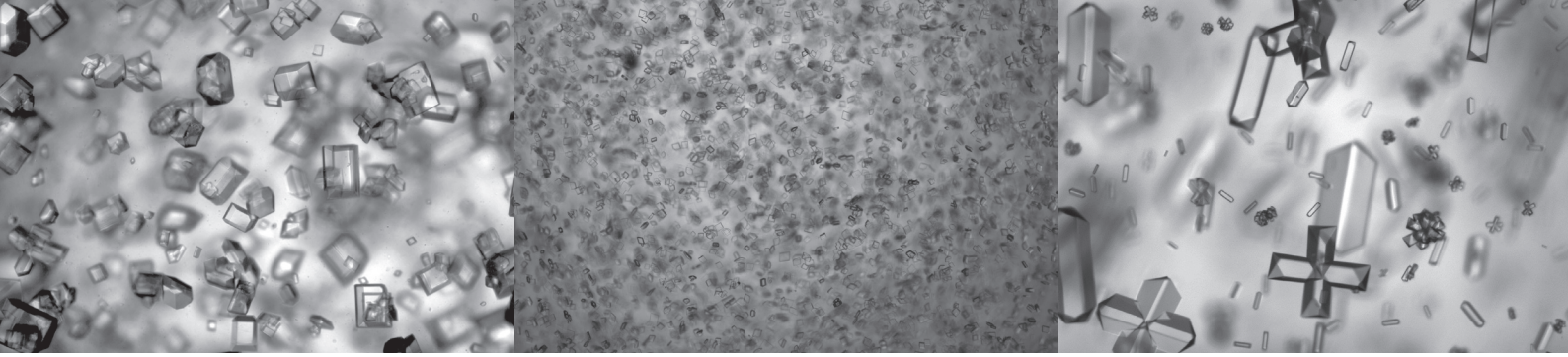


Pixact Crystallization Monitoring

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.

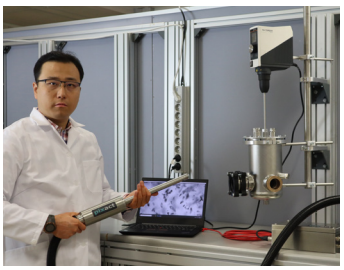
PCM offers high-quality live view and real-time crystal analysis even in high color and concentration. Measurement data produced by PCM helps you to optimize, control and troubleshoot your crystallization process efficiently.

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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Benefits

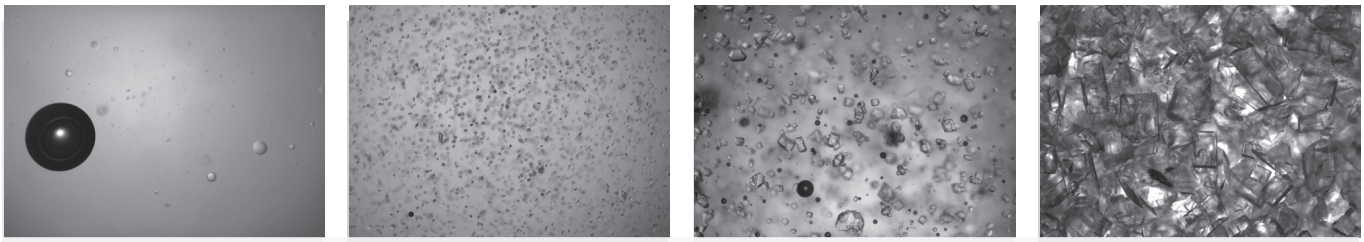
With PCM you get real-time measurement data for process control:

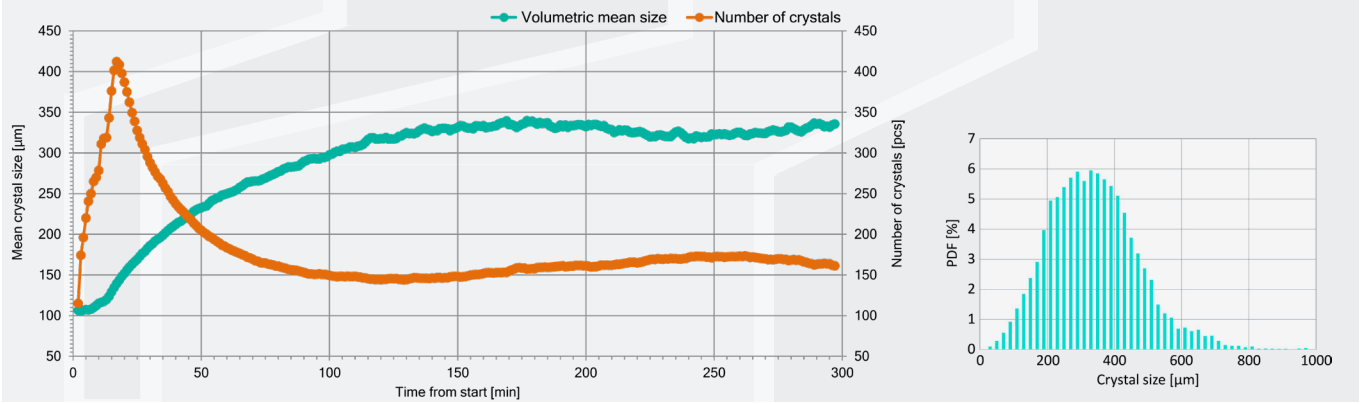
- Superior image quality and robust crystal analysis even in high color and concentration
- Accurate control of supersaturation by monitoring micro-crystal formation
- Immediate evaluation of seeding phase and improved repeatability in batch crystallization
- Efficient reporting tools
- Integrated control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

