THORNTON
Leading Pure Water Analytics

6000TOCi
Pump Module
Instruction Manual

6000TOCi
30516570 Rev B

METTLER TOLEDO

Instruction Manual
6000TOCi Pump Module

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Content

1 Safety instructions

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

1.1 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.

- Follow all warnings, cautions, and instructions indicated on and supplied with this product.
- Install equipment as specified in this instruction manual. Follow appropriate local and national codes.
- Use only factory documented components for repair. Tampering or unauthorized substitution of parts and procedures can affect the performance and cause unsafe operation of your process as well as void factory warranties.
- Protective covers must be in place unless qualified personnel are performing maintenance.
- If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment against hazards may be impaired.
- Prior to shipping equipment back to the factory for repair or re-calibration, water MUST be drained from equipment to avoid damage due to freezing.

WARNINGS:

- Installation of cable connections and servicing of this product require access to shock hazard voltage levels. Main power must employ a switch or circuit breaker as the disconnecting device for the equipment. The breaker should be properly labeled and easily accessible for system isolation by service personnel.
- 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 instrument be connected and properly grounded through a three-wire power source.
- PROCESS UPSETS: Because process and safety conditions may depend on consistent operation of this equipment, provide appropriate means to maintain operation during cleaning, replacement, or equipment calibration.

2 Instructions

The Pump Module 8.5 mL/min is an accessory for use with Mettler-Toledo Thornton 6000TOCi sensor. This manual covers routine operation of the Module including installation, operation and periodic maintenance procedures.

The Pump Module uses a precision, positive displacement pump to provide a highly stable, metered flow of process water to the 6000TOCi sensor to ensure reliable and consistent TOC measurement performance. This accessory is recommended for applications where system pressure is either too low to provide adequate flow through the 6000TOCi Sensor, or for low-pressure applications where system pressure may vary routinely during operation.

Applications where these conditions are most likely to be found include distillation and RO Permeate, where operating pressures are normally lower. In addition, the Pump Module may be needed for applications with a process stream supplied from a water reservoir of varying height, such as Tank Cleaning Validation or Pharmaceutical glass-washers.

3 Instrument Description

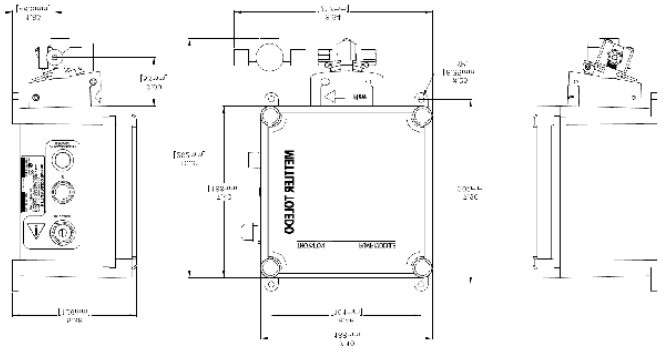
3.1 Unpacking

Carefully unpack the Pump Module. The box should contain the following items:

- Pump Module
- Pump Module Instruction Manual
- Certificate of Conformity
- Installation Kit includes:
  - One - 6 foot (2m) length of PTFE tubing, 0.125 inch (3mm) O.D.
  - One - Tool, Pump Module Cover
  - Two - 0.25 inch (6mm) to 0.125 inch (3mm) Swagelok Adaptor Fittings
  - Pulsation dampener
  - Pulsation dampener interconnect

3.2 Dimensions

Shown below (Figure 1) are the case dimentions for the Pump Module.



4 Installation

4.1 Pump Module Installation

Mount the Pump Module between the sample point and the 6000TOCi Sensor. The Module should be mounted vertically and as close to the 6000TOCi Sensor as possible. **Shorter sample tubing length between the sampling point and the 6000TOCi Sensor will provide faster response time.** As shown in Figure 1, the Pump Module is supplied with wall-mounting tabs for wall or panel mount.

The Pump Module requires some routine maintenance; therefore it is beneficial to mount the Module in an easily accessible location.

4.2 Sample Tubing and Pulse Dampener Installation

The installation kit provided with the Pump Module includes sample tubing consisting of one 6-foot (2 m) length of PTFE tubing included for the supply. Two 0.25 inch (6mm) O.D. to 0.125 inch (3mm) O.D. tubing reducers are also included and can be used where applicable.

