instructions on basic configuration of the 5000TOCi and M800, please refer to the 5000TOCi Quick Start Guide. A printed copy of the Quick Start Guide is provided with the 5000TOCi. A copy of the Quick Start Guide is also provided on the Operating Manual CD provided with the 5000TOCi sensor.

5.4 Normal Operation

Under normal operating conditions, the 5000TOCi Sensor is continuously relaying information to and from the M800. The M800 display also acts as a display and status indicator for the sensor. The M800 can be configured for 1-channel, 2-channel, 4-measurement or 8-measurement mode. Please refer to the M800 operating manual for more detail on these display modes.

If an ERROR or FAULT condition is displayed on the M800, the Messages menu can be used to retrieve more information regarding the cause of the condition. The Messages menu is accessible by pressing the ISM icon () and selecting Messages. Alternatively, the flashing Red or Yellow colored bar on the M800 can be pressed to be taken directly to the messages screen.

5.5 Calibration

System Suitability, TOC and Conductivity Calibration Test Kits (p/n 58 091 559 and 58 091 566) are



available for the 5000TOCi Sensor. The 5000TOCi Sensor Full Calibration SOP (p/n 58 130 257) describes these calibrations in detail. Calibration standards (p/n 58 091 259 or 58 130 568) are also available. Contact Mettler-Toledo Thornton Customer Service for ordering information.

NOTE: It is recommended that a TOC calibration be performed after every UV lamp change, and not to exceed 1 year. A full calibration is recommended annually.

5.5.1 TOC Calibration Methods

There are four main TOC calibration “types” available:

- Standard
- Extended
- 1-point slope (or span)
- 1-point offset

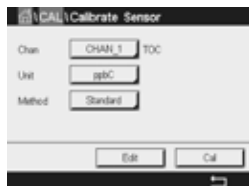
Standard: For most applications that operate over a wide dynamic range, the Standard TOC calibration type is recommended. A standard calibration requires two TOC calibration solutions, typically at 250 ppb and 500 ppb. Two calibration multipliers and adders are determined in the range of 0 to 250 ppb TOC and 250 to 500 ppb TOC. The two lines intersect at 250 ppb. This calibration type is recommended for applications requiring accuracy up to 1000 ppbC TOC.


Extended: For applications requiring accuracy up to 2000 ppbC, the Extended TOC calibration type is recommended. An Extended calibration utilizes three TOC calibration solutions, typically at 250 ppbC, 500 ppbC and 2000 ppbC. Three calibration multipliers and adders are determined in the range of 0 - 250 ppbC, 250 -500 ppbC and 500-2000 ppbC.

1-point slope: A 1-point slope calibration method will adjust the TOC calibration multiplier. If a standard or extended calibration is being used with your 5000TOCi and the “1 point slope” is performed, it will over-write the active calibration.

1-point offset: This method will adjust the the TOC calibration adder. If a standard or extended calibration exists and the “1 point offset” is performed, it will modify the adder on the 0 – 250 ppb range. The TOC calibration standard concentration used for the “1-point offset” must be lower than the midpoint of the standard calibration or 50 ppb, whichever is lower. This method is recommended for applications where very low TOC is predominantly expected. This calibration will not affect the TOC multipliers.

5.5.2 Enter Calibration Mode



While in Measurement mode, press the  icon and select Calibrate Sensor. Using the appropriate drop-down selectors from the M800, select the channel associated with the desired TOC sensor, and select the unit associated with the parameter (TOC, Conductivity, Temperature or Flow) to be calibrated. Then, select the specific internal sensors to be calibrated (conductivity and temperature only), and the calibration type to be performed.

For a detailed explanation on how to perform a calibration a 5000TOCi calibration, please refer to the Standard Operating Procedure Part Number 58 130 257.



NOTE: During Calibration, a green flashing “H” on the display indicates a calibration is in process with a Hold condition active on the sensor associated with the indicated measurement. Refer to the M800 Operating Manual for details on the operation of the calibration hold function.

5.6 System Suitability Testing

In most pharmaceutical water applications, System Suitability Testing is required by various regulating organizations such as the United States Pharmacopoeia (as stated in USP <643>) and European Pharmacopoeia (as stated in EP 2.2.44) to qualify instruments used for total organic carbon (TOC) measurements. The System Suitability Test and TOC Calibration Kits (p/n 58 091 559 or 58 091 566) for the 5000TOCi Sensor are available to meet this requirement. The 5000TOCi System Suitability Standard Operating Procedure (p/n 58 130 258) describes the System Suitability Testing procedure in detail. System Suitability Standards (P/N 58 091 526) are also available. Contact your local METTLER TOLEDO Customer Service representative for ordering information.



NOTE: System Suitability Testing should be performed according to individual user policy. A System Suitability Test is recommended after each UV lamp change.

6 5000TOCi and M800 Configuration

This section discusses M800 menus needed for configuration of features unique to the 5000TOCi. For information on use of general menus associated with M800 setup which are not covered here, please refer to the M800 Transmitter Operating Manual.

6.1 Channel Setup

(PATH: ******/Measurement/Channel Setup)

The Channel Setup function allows configuration of the individual measurements which will be visible on the M800 display area associated with the selected sensor channel. For the 5000TOCi, the following measurement options may be selected:

TOC

Displays TOC concentration in ppt, ppb or ppm.

gC/L

Displays TOC concentration in mg/LC, ug/LC, and ng/LC.

Conductivity/Restivity

Inlet sample conductivity/restivity may be displayed in ohm-cm (Mega or Kilo), S/cm or S/m (Mili, Micro or Nano).

