# Pixact Crystallization Monitoring

The Pixact Crystallization Monitoring (PCM) technology is designed for the inline analysis and control of batch and continuous crystallization processes. The technology combines inline process microscopy with advanced image analysis techniques.

PCM offers high-quality live view and real-time crystal analysis even in high color and concentration. Measurement data produced by PCM helps you to optimize, control and troubleshoot your crystallization process efficiently.

Experiences of plant managers

"We have been able to decrease batchwise variation and reduce the number of out-of-spec batches from a few to zero."

"PCM enables more accurate control of metastable state than any other method in our factory."

"In the six months we have had the Pixact system installed we have learned as much as in the past decade."
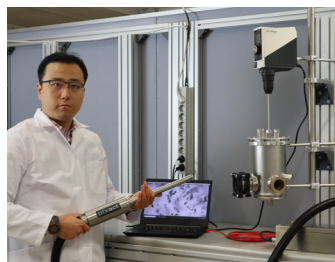
Same equipment from laboratory to manufacturing scale

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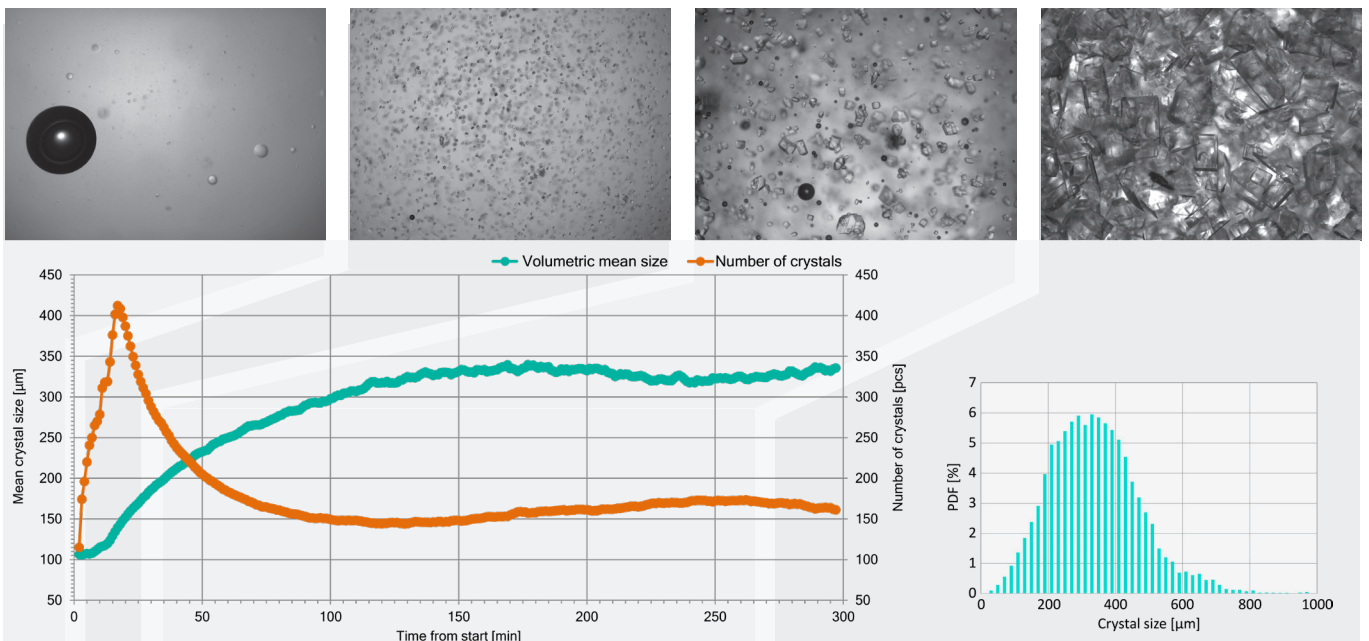a brighter picture of your process

Benefits

With PCM you get real-time measurement data for process control:

- Superior image quality and robust crystal analysis even in high color and concentration
- Accurate control of supersaturation by monitoring micro-crystal formation
- Immediate evaluation of seeding phase and improved repeatability in batch crystallization
- Efficient reporting tools
- Integrated control of auxiliary systems (thermal baths, mixers) with Pixact software
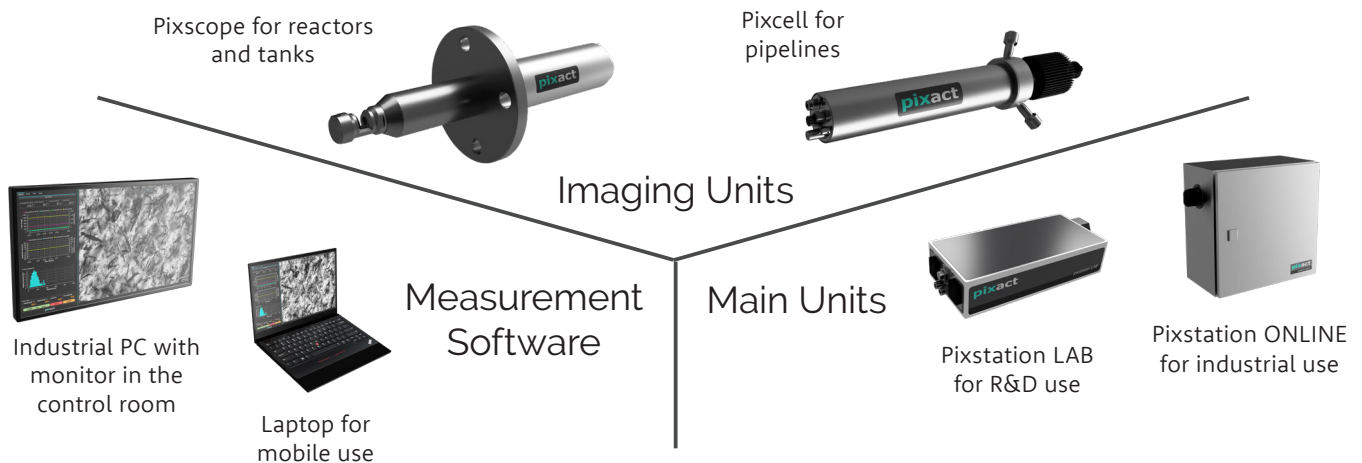- Selection of customized settings and comprehensive customer support

Measurement results

PCM provides a live camera view of the process and detailed measurement data on crystal characteristics:

- Crystal size distribution and related statistics (mean and standard deviation; number and volume fraction of fines and crystals in user specified bins)
- Crystal growth rate
- Number of crystals and nucleation rate
- Crystal morphology, aspect ratio and surface texture
- Detection of impurities, agglomerates, droplets and bubbles
- Suspension flowability and light transmittance

Pixact Solution

Pixscope for reactors and tanks

Pixcell for pipelines

Imaging Units

Industrial PC with monitor in the control room

Laptop for mobile use

Measurement Software

Main Units

Pixstation LAB for R&D use

Pixstation ONLINE for industrial use

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Pixscope Imaging Units

Pixscope imaging units produce microscope quality image data from the process. The imaging unit flange type and probe wet length are customizable, allowing installation for a variety of industrial process equipment. Below are presented some typical installation options, but the designs are fully customizable.
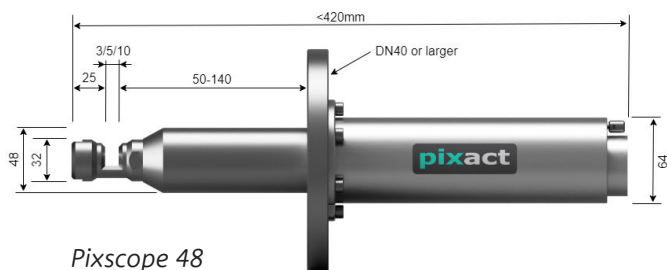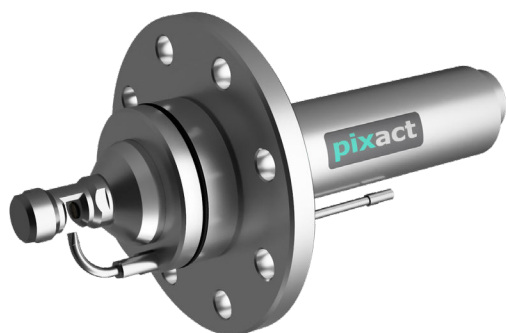

Pixscope 48
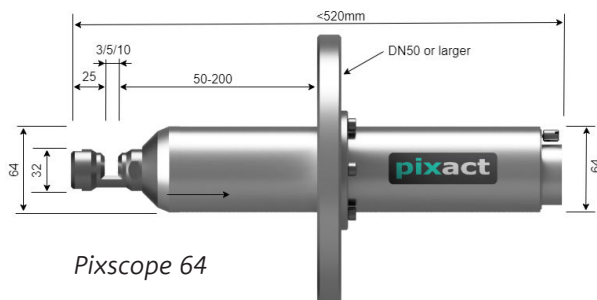
Pixscope 64

Installation

Preferred installation location for the *Pixscope* 48/64 is a flange on the reactor or on the tank side wall. If side inlet is not available, longer version of *Pixscope* can be built to reach the suspension from the flange on top of the reactor.