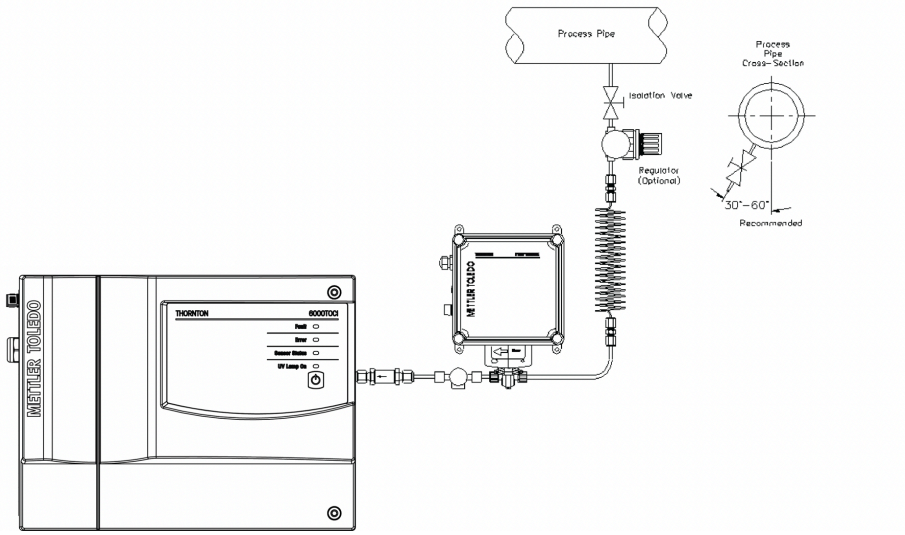
NOTE: use only the supplied tubing or other non-leaching tubing such as stainless steel to prevent contamination to the 6000TOCi Sensor.

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

- Sample isolation valve (not provided with Module).
- 0.125 inch compression tube fitting for sample point (common tube fitting adapters are available from Thornton; see Section 7, ACCESSORIES AND CONSUMABLE ITEMS).

NOTE: The sample point should contain a shut-off valve to isolate the Pump Module/6000TOCi 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.

Figure 2: Sample Pump Module and 6000TOCi Sensor Installation



- Remove the protective covers from the sample connections on the Pump Module.
- Attach the open tube end of the supplied PTFE tubing to the sample isolation valve. Cut excess tubing to minimize the sample tubing length. Be sure all fittings are properly fastened to avoid leaks and the possibility of air ingress.

NOTE: The distance from the sample point to the Pump Module inlet should be close enough to always allow for a flooded suction through the inlet tubing.

CAUTION: To avoid possible instrument damage or malfunction, do not allow dry operation of the Pump Module. Always ensure that the sample line is filled from the sample point to the pump inlet connection.

CAUTION: The pump module uses a low-torque stepper motor to prevent down-stream over pressurization in the event of a blockage; no additional over pressure protection is provided. If risk of over pressurization caused by operating system pressure exists, additional over pressure protection may be required.

- Prior to connection to the pump inlet, slowly open the sample line isolation valve until water flows from the sample line connection. Once water is flowing through the sample line, shut the sample line isolation valve. Continue with connection of the sample line to the inlet of the pump.

Flush the sample inlet tubing to remove any particles that may be in the line or fittings before connecting it to the Pump Module.

NOTE: If particulate contamination exceeding 100 microns is expected in the water stream, a suitable filter should be installed before the inlet of the Pump Module.

- Connect the 0.125 inch (3mm) PTFE tubing from the sample line to the Pump Module inlet by securing the tubing in the compression fitting on the inlet of the Pump Module assembly. Do not over tighten.
- Using the stainless steel interconnect piece provided, attach the pulsation dampener to the Pump Module outlet connection. Insert the interconnect piece into the Pump Module outlet fitting and hand-tighten. Once tightened, insert the pulsation dampener onto the interconnecting piece, and hand-tighten. Position the pulsation dampener so that the bellows is located at the top of the assembly, as shown in Figure 2.
- Connect the 0.125 inch (3mm) PTFE tubing supplied with the 6000TOCi Sensor from the outlet fitting of the pulsation dampener to the inlet fitting of the 60 micron high capacity filter connected to the 6000TOCi Sensor inlet. Secure the tubing in the compression fitting on the 60 micron high capacity filter assembly. Do not over tighten.
- Install the remaining tubing connections to the 6000TOCi Sensor following the 6000TOCi Sensor Instruction Manual.
- Once all tubing connections are complete and the sample inlet tubing has been flushed to drain, sample water can be introduced to the Pump Module/6000TOCi Sensor.
- Slowly open the sample point isolation valve and check to be sure there are no leaks in the sample line or at the Pump Module.

