Hardware Manual

ParticleTrack G600Ex

Real-Time Particle Characterization

METTLER TOLEDO

11152016

For technical support, email: AutoChemCustomerCare@mt.com

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Mettler-Toledo AutoChem, Inc.
7075 Samuel Morse Drive
Columbia, MD 21046

www.mt.com/AutoChem

Tel: + 1 866.333.6822

Fax: +1 410.910.8600

Contents

1 Introduction

This manual covers specific safety and quality information relating to the ParticleTrack™ G600Ex with FBRM® (Focused Beam Reflectance Measurement) technology. Throughout this manual, the system is referred to by the name: ParticleTrack G600Ex or FBRM G600Ex. The ParticleTrack G600Ex system includes the base unit with purge and pressurization system and a probe connected by a flexible armored conduit. The purge and pressurization system for the base unit enclosure enables use of the ParticleTrack G600Ex system in potentially explosive atmospheres in an above-ground (Group II) application.

www.mt.com/ParticleTrack G600Ex

The purge and pressurization system controls the flow of instrument air (or inert gas) into the base unit enclosure and maintains a constant pressure that is slightly higher than the ambient pressure outside the enclosure. The overpressure in the enclosure ensures gas from outside the enclosure cannot enter the base unit. If the pressure is lost for any reason, the power to the base unit shuts down automatically. The purge and pressurization system operates pneumatically and requires no electrical supply to function.

ParticleTrack G600Ex with FBRM technology is a rugged probe-based instrument that is inserted directly into large-scale vessels or pipelines to track changing particle size and count in real time at full process concentrations. Particles, particle structures, and droplets are monitored continuously, as process parameters vary, enabling engineers to effectively troubleshoot and improve processes effectively. Click the link to see the FBRM Method of Measurement video (requires internet connection).

2 Intended Use

The METTLER TOLEDO AutoChem ParticleTrack G600Ex is an analyzer that provides in-process real-time particle characterization. The apparatus is comprised of an Expo Technologies Ltd PE2E stainless steel enclosure with dimensions of approximately 500 x 750 x 250 mm, complete with integral MiniPurge type px purge and pressurization system, associated MiniPurge Interface Unit, and maintenance override switch. Refer to the EXPO MiniPurge and Enclosure manual (ML482) for more information.

The installed electrical apparatus is comprised of a power supply; laser and detector modules, laser current limiter assembly, fiber optic communications, PCBs, and pneumatic controls. The apparatus is fitted with a permanently attached flexible armored conduit, which is connected to the process probe.

The pressurized enclosure may be used in Zone 1 or Zone 21 hazardous areas, and the probe may be used to monitor a process in Zone 0 or Zone 20 hazardous areas. The flexible conduit connecting the probe to the main enclosure shall not be installed in Zone 0 / Zone 20.

The analyzer and probes have been analyzed according to the ATEX directive and are marked as follows:

Analyzer:

CE 2460 Ex II 2 (1) GD Ex db pxb [op is Ga] IIC T4 Gb
Ex tb pxb [op is Da] IIIC T135°C Db

Probe:

CE 2460 Ex II 2 / 1 GD c Ex op is IIC T4 Ga
Ex op is IIIC T135°C Da

Purge Parameters

Purge gas	Instrument air
Purge flow rate	225 L/min
Minimum overpressure	0.5 mbarg
Maximum overpressure	12 mbarg
Minimum purging time	5 minutes
Air supply pressure	4 to 8 barg
Maximum leakage rate	30 L/min

Table 1. Purge parameters

3 Technical Data

System certifications	
Class I/Division 1	Group A-D, T4
ATEX and IECEx	
Analyzer (Enclosure):	CE 2460 Ex II 2 (1) GD Ex db pxb [op is Ga] IIC T4 Gb Ex tb pxb [op is Da] IIIC 135°C Db
Probe:	CE 2460 Ex II 2/1 GD c Ex op is IIC T4 Ga Ex op is IIIC T135°C Da
Laser classification	Class 1 Laser Device, Compliant with 21 CFR 1040.10 and 1040.11 and IEC 60825-1
Ingress protection	IP66
Functional specifications	
Method of Measurement	Focused Beam Reflectance Measurement (FBRM®)
Measurement range	0.5 to 2,000 µm
Scan speed	2 m/s (standard); 4 m/s (optional)