Measurement results

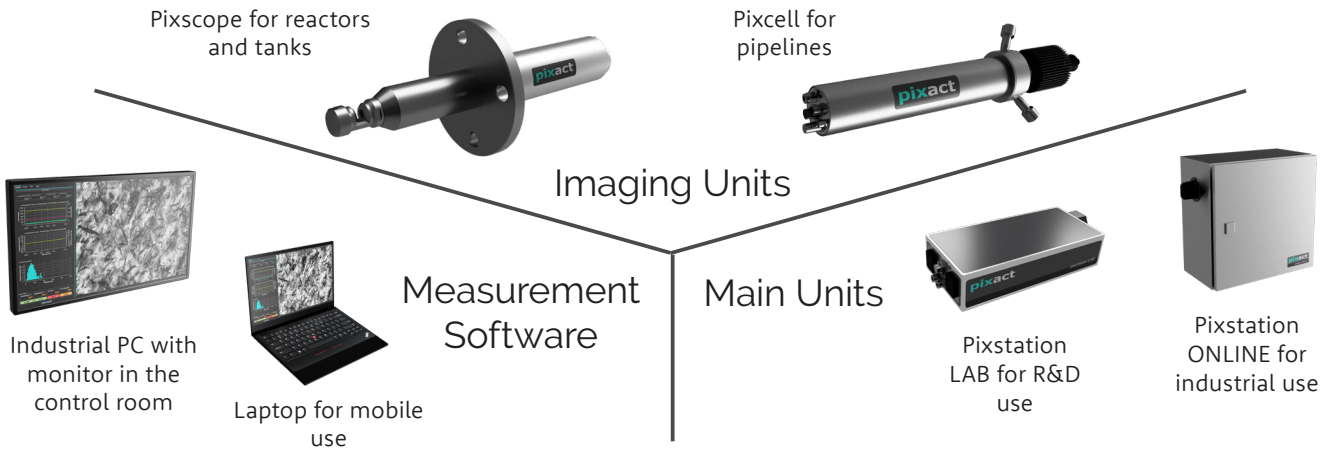
PCM provides a live camera view of the process and detailed measurement data on crystal characteristics:

- 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



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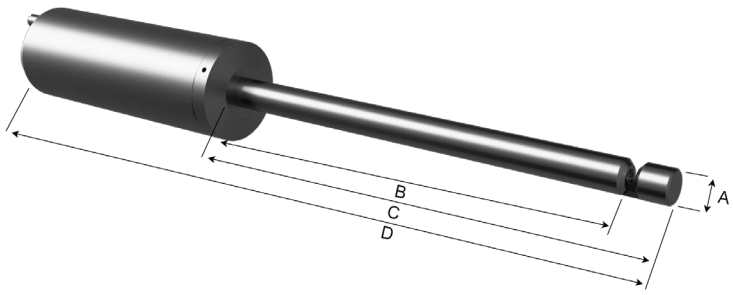
Pixscope Imaging Units

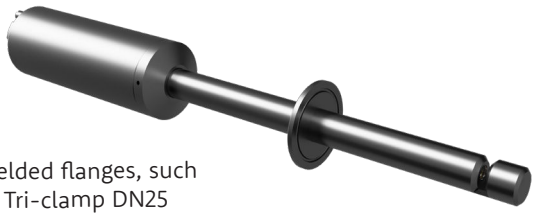
Pixscope imaging units produce microscope-quality image data from the process. The smallest versions of the Pixscope product family are designed for laboratory use and they fit to a variety of laboratory equipment, such as reactors and beakers. Combined with Pixstation LAB main unit they are portable and can be used for multi-location work or as a shared device for user groups.