Temperature

Inlet sample temperature may be displayed in °C or °F.

Lamp

Remaining lamp operating hours will be displayed, including a colored bar providing a visual indication of lamp life remaining.

TOC_{ave} or gC/L_{ave}

The average TOC concentration over a user-specified time frame will be calculated and displayed by the M800. TOC_{ave} is calculating on a moving time-period which can be set from 1 to 24 hours.

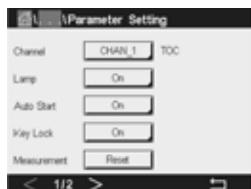
TOC_{pk} or gC/L_{pk}

The peak or maximum TOC concentration recorded within a user-specified period from 1 to 24 hours will be recorded and displayed by the M800. TOC_{pk} is determined over a moving time period as specified by the user.

NOTE: Average and Peak TOC concentration can be used to provide a summarized representation of system water quality over a user-specified time period of up to 24 hours.

These readings allow the use of two data points to represent the overall water quality (average TOC concentration) and poorest water quality (maximum TOC concentration) present during the specified time period. This avoids the need to review several hours of data when documenting that water is safe for release, greatly simplifying the quality data collection process.

6.2 Parameter Setting



(PATH: **☛**/Measurement/Parameter Setting)

From the activated M800 display, press the Configure icon (**☛**), select Measurement, then select Parameter Setting. From the channel selector pull-down list, select the channel associated with the 5000TOCi to be configured. The following features can be configured from this menu:

Lamp

Energize or de-energize the UV lamp. Select 'On' to energize the UV lamp. Select 'Off' to de-energize the UV Lamp

AutoStart

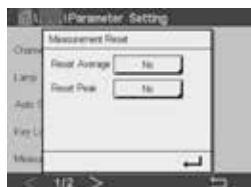
The AutoStart feature allows the 5000TOCi Sensor to automatically resume normal operation following a power failure or fault condition. The factory default setting for the Auto Start function is 'Off'. Therefore during initial start-up, the M800 will identify the sensor as a 5000TOCi Sensor, yet will not start a TOC measurement. To start a TOC measurement, the UV Lamp must be manually energized. Once the 'Auto Start' mode is set to 'On', it is no longer necessary to manually energize the UV Lamp.

Select 'On' to activate the AutoStart feature, allowing the TOC sensor to automatically resume operation. Select 'Off' to require manual activation of the UV Lamp following a power loss or fault condition. The recommended setting is 'On'.

Key Lock

Key Lock will deactivate the UV lamp control button located on the 5000TOCi. The Sensor Key Lock option can be set to 'On' or 'Off'. The default setting is 'Off'. To de-activate the Keypad at the Sensor, set the 'Key Lock' option to 'On'. This function can be used to avoid inadvertently turning the UV lamp off at the sensor under normal operating conditions.

Measurement



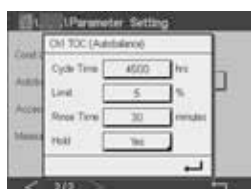
The 5000TOCi provides two derived TOC measurements; Average TOC and Peak TOC. These measurements provide an average of all TOC readings, or the maximum TOC reading, determined over a specified time period. The Measurement option in this menu allows resetting the Peak and Average TOC measurements to restart the time period over which these values are determined.

To re-set these measurements to Time Zero, press the Measurement Reset button, select the measurement(s) to be reset, then press the **←** icon. The peak and average TOC determination will immediately restart.

Cond Limit

The Conductivity Limit allows configuring the sensor to alert the operator when the specified limit is exceeded by giving an error indication and message. The limits are selectable, and must be set above 0.0. To activate this limit, set the drop-down selector to 'On' then specify the conductivity value at which the error message will be received. The default value is 2 uS/cm.

Autobalance



The 5000TOCi Sensor is capable of automatically balancing the two conductivity sensors. This step is performed to account for small differences in conductivity measurement between the two conductivity sensors. The default factory condition of the AutoBalance feature of the 5000TOCi Sensor is 'Off'. This will result in no AutoBalance activity being performed automatically. The user may change this attribute to 'On' at anytime. For applications with very low TOC (<5 ppb) AND high resistivity (>15 Mohm-cm), it is advised to set this feature to 'On' for improved accuracy. For applications that do not meet both criteria, such as pharmaceutical-grade water production, the user may elect to set the AutoBalance feature to 'Off' with little observable effect.

To activate the Autobalance feature, select 'On' in the Autobalance drop-down menu. Press 'Configure' to open a window for setting the Autobalance characteristics described below:

Cycle Time: Set a time interval for the Autobalance to occur automatically. This value is selectable from 24 to 4500 hours, with a factory default setting of 4500 hours. Note that the time remaining until the next autobalance occurs can be viewed under **ISM** iMonitor.

Limit: Set the tolerance for balancing the sensors (limit in %). This is the percentage difference allowed between the two conductivity sensor readings during an Autobalance cycle when the lamp is off.

Rinse Time: Set the length of time that the 5000TOCi sensor will have sample water flowing through it before performing the Autobalance function. The Rinse Time can be set from 1 to 999 minutes. During the rinse and Autobalance process, the UV lamp will be turned off, and the sensor will not provide a TOC indication.

Hold: Set a 'hold last measurement' condition so the analog outputs and relays are held in the current state while an Autobalance is performed.

To manually initiate an autobalance sequence outside of the automatic cycle time, use the Autobalance Now feature. Set Autobalance to 'On', then press the 'Start' button located on in the TOC Maintenance menu. Access the TOC Maintenance menu by pressing **↳**/TOC Maintenance from the M800 main screen.