Table 2. System certifications and functional specifications

Base Unit Specifications

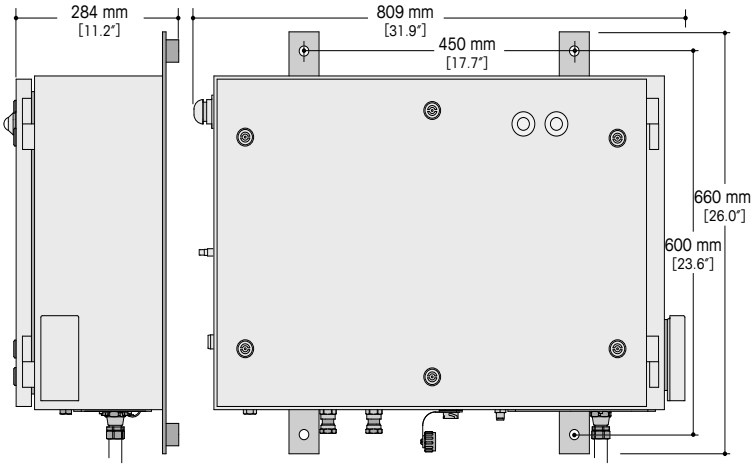


Figure 1. Base unit enclosure dimensions

Environmental	
Operating humidity range	0 to 85%
Operating temperature range	0 to 40 °C
Installation	
Earth/Ground strap (customer-provided)	Minimum 3.31 mm^2 [12 AWG] to 6.35 mm stud on enclosure
External connection	Hawke type ICG 635 or equivalent
General	
Material of construction	SS316
Ingress protection	IP 66 (4X equivalent)
Power Ratings	Voltage: 100–125 V or 200–240 V Frequency: 50/60 Hz Max Current: 0.5 A Max Power Consumption: 60 W
Fuses	Main power fuse: 2.0 A, 250 V Slow Blow, Type T Laser fuse: 0.15 A, 205 V, T-LAG
Weight	54.4 kg [120 lb]
Communication interface	Fiber Option to USB 2.0
Installation (overvoltage) category	II

Table 3. Base unit specifications

Probe Specifications

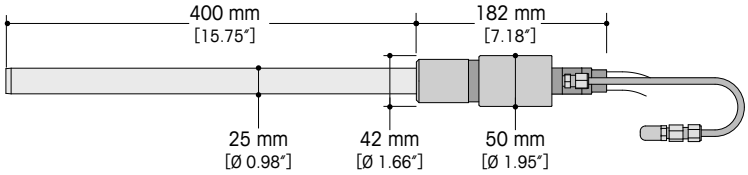


Figure 2. Probe dimensions—G600**R**

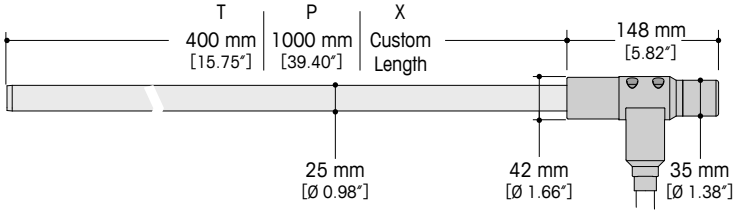


Figure 3. Probe dimensions—G600**T**, **P**, **X**

Wetted materials of construction	
Probe tip	SS316L (standard) Alloy C22 (optional)
Probe window	Sapphire
Probe window seals	Kalrez® 6375 (standard) TM [Thermo-Mechanical press-fit] (optional)
Environmental	
Operating pressure range	0 to 10 barg (standard) Up to 250 barg (optional, requires custom engineering design)
Operating temperature range	-10 to 120 °C (Kalrez® 6375 window seal) -80 to 120 °C (TM window seal)
Installation	
Conduit length	15 m [49.2 ft]
Conduit bend radius (min.)	20 cm [8 in]
Probe and conduit weight	6.8 kg [15 lb]

Table 4. Probe specifications

Site preparation for the METTLER TOLEDO ParticleTrack G600Ex system is the end user's responsibility. The following should be considered to ensure successful installation of the system:

Power Requirements

A temporary power cord is provided with the ParticleTrack G600Ex system for convenience of installation and commissioning. The final installation must comply with EN60079-14 and use fittings and wiring rated appropriately for the location. The equipment shall be permanently installed to the main power supply through metal conduit with > 75 °C temperature-rated cable and connected to protective earthing. A 10-ampere circuit breaker should be included in the building installation to provide overcurrent protection. The circuit breaker should be within easy reach of the operator and marked as the disconnecting device for the connection.

Air/Gas Requirements

A ParticleTrack G600Ex system requires a source of clean, dry, and pressure-regulated instrument air or inert gas to drive the probe optical scanner. The quality of the air or gas supply must meet the specifications of the American National Standards Institute/ Instrument Society of America (ANSI/ISA) S7.0.01-1996 Quality Standard for Instrument Air. Air/gas must:

- Have a dew point at least 10 °C [50 °F] lower than the minimum temperature to which any part of the system will be exposed.
- Contain less than 1 ppm total oil or hydrocarbons
- Contain less than 1 ppm particulates at a maximum size of 3 microns
- Be free of any corrosive contaminants and flammable or toxic gases.

