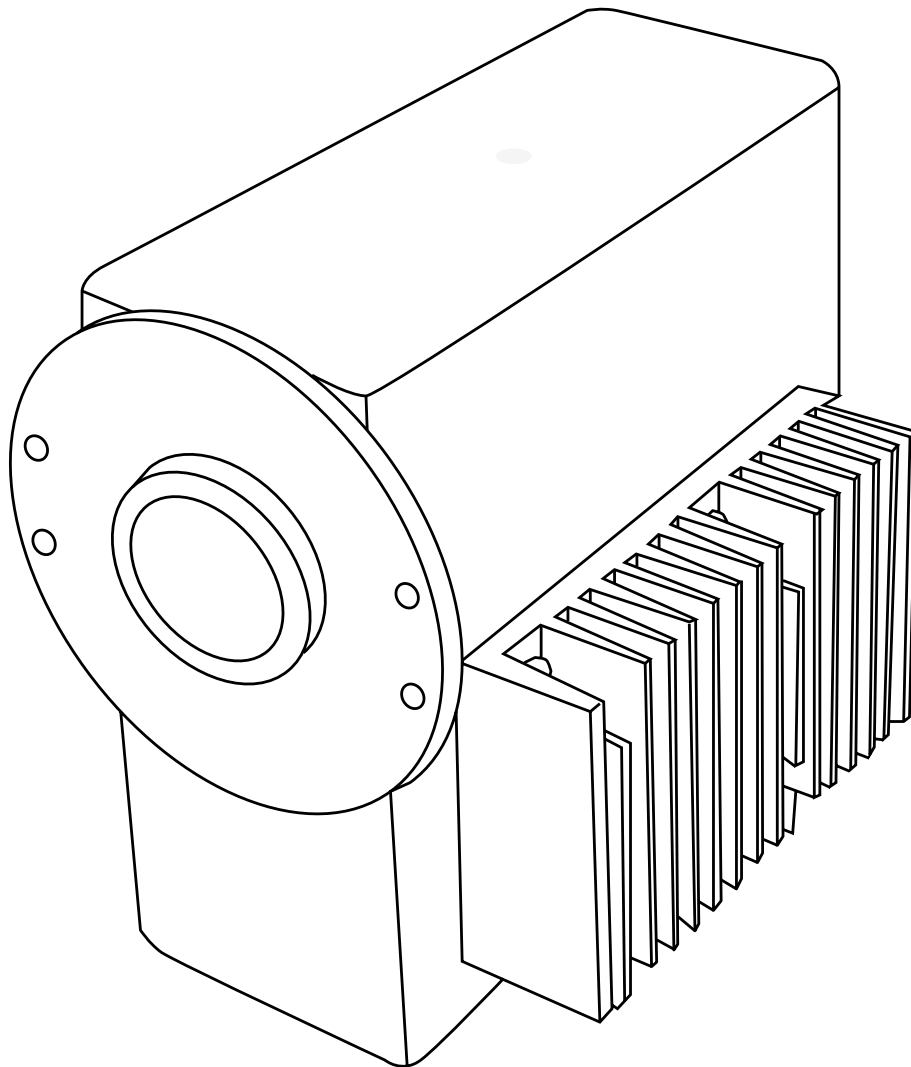




## **NIR-Online** Technical data sheet

NIR-Online®

All NIR-Online sensors are based on diode-array technology. The compact, robust instrument is equipped with a flange and sapphire lens. It can be directly mounted to a process vessel or tube. Additional accessories for solid and liquid products are available.

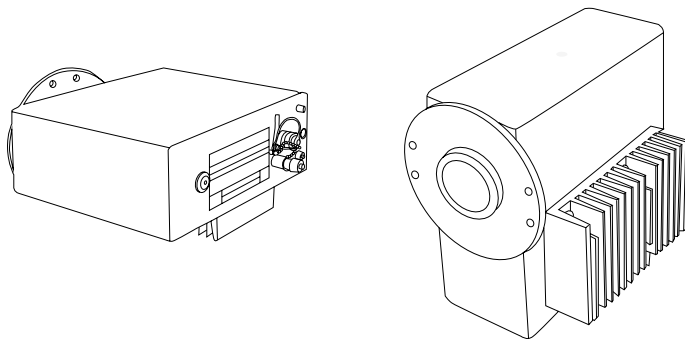


## Scope of delivery

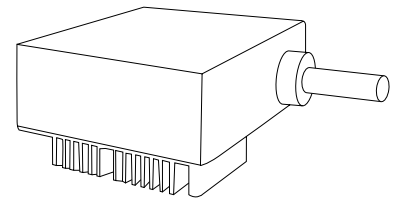
Different detectors can be combined in one instrument to meet a wide variety of requirements.