Pixscope models	14-250	19-300	24-300
A Wet part diameter *mm*	14	19	24
B Wet part length to window *mm*	232	260	268
C Wet part total *mm*	250	284	295
D Total length *mm*	432	466	480

Installation

Pixscope 14/19/24 models can be installed to the reactor through standard and custom inlets.



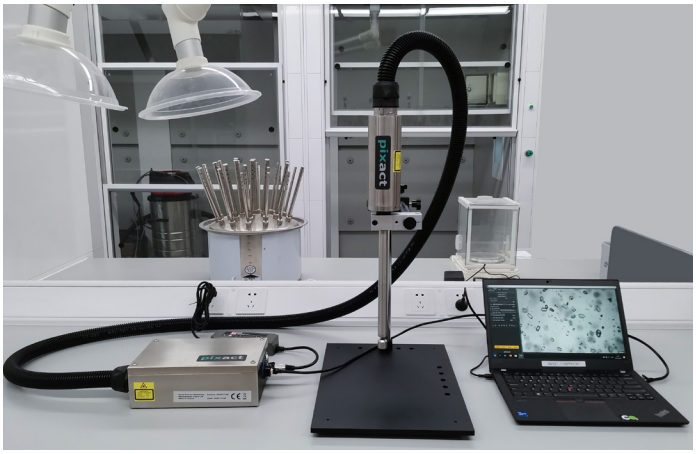
Welded flanges, such as Tri-clamp DN25

1" Ingold fitting

DN40p

PTFE lining for glass reactors

Examples of installation accessories available to Pixscope 14/19/24



Mechanical specification	
Measurement gap *mm*	3 or 5
Wet part material	AISI316L/1.4404 Hastelloy C22
Window material	Sapphire
Sealing material	PFA
Probe weight *kg*	1.4-1.5

Process & Environment specification	
Process temperature *°C*	Standard: 10-120 Ext-temp : -50-120
Process pressure *Bar*	Standard: 8 Optional: 30
Ambient temperature *°C*	0-45
Laser class	3R
Housing protection	IP65

Optical specification	14-250	19-300	24-300
Image resolution *µm*	1.2	1.7	1.7
Image area *mm*	3.7 x 2.5	3.9 x 3.3	4.2 x 3.5
Mesurement range *µm*	5-1000	5-1500	3-2000

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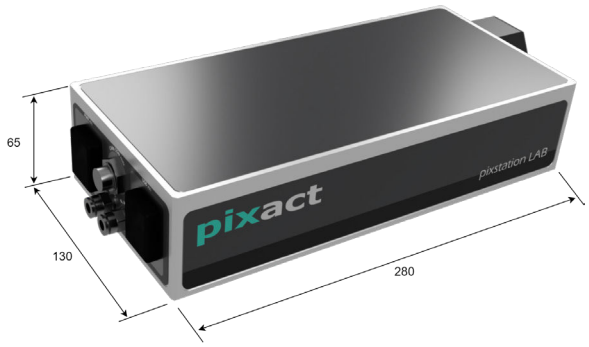
Pixstation LAB Main Unit

Pixstation LAB is a portable main unit to the Pixact measurement system. It is designed for R&D use in laboratories and pilot facilities where the measurement location may change frequently. Portability also allows the system to be shared between user groups and even different locations.



Connections	
Power supply / PWR	100-240 VAC, 3.0A, 50/60 Hz
Camera connection / CAM CON	LAN M12
USB connection / USB	USB 2.0 A
Air purge / AIR IN	6mm pneumatic hose, pmax=0.1Bar
N2 purge / N2 IN (optional)	6mm pneumatic hose, pmax=0.1Bar
Thermocouple / TC (optional)	Type-K
Air or N2 purge out / AIR OUT	¼" thread for muffler or fitting

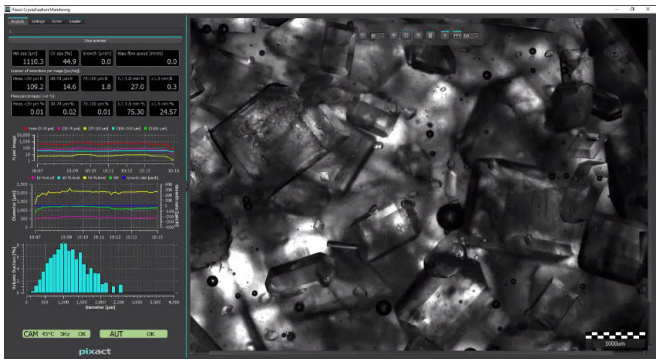
Through a flexible communication interface, signals from thermocouples and pressure sensors can be logged in the Pixact system. The system is also able to control selected stirrers and poultices enabling real-time automated process control and optimization based on measurement data of particle size, morphology and concentration.

Environment	
Housing protection	IP65 (w/o TC connector)
Ambient temperature	0-45 °C

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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