The imaging unit can also be equipped with a washing nozzle to flush the measurement gap when needed.


Mechanical specification	
Wet part diameter	Pixscope 48: 48.3mm Pixscope 64: 63.5mm
Wet part length to window	Pixscope 48: 50-140mm Pixscope 64: 50-200mm
Measurement gap	3, 5 or 10mm
Wet part material	AISI316L/1.4401 AISI904L/1.4539 Super duplex/1.4410 Hastelloy C22
Window material	Sapphire
Sealing material	Standard: EPDM, FFKM, VMQ, NBR Ext. temp 1: EPDM, FFKM Ext. temp 2: EPDM
Probe weight	3-8 kg

Process & Environment specification	
Process temperature [C]	Standard: 10-85°C / 120°C short.t. Ext-temp 1: -40-120°C Ext-temp 2: -55-120°C
Process pressure [Bar]	Standard: 8 Bar Optional: 30 Bar
Ambient temperature	0-45 °C
Laser class	3R
Housing protection	IP65

Optical specification	
Image resolution	M10: 3.5µm M20: 1.7µm
Image area	M10: 8.4 x 7.1mm M20: 4.2 x 3.5mm
Mesurement range	M10: 4-4000µm M20: 2-2000µm

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Pixstation ONLINE Main Unit

Pixstation ONLINE is the Pixact main unit for industrial online use. It houses the measurement computer, automation gateway, power supply and all connection terminals to external systems. The cabinet can be equipped with a local or a remote display to view the Pixact software user interface. Thanks to IP65 level protection, the cabinet can be installed directly on the field next to the imaging unit.
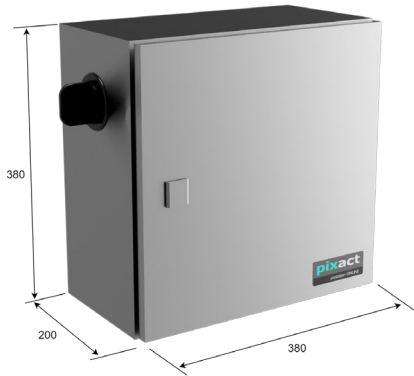
Connections	
Power supply / PWR	100-240 VAC, 3.0A, 50/60 Hz
Automation interface / AUT	According to customer spec: OPC-UA, Profinet, Profibus, Modbus-TCP, mA etc.
Internet connection / NET	RJ45 for LAN or optional 4G modem
Service connection / SRV	Local VNC for service laptop
Cooling air / AIR IN	Vortex cooler, 6mm pneumatic hose, p=1-4 Bar

Materials & Environment	
Cabinet material	AISI304 (EN1.4301)
Ambient temperature	0-45 °C
Cabinet protection	IP65

Pixact Software

Pixact software controls the entire measurement procedure, including the hardware, data acquisition, image analysis, and results post processing. Depending on the system specification, the operation varies from a fully automated online measurement to a manually controlled data collection and analysis. Pixact software can be configured from a robust online analysis software to an effective R&D tool, giving access to all required settings.

Key features

User-friendly adjustment of imaging parameters
- Automatic camera controls to optimize the image quality in varying process conditions
- Adjustable image refresh frequency with zoom and pause features
- Image recording capabilities with time stamps for later inspection or analysis

Flexible reporting tools
- Image data storing to internal or external hard drive
- Internal database for the measurement results
- Export results in the Microsoft Excel ®, CSV, or ASCII format
- From systems equipped with an automation interface, results can be transmitted to external data collection using OPC-UA, Profinet or another standard protocol
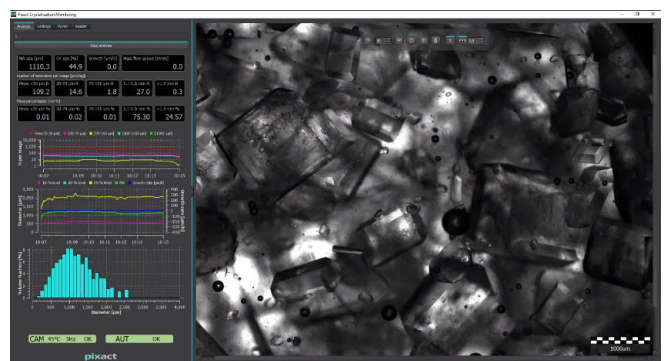
Powerful analysis algorithms
- High-performance image analysis techniques to produce real-time quantitative measurement information from the image stream
- In-house developed image analysis modules available for several application analyses – customized analysis features on request

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