Accessory

The accessory setting overrides the automated flow control feature within the 5000TOCi, and sets the flow control valve to fully open. For low pressure applications, a pump may be necessary to provide adequate pressure to the 5000TOCi in order to achieve a flow rate of 20 ml/min. Mettler-Toledo Thornton offers a metered, positive displacement Pump Module (P/N 58 091 565) as an accessory for applications where a pump is required.



When the Pump Module is installed, select 'Pump' in the Accessory drop-down menu.

Measure

Measure assigns the primary measurement associated with the TOC channel. The selected parameter will be the primary measurement, and will be the first measurement displayed within the associated channel displays on the M800 transmitter. To change the primary measurement, select the appropriate measurement from the 'Measure' drop-down menu.

6.3 ISM Setup

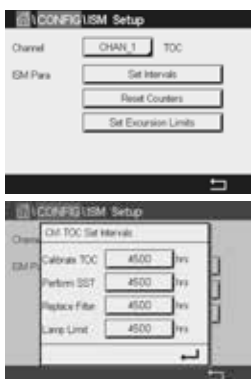
(PATH: **⌘**/ISM Setup)

The ISM Setup menu allows configuration of various ISM features associated with the 5000TOCi. These features are:

Set Intervals

The M800 iMonitor provides an intuitive, graphic user interface which allows quickly and intuitively assessing the general health of the associated sensor by displaying a series of colored bars which depicts the time remaining before specific service procedures must be completed. The 'Set Intervals' menu allows defining the time interval for conducting these service steps.

Calibrate TOC: Define the maximum time period in hours before a calibration must be performed.



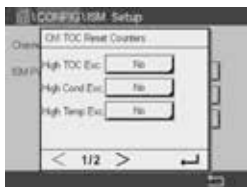
Perform SST: Define the maximum time period in hours before an SST should be performed.


Replace Filter: Define the maximum time period in hours before the high capacity inlet filter must be replaced.

Lamp Limit: Define the maximum time period in hours before the UV lamp must be replaced.

Reset Counters

The 5000TOCi provides the ability to count the number of occurrences where select parameters rise above or fall below user-specified values. The total number of occurrences is tracked by the Excursion Counter feature, fully described in the ISM Diagnostics section of this manual. The Reset Counters option allow setting these counters back to zero.

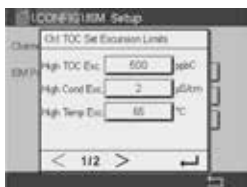


To reset these counters, press the drop-down selector associated with the counter which is to be reset, and select 'Yes' from the list that appears. Repeat this process for each counter to be reset. Once all counters have been selected, press the  icon. The value for each counter selected will be set back to zero.

The limits for these counters may be set using 'Set Excursion Limits' noted below.

Set Exc. (Excursion) Limits

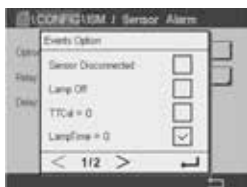
The 5000TOCi Sensor is capable of automatically tracking the number of occurrences where select parameters rise above or fall below user-defined values. The Set Excursion Limits feature allows defining the threshold values for the following limit counters:



High TOC
High Conductivity
High Temperature
High Flow
Low Flow

6.4 ISM / Sensor Alarm

(PATH:  ISM / Sensor Alarm)



The ISM / Sensor Alarm feature allows configuring an alarm relay to provide an external indication of selected alarm conditions. When any of the selected events occur, a Flashing Red Bar will be displayed on the M800, and the alarm relay will energize if configured.

For the 5000TOCi, the following alarm conditions may be selected:

Sensor Disconnected: The selected alarm relay is activated when the 5000TOCi becomes disconnected from the M800 transmitter.

Lamp Off: The selected alarm relay is activated if the 5000TOCi UV lamp it turned off for any reason.

TTCal = 0: The selected alarm relay is activated when the remaining time until the next calibration reaches 0 Hours.

LampTime = 0: The selected alarm relay is activated when the remaining lamp life reaches 0 Hours.

TTSST = 0: The selected alarm relay is activated when the remaining time until the next System Suitability Test reaches 0 Hours. De-selecting the even will also deactivate the iMonitor indication.

Filter = 0: The selected alarm relay is activated when the remaining time until the next System Suitability Test reaches 0 Hours. De-selecting the even will also deactivate the iMonitor indication.

6.5 Reset

(PATH: **#*/Reset**)



The M800 provides the ability to reset various settings within connected sensors to factory default values. To reset parameters associated with the 5000TOCi, enter the Reset menu and select the channel associated with the 5000TOCi to be reset from the drop-down selector provided. To configure the reset function, press the 'Configure' button, select the specific parameter sets that are to be reset to the factory values, and press the **←** icon.

From the main Reset screen, a 'Reset' button will now be visible. To reset the selected parameter sets, press 'Reset' and then press 'Yes' in the acknowledgement dialogue box that appears.

The following parameter sets associated with the 5000TOCi may be reset:

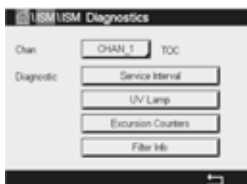
SensorCal: The original factory calibration will be restored for all internal measurement parameters (TOC, Conductivity, Temperature and Flow).

ElecCal: The electronics calibration for conductivity will be restored to the original factory settings.

Sensor Setup: All sensor setup parameters excluding calibration values will be restored to factory settings.

6.6 ISM Diagnostics

(PATH: **ISM/ISM Diagnostics**)



The ISM Diagnostics menu allows viewing many characteristics of the 5000TOCi to allow assessing the general condition of the sensor.

