

February 2015

MK-PB-0113-AC Rev A

DCN 2303

ParticleView™ V19

View Particles in Real Time

METTLER TOLEDO

Copyright and Trademarks

© 2015 Mettler-Toledo AutoChem, Inc.

All world rights reserved.

Printed in the USA.

No part of this publication may be stored in a retrieval system, transmitted, or reproduced in any way, including but not limited to photocopy, photograph, magnetic or other record, without the prior written permission of Mettler-Toledo AutoChem, Inc.

3 February 2015

ParticleView™, ParticleTrack™, FBRM®, iC Process™ for FBRM®, iC FBRM™, PVM®, iC PVM™, iControl™, EasyMax™, and OptiMax™ are trademarks or registered trademarks of Mettler-Toledo AutoChem, Inc.

Kalrez® and Viton® are registered trademarks of E.I. du Pont Nemours and Company. Tri-Clamp® and Tri-Clover® are registered trademarks of Alfa Laval, Inc. Microsoft® and Windows® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Adobe® Reader® is a registered trademark of Adobe Systems, Inc.

All other brand and product names are trademarks or registered trademarks of their respective owners.

METTLER TOLEDO probes with Focused Beam Reflectance Measurement (FBRM®) technology are covered by patents or pending patents including:

USPN 6,449,042

USPN 6,940,064

USPN 8,468,642

Address comments to:

Mettler-Toledo AutoChem, Inc.

7075 Samuel Morse Drive

Columbia, MD 21046

Tel: + 1 866.333.6822

Fax: +1 410.910.8600

www.mt.com/pvm

For technical support, contact: AutoChemCustomerCare@mt.com

The information in this publication is provided for reference only. All information contained in this publication is believed to be correct and complete. Mettler-Toledo AutoChem, Inc., shall not be liable for errors contained herein nor for incidental or consequential damages in connection with the furnishing, performance, or use of this material. All product specifications, as well as the information contained in this publication, are subject to change without notice.

This publication may contain or reference information and products protected by copyrights or patents and do not convey any license under the patent rights of Mettler-Toledo AutoChem, Inc., nor the rights of others. Mettler-Toledo AutoChem, Inc. does not assume any liability arising out of any infringements of patents or other rights of third parties.

Mettler-Toledo AutoChem, Inc. makes no warranty of any kind with regard to this manual, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.



In conformance with the European Directive 2002/96/EC on Waste from Electrical and Electronic Equipment (WEEE), this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.

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.

Should this device be passed onto other parties for private or professional use, the content of this regulation must also be related.

Thank you for your contribution to environmental protection.

Contents

Chapter 1	Introduction	
	ParticleView V19—Intended Use of Equipment	5
	General Information	5
	System Configuration	5
	Equipment Ratings	6
	Warnings, Cautions, and Notes	6
	Service and Technical Assistance	7
Chapter 2	Safety Certifications and Specifications	
	Equipment Certifications	9
	Laser Classification	9
	CE Compliance (EMC and LVD)	9
	CB Scheme Certification	10
	NRTL Certification	10
	ParticleView V19 System Ratings	10
	Probe	10
	Interface Unit	11
Chapter 3	Safe Installation and Use	
	Instrument Installation	13
	System Inputs and Outputs	13
	Power Supply (USB)	14
	Earth Grounding	14
	Mounting	14
	Transport	14
	Installation—Power/Communications/Air	14
	Instrument Operation	14
	Starting and Stopping the ParticleView V19 System	14
	General Conditions for Safe Use	15
	Instrument Maintenance	15
	Cleaning Instructions	15
	Instrument Service	16
	Index	17



Contents

Introduction



Caution—Read this safety manual before ParticleView™ V19 installation, operation, and maintenance. Failure to follow the instructions and caution/warning statements in this manual could result in personal injury and/or product damage that could void the warranty.

This safety manual supplements the “ParticleView V19 Hardware Manual.”

Per the ISO 9001 procedures followed at METTLER TOLEDO, the ParticleView V19 system adheres to applicable regulations and standards in the area of intended use. Requirements for compliance with local regulations may be different. The end user of the equipment is responsible for compliance with all local, corporate, or other applicable regulations.

ParticleView V19—Intended Use of Equipment

The ParticleView™ V19 system with Particle Vision and Measurement (PVM®) technology is a probe-based instrument that visualizes particles and particle mechanisms in real time. High resolution images are continually captured under a wide range of process conditions without the need for sampling or manual offline analysis. The *in situ* instrument collects images for use during laboratory and scale-up campaigns. ParticleView V19 is an integrated solution that includes a probe (with interface unit) and control software.