Air supply pressure	4.5 to 5.2 barg [65–75 psig]
Maximum flow rate	40 L/min [1.4 SCFM]

Table 5. Probe air/gas specification

Area of Intended Use

Ensure the area of intended use has adequate space to mount the base unit and a support structure capable of supporting the system weight. The base unit has mounting tabs for four (4) 8 mm [5/16 inch] minimum diameter stainless steel bolts (end user-provided). The support structure must not be subject to excessive vibration. The probe conduit should not bend beyond 20 centimeters (8 inches) and it should not be put into an "S" shape. Include a suitable work location for the control computer that allows connectivity through a USB cable.

The base unit must be convenient for access (eye level) and readily accessible for service. It can also operate in a horizontal position—placed back side down on a flat horizontal surface. Position the base unit to enable easy access to the purge and pressurization system air supply. The ParticleTrack G600Ex base unit contains sensitive electronic components that should be protected from severe environmental conditions. If the area is outdoors in warmer climates, the base unit must be shaded from direct sunlight.

4 Safety Information

CE	The CE Mark applies only to unmodified instruments as supplied by Mettler-Toledo AutoChem, Inc. Modifications may require on-site testing for compliance verification. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
	**Caution**—Read all safety warnings before installing or operating this equipment. Failure to follow the instructions and caution/warning statements could result in personal injury and/or product damage that could void the warranty.
	**WARNING**—Main power shall be supplied through a metal conduit following local and governmental regulations.
	**WARNING**—Only skilled, trained technicians can service this equipment.
	**WARNING**—Pressurized Enclosure. Do Not Open When Flammable Gas Is Present Even When De-Energized.
	**WARNING**—**Do Not Open When An Explosive Atmosphere Is Present**
	**WARNING**—Power shall not be restored after the enclosure has been opened until combustible dust accumulations within the enclosure have been removed.

Table 6. Safety cautions and warnings

Special Conditions of Safe Use

1. The user shall ensure that the exit of air from the purge cannot disturb surrounding dust deposits and hence create a dust cloud.
2. Cable glands used for connection to the flameproof terminal compartment shall be Ex-certified flameproof type, certified as apparatus and employ sealing around individual cores. Additional thread adapters shall not be used.
3. The optical cable connecting between the purge enclosure and the USB-to-Fiber converter must be protected from damage that could allow the release of optical energy. This may be accomplished by either using armored type optical cable, or by routing the cable via rigid conduit.
4. The protective non-metallic cover of the purge indicators presents a potential electrostatic charging hazard. Do not rub with a dry cloth or clean with solvents. Clean only with a water damp cloth.

Laser Classification

All standard-model FBRM G600 Ex instruments are in compliance with the U. S. Department of Health and Human Services (DHHS) Radiation Performance and in accordance with International Standards.

THE FBRM G600 Ex IS A CLASS 1 LASER PRODUCT COMPLIANT WITH
DHHS 21 CFR 1040.10 AND 1040.11
EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE 50, DATED JUNE 24, 2007.
THE FBRM G600 Ex IS A CLASS 1 LASER PRODUCT COMPLIANT WITH IEC 60825-1

Laser de Classe 1
Conforme à la norme 21 CFR 1040.10 et 1040.11
À l'exception des écarts conformement à l'avis Laser 50 en date du 24 Juin 2004,
et conforme à la norme IEC 60825-1

	**LASER SAFETY WARNING** Opening the enclosure and making adjustments, or performing procedures other than those specified in the instrument manual may result in hazardous radiation exposure.
	**Caution**—Use of controls or adjustments or performance of procedures other than those specified in the instrument manual may result in hazardous radiation exposure.
	There are no user-serviceable components in the laser module. Only skilled, trained technicians can service this equipment.
	Looking directly into the aperture of any laser-emitting device is never advised.

Table 7. Laser safety warnings and cautions

5 Supplementary Documentation

An electronic ParticleTrack G600Ex Hardware Documentation Portfolio, shipped with the instrument, includes the following documents in addition to this manual:

- QuickRef: "Positioning the ParticleTrack or ParticleView Probe" (MK-PB-0050-AC)
- "Calibration Validation in iC FBRM" (MK-PB-0071-AC)
- "System Calibration in iC FBRM" (MK-PB-0082-AC)
- "Calibration Validation in iC Process for FBRM" (MK-PB-0109-AC)
- "System Calibration in iC Process for FBRM" (MK-PB-0110-AC)

Please refer to the iC FBRM and iC Process for FBRM software user assistance and Documentation Portfolios for software publications.

Check the https://community.autochem.mt.com site for the latest portfolios.