Service Interval

The Service Interval screen will display the required date on which the next Calibration, System Suitability Test, UV Lamp Replacement and high capacity Inlet Filter Replacement must be conducted, based on the settings configured in the 'Set Intervals' section, described above.

UV Lamp

Operating parameters associated with the UV lamp can be viewed from the UV Lamp diagnostic screen. These parameters include:



User ID: Displays the user ID that was active when a lamp change was last registered through the TOC Maintenance menu. Note that the User ID is recorded only if Password Protection is turned on in the M800 transmitter at the time the lamp change is registered. If password protection is not turned on, then no user ID will be recorded.

Remain: Displays hours of operation remaining on the current UV Lamp based upon the Lamp Limit

setting under ISM Setup. This value is reset to the Lamp Limit setting when a lamp replacement is registered through the TOC Maintenance menu.

Last Changed: Indicates the date of last lamp change, based upon the M800 internal clock setting at the time a UV lamp replacement is registered through the TOC Maintenance menu.

Change Cycles: Indicates the total number of lamp replacements performed over the life of the sensor. This counter is incremented when a lamp replacement is registered through the TOC Maintenance menu.

Power Cycle (Today): Number of on/off cycles experienced by the lamp during the current calendar day. This counter will automatically reset to zero at midnight, as determined by the M800 internal clock. This counter may also be manually reset from the TOC Maintenance menu.

Power Cycle (Lifetime): Number of on/off cycles experienced by the UV lamp during the life of the current UV Lamp. The counter is reset to zero when a lamp change is recorded in the TOC Maintenance menu.

When a UV lamp replacement is registered (See TOC Maintenance below), the User ID active at the time the lamp change is registered will be recorded (only if Password protection is turned on at the M800), the Change Cycles value is incremented by 1, the 'Last Change' date is set to the current date (based on the M800 internal clock), the hours remaining is set to the Lamp Life Limit, and the power cycle counters are reset to zero.

Exc. Counters

The 5000TOCi Sensor is capable of automatically tracking the number of occurrences where select parameters rise above or fall below user-defined values as described in the Set Excursion Limits section above. The Excursion Counters screen allows viewing the total number of excursions that have occurred for the following conditions based on the values entered in Set Excursion Limits:

High TOC
High Conductivity
High Temperature
High Flow
Low Flow



Filter Info

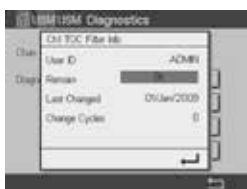
Operating parameters related to the high capacity inlet filter can be viewed from the Filter Info screen. These parameters include:

User ID: Displays the user ID that was active when a filter replacement was last registered through the TOC Maintenance menu. Note that the User ID is recorded only if Password Protection is turned on in the M800 transmitter at the time the filter replacement is registered. If password protection is not turned on, then no user ID will be recorded.

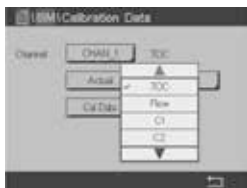
Remain: Displays hours of operation remaining on the current inlet filter based upon the Replace Filter setting under ISM Setup. This value is reset to the Replace Filter setting when a filter replacement is registered through the TOC Maintenance menu.

Last Changed: Indicates the date of last filter replacement, based upon the M800 internal clock setting at the time a filter replacement is registered through the TOC Maintenance menu.

Change Cycles: Indicates the total number of filter replacements performed over the life of the sensor. This counter is incremented when a filter replacement is registered through the TOC Maintenance menu.



6.7 Calibration Data



(PATH: **ISM**/Calibration Data)

The 5000TOCi will store up to 4 sets of calibration data including the factory calibration (Factory), the current active calibration (Actual), and up to two of the most recent previous calibrations (Cal1 and Cal2, with Cal1 being the most recent historical calibration record). Each of these calibration records can be viewed from the M800.



To view any of these calibration records, select the channel associated with the applicable 5000TOCi, the calibration, and the parameter to be reviewed from the drop-down selectors provided, then press the Cal Data button. Use the < and > icons to change pages to view the entire calibration record. Once viewing of the record is completed, press the icon to return to the Calibration Data screen.

6.8 SST Information



(PATH: **ISM**/SST Info)

The 5000TOCi will store up to 4 sets of System Suitability Test results labeled SST-1 (most recent) through SST-4. The results of each of these SST procedures can be retrieved through the M800 transmitter.

To view any of these SST records, select the channel associated with the applicable 5000TOCi sensor and the SST result to be viewed from the drop-down selectors provided, then press the SST Data button. Use the < and > icons to change pages to view the entire SST record. Once viewing of the record is completed, press the icon to return to the SST Info screen.

6.9 TOC Maintenance

(PATH: /TOC Maintenance)

The TOC Maintenance menu allows recording the completion of standard maintenance tasks that are not controlled through menu operation, as well as access to certain features that may be needed during system maintenance. These features include UV Lamp or Inlet Filter Replacement, display or manual control of TOC Sensor sample flow rate, or resetting the Lamp Power Cycles Today counter. Operations such as calibration and system suitability testing are automatically recorded at the completion of these tasks.

Replace Lamp

Press the 'Change' button after performing a UV lamp replacement to update the information related to the UV lamp under ISM Diagnostics.

Lamp Power Cyc. Today

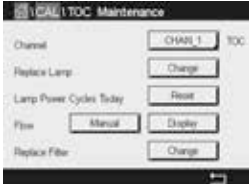
Press 'Reset' to set the Lamp Power Cycles Today counter back to zero.