The area of intended use:

- Non-explosive atmosphere
- Laboratory/scale-up applications such as under a fume hood
- Recommended purge requires instrument quality air

General Information

This section introduces the system configuration.

System Configuration

The ParticleView V19 configuration (Figure 1-1) includes the following components:

- **Instrument**—ParticleView V19 probe and interface unit
- **Power**—External power through USB 3.0 port on control computer
- **Communication**—USB 2.0 cable to USB 3.0 port
- **Control software**—iC PVM

A purge control unit is recommended to prevent condensation in the probe when wetted temperatures are below the dew point.

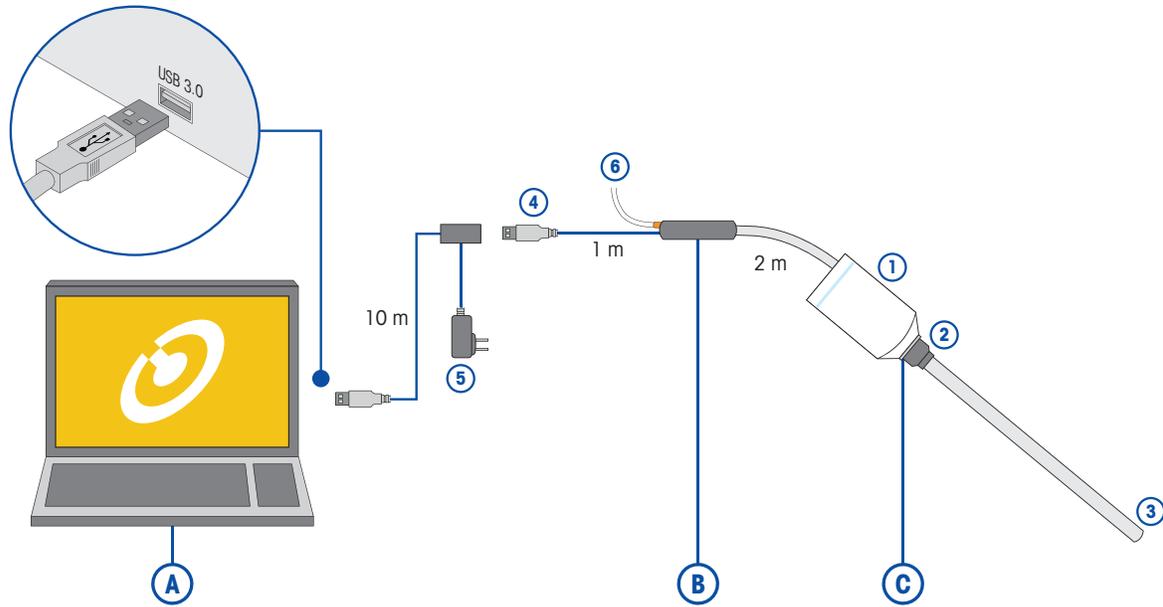


Figure 1-1 System configuration

- A** = iC PVM instrument control software
- 1** = Probe back end
- 2** = Probe flexible mounting adapter
- 3** = Probe sapphire window
- B** = ParticleView V19 interface unit
- 4** = Fixed USB cable (1 m)
- 5** = Powered USB 2.0 extension cable (10 m)
- 6** = Air inlet (optional)
- C** = ParticleView V19 instrument

Equipment Ratings

Table 2-2 on page 11 provides details on the probe that is inserted in the particle or droplet system and the probe back end that contains the camera and laser light sources. Table 2-1 on page 10 provides power, temperature, and optional air specifications for the interface unit.

Warnings, Cautions, and Notes

To help you recognize information related to equipment and user safety, the following symbols appear throughout this manual. Please pay particular attention to the sections marked by these symbols.

	WARNING —Important safety information—Failure to observe the warning may result in serious personal injury or equipment damage.
	Caution —Risk of danger. Important information that tells you how to prevent damage to equipment or avoid a situation that may cause minor injury.
Note:	Informational content that is distinguished to receive special attention.