NOTE: Due to the design of the pumping mechanism, water will not flow through the pump module when it is not running.

- Shut off the sample flow to the Pump Module and connect AC power to the Pump Module and 6000TOCi Sensor (see 6000TOCi Sensor Instruction Manual for AC power connection to 6000TOCi Sensor).

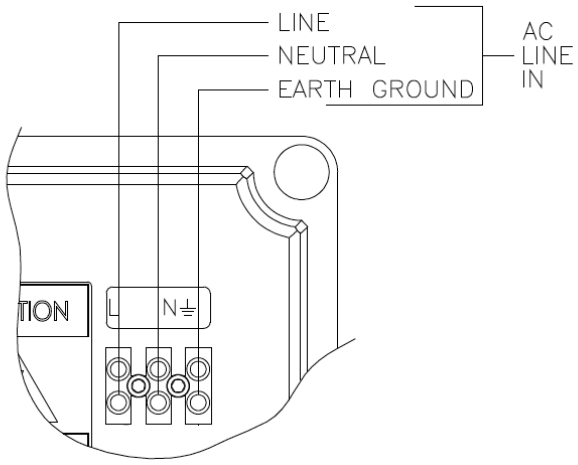
4.3 AC Power Connection

As shown in the left side view of Figure 1, there is a bulkhead cable gland located on the left-hand side of the Pump Module enclosure labeled 'AC POWER' to allow for the passage of the AC power cable (not provided with the Module). The AC power cable used should meet the following minimum specifications:

VW-1/FT-1; min 300V; 105°C, Minimum 18 AWG (0.821mm2). The free length of the leads for the AC line cord within the pump module enclosure shall be at least 6 inches (150mm). Cord diameter shall be Min/Max 0.16"(4.06mm) to 0.31" (7.87mm).

The terminal connections for AC power are mounted to the front cover of the Pump Module, as shown in Figure 4. Keep AC power separated from all other internal wiring. Use the fasteners provided to secure the power wires. Be sure there is enough excess 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 Section 9 for ordering information.

Figure 4: Power Connection



4.4 Condensation and High Temperature Applications

Certain ambient and process temperatures may cause condensation to occur inside the Pump Module. The Mettler-Toledo Thornton Sample Conditioning Coil (p/n 58 079 518) is designed to eliminate condensation conditions. For water temperatures above 70°C (158°F), the Sample Conditioning Coil (p/n 58 079 518) is required. The Sample Conditioning Coil must be installed between the sample line and the Pump Module as shown in Figure 2. Sample Pump Module and 6000TOCi Sensor Installation.

- Connect fitting A (1/8″-1/16″) of Sample Conditioning Coil to the Pump Module inlet tubing and tighten to crimp. Do not over tighten.
- Attach Fitting B (1/16″ X 1/4″ NPT) of Sample Conditioning Coil to an appropriate connection on the process pipe.
- 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 extended in length to 10′ (3m) maximum.

5 Operation

There are two basic operational procedures for the Pump Module. Both scenarios are described below. The first procedure is called the 'Initial Start-up' and the second is called the 'Normal Operation' condition.

CAUTION: Do not operate the Pump Module without water. Always ensure the sample line is filled from the sample point to the pump inlet connection by slowly opening the sample line isolation valve and allowing the line to fill with water prior to initial start-up.

5.1 Initial Start-Up

Initial start-up refers to the condition where a Pump Module is installed and setup for the first time. During initial start-up it is desirable to first verify the flow rate through the Pump Module. This is performed to ensure flow is optimized through the Module and 6000TOCi Sensor and to avoid a potential flow rate alarm condition.

5.2 Verifing Sample Flow Rate

The Pump Module is set during factory calibration to a flow rate of 8.5 ml/min. However, since the flow rate may depend on the sample line plumbing and input pressure, it is advisable to verify the flow rate at installation and to check it periodically. The Pump Module flow rate is verified by timing the volume of water collected at the sample drain line of the 6000TOCi Sensor into a dry volumetric container. Flow rate through the Pump Module/6000TOCi Sensor should be 8.5 ml/min. See Section 5, Service and Maintenance, for detailed instructions on flow rate verification.