Flow

Allows displaying the current flow rate based upon the internal flow measurement, or manually controlling of the flow rate.

Manual: Press 'Manual' to manually set the internal flow control to a specific value. The flow rate will be returned to automatic control after leaving this screen.

Display: Press 'Display' to view the current sample flow rate as measured using the flow sensor within the 5000TOCi.

**Replace Filter**

Press the 'Change' button after performing an inlet filter replacement to update the information related to the inlet filter under ISM Diagnostics.

7 5000TOCi Sensor Service Requirements

The 5000TOCi Sensor is designed to minimize service and maintenance. There are virtually no moving mechanical components, therefore normal operating wear and tear is minimal. This reduces the amount of consumable components as well as the amount of time needed to maintain the sensor. Listed below are instructions on how to perform simple periodic maintenance, which includes UV Lamp change (every 4500 hours of operation), filter replacement (typically every 6 months), and general cleaning.

7.1 UV Lamp Replacement



WARNING: UV RADIATION HAZARD

Apply power to UV lamp only when installed in housing in accordance with instruction manual. DO NOT remove UV lamp from housing unless power is off.

Always protect eyes and skin from direct exposure to UV light.

Mettler-Toledo Thornton recommends replacement of the UV lamp inside the 5000TOCi Sensor after 4500 hours of operation, or 6 months of continuous use, not to exceed one year. This is a simple procedure that requires only a few minutes to complete. The following steps explain the proper procedure for the UV lamp replacement. Refer to the illustration below.



CAUTION: Use of a UV lamp other than those provided by Mettler-Toledo Thornton specifically for use with the 5000TOCi Sensor will affect performance and void the warranty of this product.

- 1 At the sensor, turn off the UV lamp by pressing the lamp control button (UV lamp ON LED will turn off). If the LED does not turn off, check that the Sensor Key Lock is in the off position in the M800. Refer to **Parameter Settings: Sensor Key Lock** function in this manual.
- 2 Once power to the UV lamp is off, open the front cover of the sensor enclosure with the front cover tool.
- 3 Remove the side cover labeled 'UV LAMP REPLACEMENT COVER' on the left side of the sensor enclosure. Use a large-bladed flat-head screwdriver and turn the cover counter clockwise to loosen and unscrew the cover.
- 4 Disconnect the power cable to the UV lamp. This connector is located on the backside of the front cover, above the circuit board.
- 5 Loosen but do not remove the UV lamp holding screw located on the left side of the oxidation chamber.
- 6 Slide the cable of the UV lamp through the side opening of the enclosure and gently slide the UV lamp out of the oxidation chamber assembly (stainless steel cylinder). Be careful not to let the UV lamp hit the quartz glass coil inside the chamber.
- 7 Use the gloves supplied with each replacement bulb. Hold the new lamp from the ends of the lamp. Do not touch the clear glass portion of the bulb. Slide the new UV lamp into the side opening of the enclosure and into the oxidation chamber opening until it stops. Do not use excessive force to insert the UV lamp as this may cause damage to the lamp or the internal components of the oxidation chamber.
- 8 Tighten the UV lamp holding screw until snug.




CAUTION: Do not overtighten holding screw.

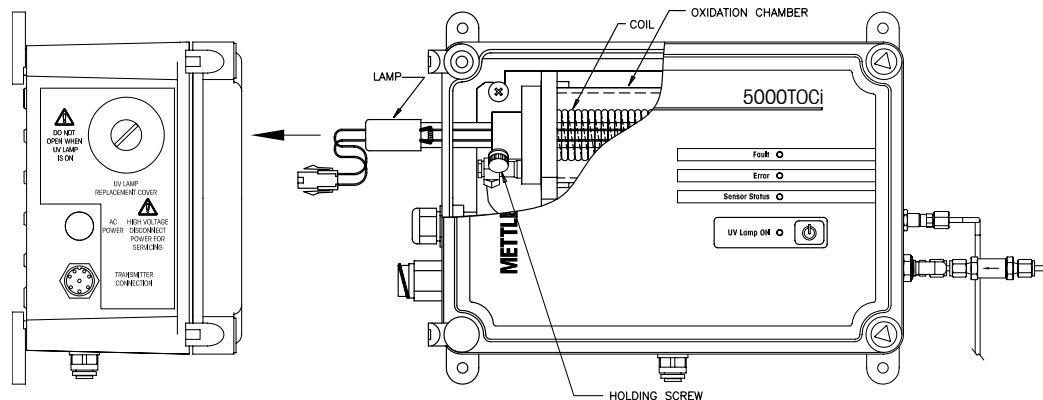
9 Feed the power cable through the side opening of the enclosure. Re-connect the cable to the power connector on the front door.

10 Close front cover of the sensor and secure fasteners with the front cover tool.

11 Install the UV Lamp replacement cover on the opening on the side of the enclosure.

12 At the M800, enter the TOC Maintenance menu at Path: /TOC Maintenance and press the Replace Lamp button to register the lamp replacement.

13 After the lamp replacement has been completed, a TOC calibration must be performed. In addition, a System Suitability Test is recommended for applications where compliance with Pharmacopeia regulations is necessary. Please refer to the Standard Operating Procedures for Calibration (P/N58 130 257) and the Standard Operating Procedure for System Suitability Testing (P/N 58 130 258) for more detail on these procedures.



7.2 Front Panel Cleaning

Clean the front panel with a damp soft cloth (water only, no solvents). Gently wipe the surface and dry with a soft cloth.