Service and Technical Assistance

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

Mettler-Toledo AutoChem, Inc.
(Columbia, MD headquarters)

<http://www.mt.com/PVM>

<http://www.mt.com/iCPVM>

Tel: **+ 1.410.910.8500**

Fax: **+1.410.910.8600**

Email: AutoChemCustomerCare@mt.com

Toll Free: **+1.866.333.6822**



1. Introduction

Safety Certifications and Specifications

This section identifies certifications and safety-related technical specifications and ratings for the ParticleView™ V19 instrument in laboratory and scale-up areas. The ParticleView V19 is fully compliant with the United States and International safety standards listed on the system label for operation in normal (unclassified) locations.

For installation, safe use, and maintenance information, refer to [Chapter 3](#). For intended use of equipment and general system information, refer to [Chapter 1](#).

Equipment Certifications

ParticleView V19 complies with the standards and certifications listed in this section.



Caution—The certification marks apply only to unmodified instruments supplied by METTLER TOLEDO.

Laser Classification

All ParticleView V19 instruments are in compliance with the U.S. Department of Health and Human Services (DHHS) Radiation Performance and in accordance with International Standards.

Class 1 Laser Product

Compliant with **DHHS 21 CFR 1040.10** and **1040.11**
except for deviations per Laser Notice 50 Dated June 24, 2007

CE Compliance (EMC and LVD)



ParticleView V19 systems have been tested and comply, as required, with the Electromagnetic Capability (EMC) Directive and Low Voltage Directive (LVD).

■ **EMC Directive 2004/108/EC**

Electrical equipment for measurement, control, and laboratory use:

IEC 61326-1:2006

■ **Low Voltage Directive 2006/95/EC**

Safety requirements for electrical equipment for measurement, control, and laboratory use:

EN 61010-1:2010

CB Scheme Certification

ParticleView V19 systems are certified to the following CB Scheme international standard under Certification Number (TUV) **DE 3-3890**.

- IEC 61326:2006
- IEC 61010:2010
- IEC 60825-1:2007

NRTL Certification

The ParticleView V19 is Nationally Recognized Testing Laboratories (NRTL) listed under Certificate Number **E113433**.



ParticleView V19 System Ratings

Below are safety specifications for the ParticleView V19 system probe and interface unit.

Probe

Table 2-1 ParticleView V19 Probe

Material of construction	
Probe (wetted)	C22 alloy
Probe window (wetted)	Sapphire, TM (standard, no o-rings)
Probe back end	Aluminum, anodized and powder coated
Probe cable (exterior)	PVC, 80 °C Flame Retardant VW-1
Cover (flexible mounting)	Delrin
Environmental conditions	
Operating Temperature Range, probe	-80 °C to 120 °C [-112 °F to 248 °F]
Pressure Range, probe	0 barg to 10 barg [0 psig to 145 psig], standard up to 100 barg [1450 psig], custom
Degree of Protection, Probe and back end	IP65 and 4X
Laser light source	
Laser classification	Class 1
Wavelength	800 nm
Status indicator	
Power and communication	External LED on probe back end

Interface Unit

Table 2-2 ParticleView V19 Interface Unit

Material of Construction	Aluminum, anodized
Electrical	
Power (via USB 3.0 on control computer)	5 VDC, 1 A (maximum)
Power (USB 2.0 powered extension cable to USB 3.0 port on control computer)	100-240 VAC (auto-switching), 50/60 Hz, 0.3 A includes three country-specific adapters
Communication	
USB cable (fixed, from interface unit)	USB 2.0, 1 m [3.3 ft]
USB powered extension cable (to USB 3.0 port on control computer)	USB 2.0 Type A, male and female 10 m [32.8 ft]
Environmental conditions: System is designed for Indoor laboratory or scale-up use.	
Operating Temperature Range	0 °C to 40 °C [32 °F to 104 °F]
Operating Humidity	0 to 95% RH
Air (Instrument quality for recommended purge)	
Inlet Air Pressure, Maximum	3.4 barg [50 psig]
Operating Pressure, Normal	2.0 barg [30 psig]
Operating Flow Rate, starting one (1) hour before use	0.5 SLPM [0.02 SCFM]



2. Safety Certifications and Specifications

Safe Installation and Use

This section outlines the safe installation, use, and maintenance of the ParticleView™ V19 system. Review the information in [Chapter 1, “Introduction”](#) and [Chapter 2, “Safety Certifications and Specifications”](#).



Caution—In area of intended use, USB cable must be easily accessible for disconnecting the instrument power.

Instrument Installation

A qualified METTLER TOLEDO representative installs and commissions the ParticleView V19 instrument and trains key personnel on how to use the equipment and software.



Caution—Improper installation and operation of the ParticleView V19 can result in safety hazards.