6 Product Installation

ParticleTrack G600Ex system installation involves three connections to the power, air, and communication inlets at the bottom of the base unit. A qualified METTLER TOLEDO Field Service Engineer performs a ParticleTrack G600Ex system installation. After initial installation, if the system requires relocation or installation after depot repair, use the steps outlined below. METTLER TOLEDO is available to provide the service if necessary.

Connect Power (**A**)

Ensure that your power supply meets the electrical specifications in section 3 "Technical Data" on page 5.

1. Run power, using fittings and wiring rated appropriately for the location, from the main supply to the terminal block inside the purge and pressurization system; interface through the base of the enclosure (**A** in Figure 4 and Figure 5). The purge and pressurization system bypass, located inside the enclosure, must be hard-wired for 115 V or 230 V, as applicable.
2. Use ground strap (customer-provided) with minimum 3.31 mm^2 [12 AWG] and connect to the earth/ground stud on right side of enclosure
3. If necessary, provide an AC Line Conditioner for noisy power.

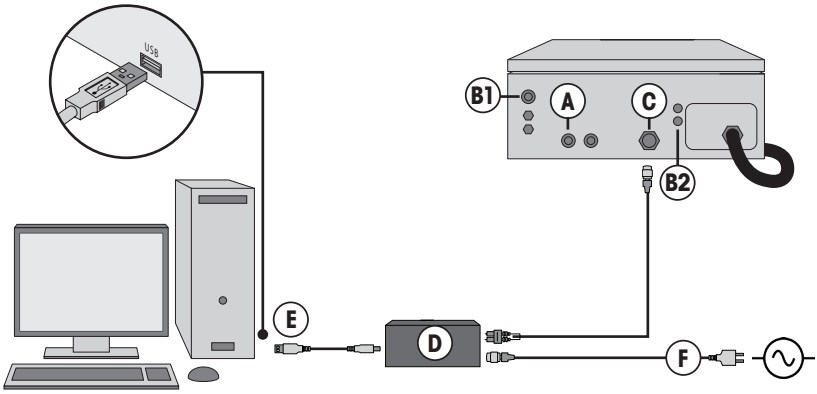


Figure 4. Instrument connections: (**A**) Power; (**B1**) Air inlet for enclosure purge and pressurization; (**B2**) Air inlet for probe scanner; (**C**) Fiber communication connection; (**D**) Fiber-to-USB extender; (**E**) USB cable; (**F**) Extender power supply

NOTE: Figure 5 shows a typical layout for wiring. The orientation of the bypass block can vary. Please wire to the empty 115 V and 230 V locations per Table 8 below.

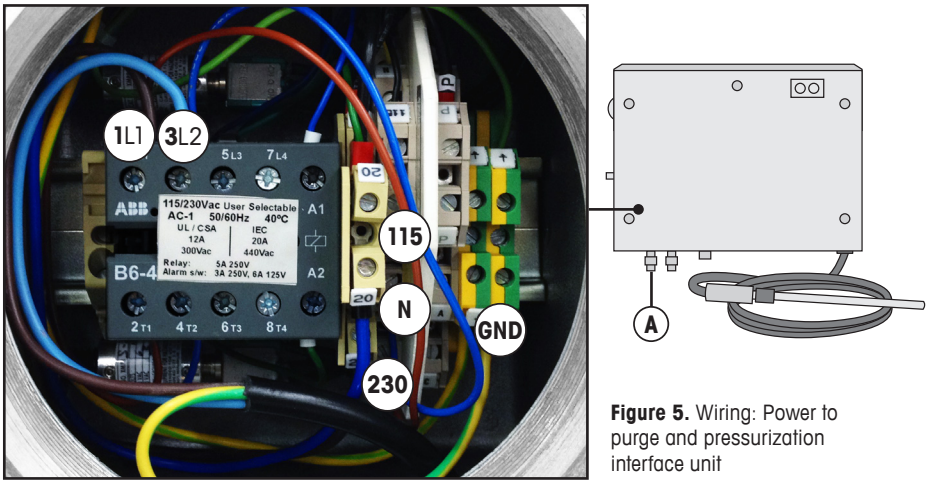


Figure 5. Wiring: Power to purge and pressurization interface unit

	Wire *	Coil (ABB)	Terminals
100–125 V	Green/Yellow		**GND** (Ground from power cable)
	Brown	**1**L1 (Line from power cable)	**115** (Jumper from **1**L1)
	Blue	**3**L2 (Neutral from power cable)	**N** (Jumper from **3**L2)
200–240 V	Green/Yellow		**GND** (Ground from power cable)
	Brown	**1**L1 (Line from power cable)	**230** (Jumper from **1**L1)
	Blue	**3**L2 (Neutral from power cable)	**N** (Jumper from **3**L2)

* NOTE: Wire color may vary depending on the global location.