7.3 Technical Support

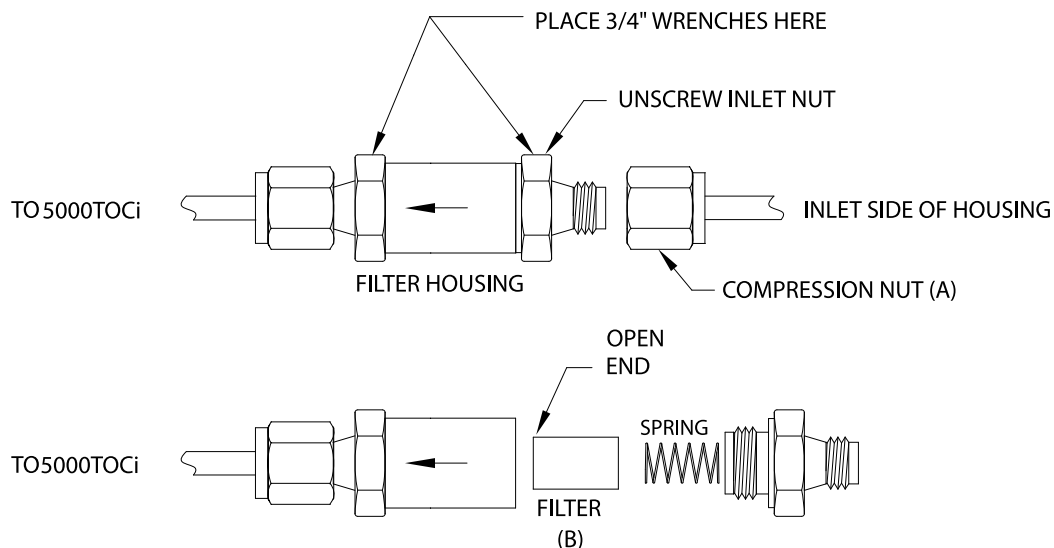
For technical support and product information for the 5000TOCi, contact your local Mettler-Toledo Sales Office or representative.

7.4 High Capacity Inlet Filter Replacement



The 5000TOCi Sensor includes a high capacity filter (shown below) containing a filter element that should be replaced (P/N 58 091 551, package of 2) after approximately 6 months of operation, depending on water quality conditions. Detailed instructions to replace this filter are included in the replacement package.

Once the filter replacement has been completed, the replacement must be registered with the 5000TOCi to reset the filter operating information. At the M800, enter the TOC Maintenance menu at Path: /TOC Maintenance and press the Replace Filter button to register the filter replacement.



REPLACING THE FILTER ELEMENT FOR THE HIGH CAPACITY INLET FILTER

7.5 Draining and Shipping Instructions

The 5000TOCi contains a glass coil which facilitates oxidation of the water sample. Water freezing within the coil during transportation will cause this coil to break. Therefore, it is important that all water be removed from the TOC sensor prior to shipment.

To drain the water, connect the TOC sensor to AC power. To put the flow control valve into the 'Drain' mode, press and hold the UV Lamp button for 5 seconds until the Sensor Status LED begins flashing. This mode will fully open the automatic flow control valve to allow draining the sensor more easily. Once the valve has been placed into the 'Drain' mode, use the supplied plastic syringe to push the water out of the sensor, blowing from the inlet, and pushing water out through the sensor outlet.

8 Troubleshooting the 5000TOCi Sensor

8.1 Basic Troubleshooting

Listed below are some techniques that may assist in troubleshooting the 5000TOCi. Refer to the Fault and Error Message Tables on the next page for messages that appear in the M800 messages menu when a Fault or Error condition exists.

Problem	Possible Cause
None of the LEDs illuminate	<ul style="list-style-type: none"> • LED/Keypad failure • Circuit board failure • No AC Power available to 5000TOCi
No Flow from sensor sample outlet	<ul style="list-style-type: none"> • High capacity inlet filter clogged • Flow control valve failure • Sample flow shut off to sensor inlet • Internal component leaking • Sample feed pressure too low
Erratic flow through the sensor	<ul style="list-style-type: none"> • Sample outlet tubing not installed per manufacturer's instructions • Flow Control valve failure • Erratic water system/sample feed pressure

8.2 Fault and Error Messages

When an Error or Fault condition exists, the M800 will display a red (fault) or yellow (error) flashing bar at the top of the channel display for the affected sensor. If the affected sensor channel is not currently displayed, the flashing bar will appear at the top of the display. The Fault or Error description can be found in the M800 messages menu. The message menu can be accessed by pressing the colored bar, or by pressing the **ISM** icon and selecting the Messages menu option. The messages associated with the 5000TOCi Sensor are listed in the following tables. The first character of the message will be an F to indicate a fault and an E to indicate an error. A fault condition will immediately disable the TOC indication. After being active for 30 seconds, a Fault will turn off the UV lamp at the 5000TOCi Sensor. Faults cause the M800 to control relays and analog outputs to the defined fail-safe condition, i.e., on fault set minimum or maximum.