5.3 Normal Operation

Once the flow rate through the Pump Module is verified, the operator can begin the TOC measurement process. Turn on power to the Pump Module and the 6000TOCi Sensor. Please refer to the 6000TOCi Sensor Manual for detailed instructions of sensor functions and operation.

During initial operation of the sensor and pump module, small amounts of TOC may be contributed to the water by the pump module. The Pump Module and 6000TOCi Sensor may need to flush with sample water (4-24 hrs is recommended) before normal TOC levels are achieved.

6 SERVICE AND MAINTENANCE

WARNING: POSSIBLE ELECTRIC SHOCK
Working internal to the unit exposes the user to 110/240 VAC.
Only qualified personnel should perform maintenance on this unit.

CAUTION: To avoid damage to the 6000TOCi Sensor and Lamp, turn off the UV lamp on the 6000TOCi Sensor before beginning any service or maintenance procedures.

The Pump Module is designed to minimize service and maintenance. Listed below are instructions on how to perform simple periodic maintenance such as flow rate verification.

6.1 Flow Rate Verification

It is recommended to verify the Pump Module flow rate both at initial start-up and every 6 months, during periodic maintenance of the 6000TOCi Sensor. This ensures proper flow through the Pump Module and 6000TOCi Sensor.

- Place a dry volumetric container under the atmospheric drain line of the 6000TOCi Sensor such that the water dripping from it may be freely collected into the clean volumetric container. Do not allow the drain line to become submerged, kinked or otherwise blocked.
- Turn on the Pump Module and allow water to flow through the Module and 6000TOCi Sensor into the cylinder and begin the time measurement using a stopwatch. It is important that the water collection and time start be closely matched.
- Collect a known volume of water with the volumetric container for a specific time, at least 3 minutes.
- Verify the flow rate is 8.5 ml/min ± 0.25 ml/min. If the flow rate does not meet the required specification, contact technical support. .

6.2 Front Panel Cleaning

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

7 Troubleshooting Checklist

Problem	Possible Cause	Suggested Corrective Actions
No Flow from Pump Module/6000TOCi Sensor sample outlet	• Pump Module not turned on • High capacity inlet filter clogged • Sample flow shut off to pump inlet • Internal TOC components leaking	• Turn on pump module • Replace 60u filter element • Restore sample flow to pump module • Repair 6000TOCi Sensor • Perform pump module flow rate verification
Pump Stalls or will not start	• Clogged filter at inlet of 6000TOCi Sensor • Blocked or pinched flow tubing on pump outlet	• Replace 60u filter element • Replaced damaged outlet tubing 6000TOCi Sensor Error light due to flow error
6000TOCi Sensor Error light due to flow error	• Flow rate out of range • Pulse dampener bellows damaged	• Perform pump module flow rate verification • Replace bellows
Water drips from pump head	• Pump Seals worn • Outlet pressure too high	• Replace pump seals • Check 60u filter element for clogging, verify that connecting tubing from pump module to 6000TOCi Sensor is not blocked or damaged. If the pump module operates at excessive outlet pressures for prolonged periods, seal damage may occur. If leaks persist after a blockage is removed, pump seal replacement may be necessary.

8 Specifications

8.1 Pump Module Performance Specifications

Sample Water Requirements

Temperature	0 to 100°C *
Particle Size	<100 micron
Flow rate	≥ 8.5 ml/min + 0.25 ml/min
Pressure	flooded suction to 60 psig (4.13 bar) at sample inlet connection

General Specifications

Overall Dimensions	7.4″ [188mm] W x 7.4″ [188mm] H 5.25″ [133mm] D
Sample Connections	
Inlet	0.125" [3mm] O.D. (6' [2m] FDA compliant PTFE tubing supplied)
Outlet	0.125" [3mm] O.D. PTFE flexible tubing
Weight	4.0 lb. [1.8 kg]
Ambient Temperature/ Humidity rating	5 to 50°C / 5 to 80% Humidity, non-condensing
Enclosure material	Polycarbonate plastic, flame retardant, UV and chemical resistant UL # E75645, Vol.1, Set 2, CSA #LR 49336
Power requirements	100 - 240VAC, 50/60 Hz, 0.2A
Wall Mount	Standard, mounting tabs provided
Ratings/Approvals	CE Compliant, UL and cUL (CSA Standards) listed. Not NEMA or IP rated

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

Specifications subject to change without notice.