Table 8. Permanent power cord wiring

Connect Air Supply (**B1** and **B2**)

A ParticleTrack G600Ex system requires instrument quality air connections for the enclosure purge/pressurization system and for the pneumatically driven probe scanner.

Air Supply to Purge and Pressurization System

The purge and pressurization system comes standard with an air regulator/filter assembly. The required 1/2" tubing is rated for 8 barg [120 psig] air service and flame retardant. Tubing may be made of polypropylene, PVC, or nylon.

1. Clean/purge all air lines and tubes before connection to the ParticleTrack G600Ex instrument.
2. Connect air for the purge and pressurization system via the air regulator/filter assembly provided to the air inlet (**B1** in Figure 4) identified at the bottom of the enclosure.

Air Supply to Probe Scanner

A ParticleTrack G600Ex system requires instrument quality air for the pneumatically driven probe scanner and comes standard with an air regulator. The regulator/filter assembly has two filters, a general purpose filter and a coalescing filter, that can be replaced if they become dirty. The required tubing is 1/4" OD, rated for 8 barg [120 psig] air service and flame retardant. Tubing may be made of polypropylene, PVC, or nylon.

1. Install air regulator and filter within six feet (two meters) of the enclosure.
2. Clean/purge all air lines and tubes before connecting to the ParticleTrack G600Ex.
3. Connect the tubing between the air supply, the regulator, and the scanner air inlet (**B2** in Figure 4) at the bottom of the ParticleTrack G600Ex base unit.

   NOTE: Air flows in the direction indicated by the arrow on the front of the coalescing filter.
4. Ensure the bowl assembly on the general purpose filter is fully inserted and locked in place by rotating it to the right.

Connect Fiber-to-USB Communications (**C, D, E, F**)

The ParticleTrack G600Ex connects to the computer by a custom fiber optic cable with an industrial LC-type connector via a Fiber-to-USB Extender (**D**). Both the fiber optic cable and the extender are supplied with the system. Follow the steps below.

1. Locate the fiber optic input at the bottom of the ParticleTrack G600Ex base unit and connect one end of the supplied fiber optic cable to the input (**C**).
2. Plug the other end of the fiber optic cable to the fiber optic input on the Fiber-to-USB extender (**D**).
3. Connect the USB cable (**E**) from the Host input of the extender to a USB port on the control computer.
4. Connect the power supply (**F**) to the USB extender and an AC outlet.

Install Probe

A variety of probe mounting options are available using the METTLER TOLEDO Flexible Mounting System ("Flexible Probe Mounting Options" on page 16). Due to the complex nature of multi-phase flow, proper installation is very important for successful application of inline particle and droplet measurement techniques. Installation and mounting of probe-based instruments for particle characterization should consider multiple factors including:

- Existing or planned process equipment
- Scale and control capabilities of existing installation ports

- Expected ranges of process variables such as temperature, pressure, flow rates, and/or flow patterns
- Expected range of particle/droplet size and concentration
- Probe location and orientation (Figure 6)

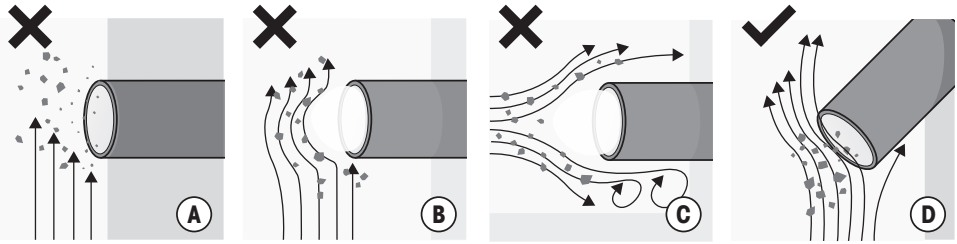


Figure 6. Implementation of a ParticleTrack instrument: (**A**) flush with wall of vessel or pipeline; (**B**) inserted tangentially to process flow; (**C**) inserted perpendicular to process flow at an elbow; and (**D**) inserted at optimal angle (45°) relative to process flow.

7 Flexible Probe Mounting Options

The Flexible Mounting System enables the attachment of both industry standard and custom designed flange adapters and fittings without permanent modification of the probe. Length reducers are an option for use with flange adapters and other flexible mounting kits to provide a practical means of decreasing the probe wetted length when a shorter insertion depth is required. The innovative design from METTLER TOLEDO allows probes with this flexible mounting adapter to be easily moved from one installation point to another at a lower overall cost. Figure 7 shows some of the standard options available for mounting to the Flexible Mounting Adapter (**A**).