Fault Message Table

Message Displayed	Description	Action
F-UV Lamp Failure	UV lamp not lit when powered up	Check lamp connections or replace lamp
F-No flow detected	Flow < 12 ml/min = no flow or flow sensor failed	Check supply isolation valve Check sample supply pressure Check for obstruction in water line Replace High Capacity Inlet Filter
F-C1 shorted	C1 failure (sensor or cable)	Replace C1
F-C2 shorted	C2 failure (sensor or cable)	Replace C2
F-C1 open	C1 failure or no water	Check for flow. Replace C1
F-C2 open	C2 failure or no water	Check for flow. Replace C2
F-T1 open/shorted	T1 failure (sensor or cable)	Replace C1
F-T2 open/shorted	T2 failure (sensor or cable)	Replace C2
F-Conductivity high	Input conductivity > 100 μ S/cm compensated on C1	Investigate cause on increased conductivity from sample supply
F-Communication	Communication failure between M800 TOC and 5000TOCi	User must correct
F-Temp High	Temperature at T1 > 95 °C.	Reduce inlet temperature Install sample conditioning coil
F-Secondary Micro (AVR) Fails	Failure of AVR Microprocessor	Replace Sensor PCBA Contact Mettler Toledo

An Error is generated by a condition that may cause a problem with the proper operation of the sensor. Under an error condition, the sensor will continue to make measurements but the measured value may be in error depending upon the cause of the error message.

Error Message Table

Message Displayed	Description	Action
E-UV lamp over time	Lamp Limit time exceeded	Replace UV Lamp Register lamp change at M800
E-AutoBal too high	Autobalance Value High	Turn lamp off, flush system, and restart Autobalance
E-Can't start rinse	Can't Start Autobalance	Check sample supply
E-NVRAM failure	Can't communicate or Checksum invalid	Repair sensor. Will work with default settings. Set by sensor.
E-Flow to low	Flow rate below 15 mL/min	Check sample supply Replace inlet filter Check for obstruction in water line
E-Flow too high	Flow > 25 mL/min	Control Valve Failure
E-Conductivity low	Input conductivity < 0.050 μ S/cm compensated on C1	User must correct
E-Cond Over Limit	Conductivity Limit exceeded as defined in TOC Parameter Settings	Investigate cause for high conductivity in sample water
E-Temp high	Temp Over range > 90 °C at C1	Reduce sample inlet temperature Install Sample Conditioning Coil
E-Temp low	Temperature detected <2 °C at C1	User must correct
E-TOC over range	TOC > 3 ppm	
E-Calibration Incomplete	Calibration not saved successfully due to power loss or communication loss while saving	Repeat calibration process. Sensor will automatically resume operation with previous calibration.

9 Accessories and Spare Parts

Please contact your local Mettler-Toledo Sales office or representative for details for additional accessories and spare parts.

9.1 M800 Transmitter

Description	Order no.
Patch Cord, 1 ft (0.3 m)	58 080 270
Patch Cord, 5 ft (1.5 m)	58 080 271
Patch Cord, 10 ft (3.0 m)	58 080 272
Patch Cord, 15 ft (4.5 m)	58 080 273
Patch Cord, 25 ft (7.6 m)	58 080 274
Patch Cord, 50 ft (15.2 m)	58 080 275
Patch Cord, 100 ft (30.5 m)	58 080 276
Patch Cord, 150 ft (45.7 m)	58 080 277
Patch Cord, 200 ft (61.0 m)	58 080 278
Patch Cord, 300 ft (91.4 m)	58 080 279

9.2 5000TOCi Sensor Accessories and Spare Parts

Description	Order no.
Pump Module	58 091 565
Kit, tool, 4000TOC / 5000TOC Sensor (Includes 5/16" (8mm), 3/8" (9.5mm), 7/16" (11mm) wrenches and offset screwdriver	58 091 520
Pipe Mounting Kit, 1-1/2" (3.8cm) pipe	58 091 521
Pipe Mounting Kit, 2" (5cm) pipe	58 091 522
Pipe Mounting Kit, 3" (7.6cm) pipe	58 091 523
Pipe Mounting Kit, 4" (10cm) pipe	58 091 524
Kit, Calibration and System Suitability Test with Smart conductivity sensor (SST and calibration standards sold separately)	58 091 559
Kit, Calibration and System Suitability Test with UniCond® Sensor (SST and calibration standards sold separately)	58 091 566
Adapter, 0.25" (6mm) tube to 0.125" (3mm) tube, compression type	58 091 540
Adapter, 0.125" (3mm) O.D. tube X 0.25" (6mm) male-NPT connector	58 091 541
Adapter, 0.125" (3mm) O.D. tube X 0.25" (6mm) female-NPT connector	58 091 542
Adapter, 0.125" (3mm) tube TO 0.5" (13mm) 316 stainless-steel pipe (0.75" [19mm] TRI-CLAMP CONNECTION)	58 091 543
Filter Assembly, High capacity	58 091 550
High pressure regulator	58 091 552
Stainless steel outlet tube	58 091 553

9.3 5000TOCi Sensor Consumable Items

Description	Order no.
Fuse, 1.25A, Sensor PCB (For use on both 110VAC and 220 VAC Models)	58 091 519
Replacement UV Lamp (recommended every 4,500 hours of operation)	58 091 513
System Suitability Standards (For use with Cal/SST KIT P/N 58 091 559 and 58 091 566)	58 091 526
Calibration Standards (For use with Cal/SST KIT P/N 58 091 559 and 58 091 566)	58 091 529
Combined Calibration and SST Standards (For use with Cal/SST KIT P/N 58 091 559 and 58 091 566; contains 58 091 526 and 58 091 529)	58 091 537
Calibration Standards for Extended Range Calibration (For use with Cal/SST KIT P/N 58 091 559 and 58 091 566)	58 091 568
Combined Calibration and SST Solutions for Extended Range Calibration (For use with Cal/SST KIT P/N 58 091 559 and 58 091 566; contains 58 091 526 and 58 091 568)	58 091 569
Filter element, High Capacity (Pkg. 2)	58 091 551