Available instrument configuration	NIR	VIS	Imaging	Dual lamp	Measuring distance	extended wavelength range (PA2)	Gas-Ex	high speed version (V3S)
X-One 11X1-Series	●			●	0 - 20 mm	●	●	●
X-Two 11X2-Series	●		●	●	0 - 20 mm	●		
X-Three 11X3-Series	●	●		●	0 - 20 mm	●	●	
X-Four 11X4-Series	●	●	●	●	0 - 20 mm	●		
X-Beam 11XB2-Series	●	●		●	100 - 200 mm		●	
X-FFPA 11XF-Series	●	●		●	immersion			

Standard instrument front and side view



instrument with fiber free port adapter



## System requirements

The PC must meet the following requirements:

Operating System	Windows 7 (32-bit or 64-bit) SP1 or Windows 10 (Windows 8 not supported)
Central Processing Unit	Intel Core i5 or higher, Intel Core i7 or higher when using camera or multiple instruments
RAM	4 GB or more
Harddisk	80 GB free hard disk space. The hard drive needs to be extra durable, e.g. type: Seagate Series EE25.2 Intranet or secondary hard disk for backup storage 0.5GB + 20MB/day/instrument
Display resolution	1280x1024 or higher
LAN	1 x 100 Mbit/s LAN or faster (2x LAN recommend)
USB 2.0 / 3.0	1 x USB per instrument 1 x USB per DataLab I/O box (V2, V3, PA2) 2 x USB per DataLab I/O box (V3S)
PCI / PCIe	1 slot for frame grabber card (if camera for imaging is selected) 1 slot for profibus card (if profibus interface is selected)
Required software	Microsoft Word and Excel 2003 or higher

## Minimum configuration

A minimum functional setup consists of at least one instrument, installation box, cable and PC with SX-Suite software. Additional hardware may be needed for accessories, such as a camera or process control interfaces. Please contact your local BUCHI representative for further details.

## Technical data

Dimensions (W x D x H)	220 x 220 (+100 for FFPA) x 135 mm (V2, V3, V3S) 235 x 230 x 180 mm (PA2)
Weight	6 - 10 kg, depending on configuration (V2, V3, V3S) 14 - 15 kg (PA2)
Max. operating pressure	30 bar at flange
Relative humidity	<90% non condensing
Ambient temperature	-10°C – 40°C
Product / flange temperature	-10°C – 70°C (130°C with X-Cell water cooling)
Vibrations	0.2 G at 0.1 – 150 Hz
Detector	Diode array

Spectral range*	Visible range	350 – 920 nm; 10800 - 28500 cm <sup>-1</sup>
	NIR range (V2)	950 – 1750 nm; 5700 - 10500 cm <sup>-1</sup>
	NIR range (V3, V3S)	900 – 1700 nm; 5900 - 11100 cm <sup>-1</sup>
	NIR range (PA2)	1100 – 2200 nm; 4545 - 9090 cm <sup>-1</sup>
Measuring time	V2	10 spectra/s
	V3	20 spectra/s
	V3S	200 spectra/s
	PA2	5 spectra/s
	Maximum product flow speed for imaging is 1 m/s	
Illumination spot diameter	30 - 40 mm, depending on accessory and optical setup	
Imaging*	High res. CCD, visible range, 80 µm spatial resolution	
Type of lamp/lifetime lamp (MTBF)	Tungsten halogen dual lamp / 18000 h (2 x 9000 h)	
Electric power supply	110 or 220 VAC ± 20%, 50/60 Hz, 30 W	
Housing materials	Stainless steel (nickel coated), aluminum cooler, FFKM (standard sealing material; custom sealing upon request)	
System protection*	IP65 or IP67	
Temperature Stabilization	ASDC (Advanced Spectral Drift Control): active temperature control to ±1°C from set system operating temperature. Deviations will lead to automatic white reference measurement to account for spectral drifts.	
ATEX	Dust: Ex II 1/2D Ex ta tb IIIC T80°C Da Db IP65 Gas*: EX II 2G Ex px IIC T4Gb	