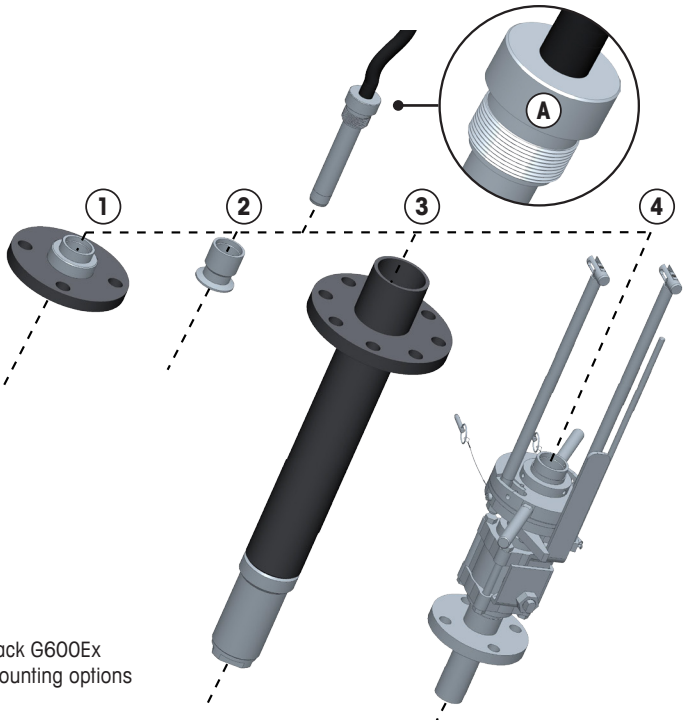


Figure 7.
ParticleTrack G600Ex
flexible mounting options

		G600T	G600P	G600R
①	**Flange Adapter Kits** For installation of probe through industry standard (ANSI) flanged ports.	•	•	•
②	**Tri-Clamp® Adapter Kits** For installation using industry standard Tri-Clamp® flanges.	•	•	•
③	**Dip Pipe Installation Kits** For simplified installation in large vessels using a custom dip pipe. Dip Pipe Adapters allow probes to be installed inside dip pipes of customized lengths to extend the effective length of the probe up to 5 meters. A Dip Pipe Installation requires the purchase of two separate accessories including (1) a Dip Pipe Installation Kit and (2) a Dip Pipe Adapter that is welded to a standard pipe during the construction of the dip pipe. The dip pipe is supplied by the customer.			•
④	**Ball Valve Assembly** For installation into an active pipeline, the FBRM Ball Valve Assembly is designed to allow the insertion or removal of a probe into a flowing stream without requiring shut down of the process. Using a ball valve assembly also helps avoid spills to minimize exposure of personnel and environment to the contents of the process stream.	•		•

Table 9. Flexible mounting options

In addition to the standard Flexible Mounting System options, METTLER TOLEDO can provide custom and special-order probe designs. Custom probes can be manufactured with permanently welded flange adapters and fittings to meet specific installation requirements that are not possible with the existing Flexible Mounting System. All custom and special order installation requirements should be discussed with your METTLER TOLEDO Technology and Applications Consultant, and may involve custom engineering and design charges.

8 Operating Instructions

During system installation, a trained METTLER TOLEDO engineer makes all system connections and verifies the system is ready for use.

1. Verify the base unit door is securely locked. Use the supplied key to lock the six latches on the enclosure door.
2. Start inlet air supply to the Probe Scanner and regulate flow to: 4.5–5.2 barg [65–75 psig].
3. Start up the purge and pressurization system.
   a. Apply inlet air supply to purge and pressurization system and regulate flow at 4.8 barg [70 psig]. The acceptable regulated pressure range is 4–8 barg [60–120 psig].
   b. The purge system starts automatically and the purge indicators (Table 10) on the enclosure cover change color. Before air is applied, the indicators are Red-Black. After air is applied, the indicators change to Green-Yellow (Purging), followed by Green-Black when the enclosure is purged/pressurized.
   c. Purge for a minimum of 5 minutes at a minimum purge flow rate of 225 L/min.
   d. Observe purge indicators change to Green-Black when the enclosure is purged and pressurized.
   e. After the purge completes, the purge and pressurization system interface unit automatically applies power to the ParticleTrack G600Ex system.

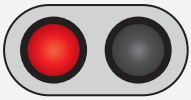
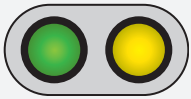
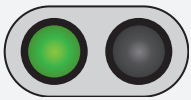
	**Unpressurized / Alarm Condition**
	**"Purging"** The process takes approximately five (5) minutes.
	**"Pressurized"** Purge complete.

Table 10. Purge and pressurization system indicators

NOTES:

- If the right indicator remains yellow or changes to yellow during operation, the purge air flow is inadequate. Check the air supply and connections.
- Venting of the relief valve during operation is considered normal. The airtight enclosure relies on the use of the relief valve to ensure a consistent level of pressurization is maintained within the enclosure.
- Ensure the ParticleTrack G600Ex system has been powered ON for 30 minutes before performing calibration validation or recording process measurements.