System Inputs and Outputs

The ParticleView V19 system has two inputs: one that supplies USB power and communications and an optional purge air inlet to the interface unit (**B**). The interface unit controls power and purge to the probe (**A**) and provides USB communication between the probe and the control computer (not shown).

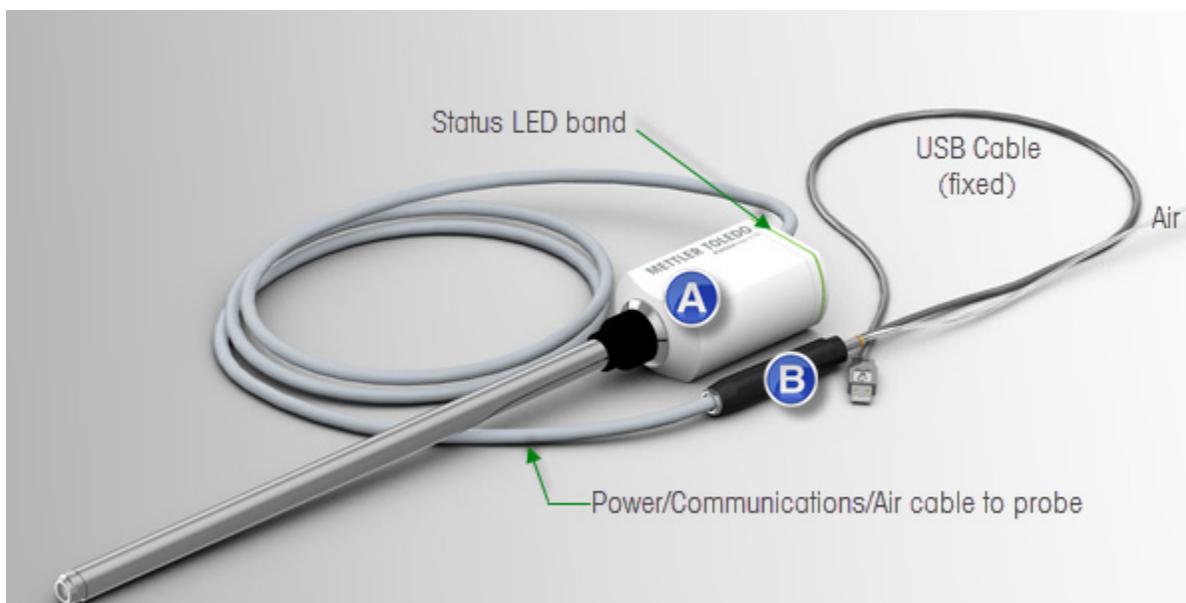


Figure 3-1 System configuration

Power Supply (USB)

ParticleView V19 is powered through the USB 3.0 port on the control PC. [Table 2-2](#) lists the ParticleView V19 power specifications.

Earth Grounding

The ParticleView V19 USB cable includes an earth/ground wire.

Mounting



Caution—Locate the ParticleView V19 system where it is readily accessible to air supply, as needed.

Transport



Caution—Transport the ParticleView V19 instrument from one location point to another with care. The probe and interface unit contain sophisticated electronics and the probe back end contains a high-resolution camera and light sources.

Installation—Power/Communications/Air

Refer to [Figure 3-1](#) for location of USB (power and communications) and air inputs on the ParticleView V19 interface unit.

1. Connect the USB cable from the interface unit to the 10-meter powered USB cable, supplied, and plug in the cable power supply.
2. Plug in the control computer.
3. Plug the USB cable into the control computer's 3.0 port. The LED band on the probe back end displays solid blue.
4. If purging the ParticleView V19 system in particle systems with temperatures below dew point where condensation could be a factor, connect instrument-quality air to the air inlet on the interface unit.

Note: A purge controller (14160068) is recommended and should always be used when probe temperatures are below dew point to prevent condensation in the probe.

Instrument Operation

This section provides instructions for starting and stopping the system along with general conditions for safe use.

Starting and Stopping the ParticleView V19 System

After the ParticleView V19 system has been installed and commissioned for use and the end users have reviewed this safety manual, start and stop the system, as follows:

To start the system:

- Power the control computer ON. The LED band on the interface unit ([Figure 3-1](#)) is solid blue when power is established.

- If using the optional purge for particle systems with temperatures below dew point, apply air and regulate pressure and flow per specifications (page 11).
- Start the iC PVM control software. The LED band changes to flashing green when communication is established.