10 5000TOCi Sensor Default Settings

Parameters	Sub Parameters	Value	Unit
Autobalance Parameters	Autobalance On / Off	Off	
	Autobalance Cycle Time	4500	Hours
	Autobalance Limit	15	%
	Rinse Time	15	Minutes
Lamp Parameters	Lamp Life Limit	4500	Hours
TOC General Parameters	AutoStart On / Off	Off	
	Sensor Keypad Lock Yes / No	No	
	Override Cond. Limit Yes / No	No	
	Conductivity Limit	2.0	$\mu\text{S/cm}$

11 5000TOCi Specifications

Measurement Range	0.05 - 2000 gC/L (ppbC)
Accuracy	± 0.1 ppb C for TOC < 2.0 ppb (for water quality > 15 MΩ-cm) ± 0.2 ppb C for TOC > 2.0 ppb and < 10.0 ppb (for water quality > 15 MΩ-cm) ± 5% of measurement for TOC > 10.0 ppb (for water quality 0.5 to 18.2 MΩ-cm)
Repeatability	± 0.05 ppb C < 5 ppb, ± 1.0% > 5 ppb
Resolution	0.001 ppbC (gC/L)
Analysis Time	Continuous
Initial response time	< 60 seconds
Update Rate	1 Second
Limit of Detection	0.025 ppbC

Conductivity Sensor

Conductivity Accuracy	±2%, 0.02 to 20 μS/cm; ±3%, 20-100 μS/cm
Constant Accuracy	2%
Temperature Sensor	Pt1000 RTD, Class A
Temperature Accuracy	± 0.25°C

Sample Water Requirements

Temperature	0 to 100°C *
Particle Size	<100 micron
Minimum Water Quality	0.5 MΩ-cm (2 μS/cm), pH < 7.5 **
Flow rate	20 mL/min
Pressure	4 to 100 psig (0.3 bar to 6.9 bar) at sample inlet connection ***

General Specifications

Overall Dimensions	11" [280mm] W x 8.8" [188mm] H x 5.25" [133mm] D
Sample Connections	
Inlet	0.125" [3mm] O.D. (6' [2m] FDA compliant PTFE tubing supplied)
Outlet	Stainless Steel drain tube (5' [1.5m] flexible tubing provided)
Inlet Filter	316SS, inline 60 micron
Weight	5.0 lb. [2.3 kg]
Enclosure material	Polycarbonate plastic, flame retardant, UV and chemical resistant UL # E75645, Vol.1, Set 2, CSA #LR 49336
Wetted parts	316SS/Quartz/PEEK/Titanium/PTFE/Silicone/EPDM
Ambient Temperature/ Humidity rating	5 to 50°C / 5 to 80% Humidity, non-condensing
Power requirements	100 - 130VAC or 200 - 240VAC, 50/60 Hz, 25W Maximum
Wall Mount	Standard, mounting tabs provided
Pipe Mount	Optional, with pipe-mount bracket accessory (for nominal pipe sizes 1" [2.4 cm] to 4" [10 cm])
Maximum Sensor Distance	300ft [91m]
Local Indicators	Four LED lights for Fault, Error, Sensor Status and UV Lamp ON
Ratings/Approvals	CE Compliant, UL and cUL (CSA Standards) listed. Conductivity and temperature sensors traceable to NIST and ASTM D1125 and D5391 Meets ASTM D5173 Standard Test Method for On-Line Monitoring of Carbon Compounds in Water by UV Light Oxidation

* Temperature above 70°C requires Sample Conditioning Coil p/n 58 079 518 (included).

** For power plant cycle chemistry samples, pH may be adjusted by measurement after cation exchange.

*** Process pressure above 85 psig (5.9 bar) requires optional High Pressure Regulator p/n 58 091 552.

Specifications subject to change without notice

12 Warranty

METTLER TOLEDO warrants this product to be free from significant deviations in material and workmanship for a period of one year from the date of purchase. If repair is necessary and not the result of abuse or misuse within the warranty period, please return by freight pre-paid and amendment will be made without any charge. METTLER TOLEDO's Customer Service Dept. will determine if the product problem is due to deviations or customer abuse. Out-of-warranty products will be repaired on an exchange basis at cost.

The above warranty is the only warranty made by METTLER TOLEDO and is lieu of all other warranties, expressed or implied, including, without limitation, implied warranties of merchantability and fitness for a particular purpose. METTLER TOLEDO shall not be liable for any loss, claim, expense or damage caused by, contributed to or arising out of the acts or omissions of the Buyer or Third Parties, whether negligent or otherwise. In no event shall METTLER TOLEDO's liability for any cause of action whatsoever exceed the cost of the item giving rise to the claim, whether based in contract, warranty, indemnity, or tort (including negligence).

13 Certificate

Mettler-Toledo Thornton, Inc., 36 Middlesex Turnpike, Bedford, MA 01730, USA has obtained Underwriters Laboratories' listing for 5000TOCi Model TOC Sensors. They bear the cULus Listed mark, signifying that the products have been evaluated to the applicable ANSI/UL and CSA Standards for use in the U.S. and Canada



Declaration of Conformity

We,
Mettler-Toledo Thornton, Inc.
36 Middlesex Turnpike
Bedford, MA 01730, USA
Declare Under our sole responsibility that the product:

5000TOCi Sensor

to which this declaration relates, in conformity with the following European, harmonized and published standards at the date of this declaration:

EMC Emissions: EN 55011 Class A

EMC Emissions and Immunity: EN 61326-1 2006, Measurement Control and Laboratory equipment EMC requirements.

Safety: EN 61010-1 2001-02, Second edition

UL LISTING

US UL61010-1 Electrical Equipment for Measurement, Control and Laboratory Use

CAN/CSA CSA 22.2 No. 61010-1

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