4. Observe LED indicators on USB Extender.

Indicators	LED State	Status
Host	ON (Solid Green)	USB cable between PC and HOST is properly connected
Power	ON (Solid Green)	Power supply is properly connected to extender
Link	ON (Solid Green)	Powered, HOST is identified, and Fiber is properly connected
LOS	ON (Solid Red)	Loss of Signal—No communication between instrument and PC

Table 11. USB Extender LEDs

5.  Turn on control computer and start the software. To add/configure the instrument in iC FBRM or iC Process for FBRM, please refer to the applicable online User Assistance.

9 Best Practices for Routine Operation

Ensure Reliable Instrument Performance

- Follow recommended calibration validation procedures monthly or quarterly as determined by your SOP.
- Follow preventative maintenance guidelines for your ParticleTrack instrument.
- Check probe window cleanliness as part of routine SOP.

Ensure Measurement Sensitivity by Optimizing Probe Location and Positioning

- Probe should be positioned in the process where it can obtain maximum sensitivity to changes in particle or droplet system.
- Probe must be oriented to ensure particle system flows optimally across the probe window surface.
- Probe tip must remain fully immersed to provide measurements of the particle/droplet system.
- Probe location is more critical under the following conditions:
  - Extreme difference between particle density compared to the carrying solution density (ranges from very low or very high)
  - Lower Rheology
  - Larger median particle dimension
  - Greater deviation between average particle shape and a sphere (more irregular particles or particle structures)
- Probe location is less critical under the following conditions:
  - Smaller difference between particle density compared to carrying solution density
  - Higher solids concentration (or higher dispersed phase in liquids)
  - Smaller median particle dimension
  - Narrower particle distribution
  - Smaller deviation between average particle shape and a sphere (fewer irregular particles or particle structures)

Track Particle Systems Reliably

- Use iC FBRM for routine monitoring of particle and droplet systems in the laboratory. Use iC Process for FBRM for secure and reliable monitoring of particle and droplet systems in batch or continuous processes.
- Use iC FBRM for advanced data analysis of data collected in either iC FBRM or iC Process for FBRM.
- Use iC FBRM for further improvement and optimization of Process Methods to be used in SOPs.

Develop a Standard Operating Procedure (SOP)

- Select or create an appropriate iC FBRM template for each given application. A well-designed template will simplify the startup procedure and ensure consistent operation in each experiment.
- Include appropriate statistical trends that can directly track particle and product and quality parameters of interest.
- Include reference and target distributions as process milestones or final product quality set-points.
- Optimize the measurement configuration (measurement interval and averaging settings) to ensure robust repeatable measurement and to maximize sensitivity to dynamic changes in the particle system.

Save Experiment Settings as a Template—Make sure to develop the right template for a specific particle or droplet system. Save a template that includes trends and reference distributions that are important to track to characterize the particle or droplet system.

Manage Reference Distributions—Distributions can be saved as references and designated as targets for subsequent experiments. Reference distributions or target distributions can be saved in particle-specific templates.

Check Probe Window Cleanliness—The probe window must be clean before mounting in particle or droplet system and before performing Calibration Validation.

10 Troubleshooting

Errors are generally hardware-related issues that affect data acquisition. The following table documents how hardware errors are displayed in the control software, describes what the error means and provides possible root causes to assist with troubleshooting and resolving the issue. If the issue cannot be resolved, please contact AutoChemCustomerCare@mt.com for assistance.

Errors

Error Message	Description	Possible Cause
Air Filter Pressure High / Low	Pressure measured at the outlet of the internal air filter is outside the recommended range	Possible causes include scanner inlet pressure is not set within recommended range or filter is clogged and needs replacement.
Box Temperature High / Low	Internal temperature of base unit has fallen outside of the recommended operating temperature range.	The base unit is installed in a location that is not within recommended specification.
Scan Speed or Scan Frequency High / Low	Desired scan speed or frequency is outside acceptable range.	Air pressure to probe scanner is set incorrectly. Check the pressure and regulate to proper range. If error continues, contact METTLER TOLEDO.
Tach Pulse Missing	Data acquisition error.	Verify USB and fiber connections are secure. If error continues, contact METTLER TOLEDO.

Table 12. Troubleshooting errors

Warnings

Warning Message	Description	Possible Cause
Effective Duration Low	Effective Duration is a measure of the data transfer efficiency. Normal operation results in an Effective Duration of approximately 50%.	Effective Duration Low may indicate that PC specifications are inadequate. A low Effective Duration may reduce the precision of the measurement. If the Effective Duration is significantly less than 40%, contact METTLER TOLEDO. The measurement interval can also impact Effective Duration. Only select an interval <10 s where you expect rapid process changes.
Average Signal Intensity High	Average Signal Intensity is an indicator of the amount of light backscattered by the particles or droplets being measured.	Average Signal Intensity High may indicate that the particles being measured are highly reflective. Very high backscatter may saturate the sensor, resulting in erroneous measurements.