The ParticleView V19 system is ready for use. A two-minute warm-up period is recommended before recording images.

To stop the system—Remove USB cable from the control computer.

General Conditions for Safe Use

- Ensure all operators are properly trained to follow safe operating and maintenance procedures as documented for this instrument.



Caution—Do not attempt to disconnect the ParticleView V19 probe fixed cable from the interface unit. Doing so will cause permanent damage to the probe and will void the warranty.



Caution—If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

- Wear appropriate safety equipment during installation, operation, and maintenance, as outlined in your standard operation procedures.
- When not in use for extended periods of time, the probe and interface unit should be stored in the original shipping container.
- Review and follow the recommended maintenance safety.
- Always ensure product use conforms to all applicable local laws, regulations, and codes.

Instrument Maintenance

A certified METTLER TOLEDO Field Service Engineer performs recommended annual system maintenance according to the service package ordered.



WARNING—There are no user-serviceable parts in the system. Contact a METTLER TOLEDO Field Service Engineer (FSE) for all service needs.

Cleaning Instructions

The ParticleView V19 system is designed for indoor use in laboratory and scale-up locations. Follow the cleaning instructions below.

- Clean all exterior surfaces with water and mild detergent.
- The probe back end is tested to IP65 and 4X and easily cleanable with solvent such as ethanol, isopropyl alcohol, or soap and water.
- Be careful not to submerge the interface unit in washing liquid.
- To manually clean the window surface, use a medium such as water, alcohol, or acetone. Rinse and use a clean, dry Kimwipe[®] to remove the cleaning solution.

Instrument Service

METTLER TOLEDO recommends an annual service and preventive maintenance service inspection, based on the service contract. Information on available service packages is in the ParticleView V19 Hardware Manual. Contact AutoChem Customer Care for service (see ["Service and Technical Assistance" on page 7](#)).

Index

Numerics

4X (ingress protection) 10

C

CB Scheme 10

certification

 CB Scheme 10

 CE mark 9

 NRTL 10

classification

 laser 9

cleaning 15

configuration

 components list 5

connections

 USB, air 13, 14

contacting METTLER TOLEDO 7

D

Degree of Protection 10

DHHS compliance (Class 1 laser) 9

E

earth/ground 14

electrical

 consumption 11

 power 14

Electromagnetic Capability (EMC) 9

EN 61010-1 9

G

general safe use 15

grounding 14

H

humidity 11

I

IEC 61326-1 9

ingress

 tested to IP65 and 4X 10

inputs/outputs 13

interface unit

 inputs/outputs (illustration) 13

 material of construction 11

IP 10

L

laser

 classification 9

LED 13

Low Voltage Directory (LVD) 9

M

maintenance 15

 cleaning 15

marking

 CE 9

 MET 10

materials of construction

 interface unit 11

 probe (wetted) 10

MET marking 10

N

NRTL 10

O

operating humidity 11

operating temperature

 interface unit 11

 probe 10

P

ParticleView V19 15

 cleaning instructions 15

 components 5

 general safety 5–6

 maintenance safety 15

 power 11

 safety specifications 9

 starting and stopping 14

power

 connecting 14

 LED 13

 specifications 11

probe

 tested to IP65 and 4X 10

purge

 specifications 11

PVM technology 5

R

ratings 11

S

safety

- CB scheme 10
- EMC and LVD 9
- general 5–6
- general safe use 15
- grounding 14
- installation 13
- laser 9
- NRTL 10
- specifications 9
- transport 14

service 7, 16

starting/stopping 14

system

- components 5
- inputs/outputs 13

T

technical assistance 7

temperature

- operating range (interface unit) 11
- operating range (probe) 10

transporting system 14

V

voltage (VDC) 11

Learn More with our Technical Webinar Program

Our on-demand webinars (online seminars) provide application and industry information relevant to you. These interactive presentations, provided by industry experts and our own applications team, give you an opportunity to learn more about your specific area of interest.

Topics include:

- Improving Crystallization and Precipitation Processes
- The Importance of Mixing in Process Development
- Avoiding Incidents During Scale-up
- Calorimetry Best Practices
- Characterization of Catalytic Hydrogenations
- Plus other applications including green chemistry, organic synthesis, fermentation, high pressure chemistry and more

► www.mt.com/ac-webinars

www.mt.com/autochem

For more information

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

Email autochem@mt.com

Subject to technical changes
© 2/2015 Mettler-Toledo AutoChem, Inc.
MK-PB-0113-AC Rev A