9 Accessories and Consumable Items

58 091 020	Pump Seal Replacement Kit
58 091 021	Replacement Fitting Kit
58 091 024	Replacement fuse (Fuse rating 250V 0.375A 5x20 mm Type 'T' (Time Lag))
58 091 025	Pulsation Dampener with interconnect
58 091 026	Pulsation Dampener Bellows Replacement Kit with Seal
58 130 016	TOC Door Tool
58 091 040	ADAPTER, 0.25" (6mm) TUBE TO 0.125" (3mm) TUBE, COMPRESSION TYPE
58 091 041	ADAPTER, 0.125" (3mm) O.D. TUBE X 0.25" (6mm) MALE-NPT CONNECTOR
58 091 042	ADAPTER, 0.125" (3mm) O.D. TUBE X 0.25" (6mm) FEMALE-NPT CONNECTOR
58 091 043	ADAPTER, 0.125" (3mm) TUBE TO 0.5" (13mm) 316 STAINLESS STEEL PIPE (0.75" [19mm] TRI-CLAMP CONNECTION)

10 Warranty

This Warranty is given expressly and in lieu of all other warranties, express or implied. The Buyer agrees that there is no warranty of merchantability and that there are no other warranties, express or implied, which extend beyond the description on the face of this agreement.

Mettler-Toledo Thornton, Inc. (hereinafter referred to as The Company) warrants to the original Buyer each electrode, component, or instrument manufactured and/or sold by The Company to be free from defects in material and workmanship in normal use and service for a period of one (1) year from shipment, unless expressly stated otherwise by the product packaging or expressly agreed to in advance by the Company. The obligation of The Company under this warranty is limited to repair or replacement of the defective product at The Company's discretion. All warranty claims shall be returned to The Company pursuant to The Company's Returned Goods Authorization program. Shipping costs (including return shipping) are the responsibility of The Buyer. The Company assumes no responsibility for any direct or indirect costs associated with removal of defective products, or re-installation of replacement products. The Company shall not be responsible for damage to any electrode, component, or instrument resulting from misuse, negligence, accident or resulting from repairs, alterations, or installations made by any person or firm not duly authorized by The Company. No agent is authorized to assume for The Company any liability except as above set forth. The Company warrants that services will be performed in a workmanlike manner in conformity with standard industry practice. Should any nonconformity be detected within 30 days after the work is completed and prompt notification is made by Buyer in writing to the Company, Company will supply the necessary service, direction, or consultation to correct the nonconformity.

Returned Goods Policy: A Returned Material Authorization (RMA) number must accompany all returned goods. This authorization is obtained by calling our Technical Service (800) 510-7873 or (781) 301-8600. All transportation costs on authorized returns must be prepaid. Authorized replacement parts sent prior to receipt and evaluation of merchandise being returned will be invoiced in full. Credit will be issued only after the returned part is received and evaluated by factory personnel. The Company is not responsible for products returned without proper authorization.

Factory Restocking Charge: Items returned to The Company more than 30 days after shipment will be subject to a 25 % restocking charge, plus any additional charges for refurbishment to salable condition. The Company will not accept returns more than 90 days after shipment, unless returned under warranty or for non-warranty repair.

Special Products: Cancellation or return of special products will not be accepted.

Disclaimer of Damages: In no event shall The Company be liable for any type of special consequential, incidental or penal damages, whether such damages arise out of or are a result of breach of contract, warranty, tort (including negligence), strict liability or otherwise. Such damages shall include, but not be limited to loss of profits or revenues, loss of use of the equipment or associated equipment, cost of substitute equipment, facilities, down time costs, increased construction costs or claims of The Buyer's customers or contractors for such damages. The Buyer agrees that in the event of a transfer, assignment, or lease of the equipment sold hereunder The Buyer shall secure for The Company the protection afforded to it in this paragraph.

For addresses of METTLER TOLEDO Market Organizations please go to:
www.mt.com/pro-MOs

Mettler-Toledo Thornton, Inc.
900 Middlesex Turnpike, Bldg. 8
Billerica MA, 01821
Tel. +1-781-301-8600
Fax +1-781-271-0214

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