Table 13. Troubleshooting warnings

11 Product Maintenance

METTLER TOLEDO warrants its products against defects in materials and workmanship for twelve months from the date of installation or fifteen months from the date of shipment, whichever comes first. For details, please refer to the warranty provided with the instrument. For assistance, please email AutoChemCustomerCare@mt.com.

It is recommended that you retain the original packing materials if you need to return the ParticleTrack system. If factory service is required, your METTLER TOLEDO service engineer will issue you a Return Material Authorization (RMA) form.

There are no user-serviceable parts inside a ParticleTrack G600Ex. Contact your METTLER TOLEDO Field Service Engineer for all service needs. Unauthorized service may damage the instrument.

Schedule the routine maintenance tasks outlined below. To facilitate maintenance (with the ParticleTrack G600Ex door open) when the purge and pressurization system cannot be used, a key is provided. The key operates the Bypass switch (**A** in Figure 8). System must be in a safe location.

When the enclosure is opened for service, observe the warning inside the enclosure (and shown in Table 6 on page 9 under "Safety Information").

- Ensure the air/gas supply meets the required standards.
- Replace the ParticleTrack G600Ex air filter if it becomes dirty. Since instrument quality air should not result in a dirty filter, look for and correct the problem that is causing the air contamination.
- Run the Calibration Validation procedure for the probe every three to six months, if the probe is dropped or relocated, and after new software is installed, if desired. If the Calibration Validation does not pass, follow the System Calibration procedure.
- The ParticleTrack G600Ex system is designed for indoor or outdoor use. The base unit can be sprayed with water jets to clean in plant environments and the system is easily cleanable with a water-damp cloth. Use caution when cleaning exhaust on probe. The protective non-metallic cover of the purge indicators presents a potential electrostatic charging hazard. Do not rub with a dry cloth or clean with solvents. Clean only with a water-damp cloth.
- Periodically perform the following maintenance task to verify purge and pressurization system function.
  a. With the enclosure closed, turn on the purge and pressurization air and adjust the pressure gauge to 4.8 barg [70 psig].
  b. Verify the Purge Cycle time is at least five (5) minutes.
  c. Verify the purge cuts power to the system when door is opened.
  d. Close door.

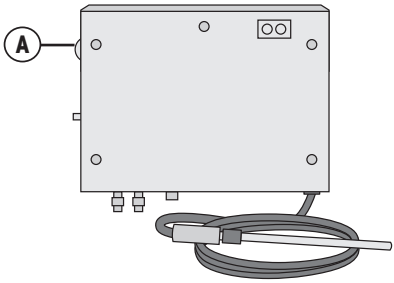


Figure 8. Bypass switch

METTLER TOLEDO has offices around the world. Contact the Mettler-Toledo AutoChem, Inc., headquarters in the USA for technical support or service. To arrange for specific application assistance from a METTLER TOLEDO Technology and Applications Consultant, or for assistance, contact Customer Care through the toll-free number on page 2.

Recommended Maintenance

A qualified METTLER TOLEDO Field Service Engineer should perform regular Preventive Maintenance (PM) on the system. Table 14 shows the normal life expectancy of several components and identifies any customer-replaceable parts. Use this information for planning potential cost of ownership.

Replacement Interval	Part
Annually	PVC Reference Sample, G600 • customer-replaceable • PVC life: 10 uses or one year, whichever comes first • included in annual PM
	Internal Filter Assembly
	External Air Regulator, Filter (customer-replaceable)
Every two (2) years	Control Valve
Every three (3) years	Laser Board

Table 14. Parts life expectancy

Relocation, Shipment, or Storage

To prevent and minimize damage to the ParticleTrack G600Ex, follow the instructions below to prepare the system for relocation, shipment, or storage.

1. Close the iC FBRM or iC Process for FBRM software application and shutdown the computer according to normal operating procedures.
2. Disconnect the power, air, and communications from the bottom panel of the base unit enclosure.
3. Disconnect the Fiber-to-USB Extender from the power supply and from the control computer.
4. Store the system and all components in the factory-supplied crate.

12 Disposal

Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

If you have any questions please contact the responsible authority or the distributor from which you purchased this device.

Thank you for your contribution to environmental protection.

Notes

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Mettler-Toledo AutoChem, Inc.
7075 Samuel Morse Drive
Columbia, MD 21046 USA
Telephone +1 410 910 8500
Fax +1 410 910 8600

Email autochem@mt.com
Internet www.mt.com/autochem

Printed in USA MK-PB-0079-AC Rev E DCN 3000