\* Availability depends on the selected instrument configuration

## Software

All configurations of the instruments are operated by the SX-Suite, consisting of the following modules:

	Description	Typical usage	User	Occurrence
SX-Server	Instrument driver	Read out instrument status	Operator	As needed
		Setup of hardware	NIR-admin	On installation and maintenance
		Setup of camera for image analysis or accessory	NIR-admin	When adjusting to new product
SX-Center	User interface	Choose product View results (table, trend charts, reports) Enter reference data	Operator	Daily use (if not fully automated)

	Description	Typical usage	User	Occurrence
SX-Backup	Data backup scheduler	Automated backup of measurement data, results and calibrations	NIR-admin	On setup
		Store or delete images from camera (if applicable)	NIR-admin	On setup

The following licenses activate different functionality of the SX-Suite. All versions of the SX-Suite are capable of measuring and analyzing NIR and VIS spectra, if the respective detector is installed.

License	Imaging	Use case
Standard	●	Count particles and calculate area
Conveyor belt		Optimized for measurement of moving objects on a conveyor belt
Mix		Control end-point of mixing processes
Sample movement detection	●	Verify sample flow

### Optional software

Software	Description	Typical usage	User	Occurrence
AutoCal	Automated calibration	If new reference data is available the calibration is updated and optimized automatically.	Operator (to enter reference data)	When calibration update is needed.
SX-Plus	Chemometric software	Manual build up or optimization of calibrations.	NIR-admin	When calibration update is needed.
SX-Profi	Profibus interface software	Configuration of profibus protocol (requires profibus card)	Process-control-system expert	On setup
SX-Client	Remote data visualizing	Display results or journal data for calibration purpose from a remote PC	Operator, NIR-admin	Daily use (if not fully automated)

### Interfaces to computer

Interface	Hardware	Imaging	Details
RS422	USB adapter	●	<ul style="list-style-type: none"> <li>Converts the instruments RS422 signal to USB COM port</li> <li>Electrically isolated</li> <li>Imaging requires an additional coaxial cable</li> </ul>
Ethernet	USB adapter	(●)	<ul style="list-style-type: none"> <li>Converts the instruments RS422 signal to a virtual COM port via ethernet</li> <li>Imaging requires an additional coaxial cable</li> </ul>

Interface	Hardware	Imaging	Details
Bluetooth	Bluetooth interface		<ul style="list-style-type: none"> <li>· Wireless operation together with a battery pack (needs to be ordered separately).</li> <li>· Does not submit imaging data</li> </ul>

### Interfaces to Process Control System

Interface	Hardware	Details
Analog	Datalab, 4-20mA Interface	<ul style="list-style-type: none"> <li>· Analog output of results</li> <li>· Alarm output</li> <li>· Heart-beat toggle for verification of interface</li> <li>· max. 4 parameter</li> <li>· 1 box per instrument</li> </ul>
Profibus	Softing PB-IF-1MS or PB-IF-1S (+ SX-Profi software)	<ul style="list-style-type: none"> <li>· Transmission counters to monitor function</li> <li>· Profibus and TCP/IP cannot be used at the same time</li> <li>· Needs SX-Profi software</li> </ul>
RS422	Standard interface card	
TCP/IP	Standard ethernet card	<ul style="list-style-type: none"> <li>· Transmission counters to monitor function</li> <li>· Profibus and TCP/IP cannot be used at the same time.</li> </ul>

## Accessories

Articles	Details
Installation Box Standard	Supplies the instrument with power. Data cable to PC needs to be ordered separately. <ul style="list-style-type: none"><li>· Steel housing 1.4301 / SST 304</li><li>· Dimensions: 300 x 167 x 300 mm (WDH)</li><li>· ATEX II Ex 3D A 22 IP66 T100°C</li><li>· Power supply</li><li>· Instrument cable 10 m (32.8 ft)</li></ul>
Installation box bypass	Supplies the instrument and a feeder with power. Controls the pneumatic sampler. <ul style="list-style-type: none"><li>· ATEX II Ex 3D A 22 IP65 T100°C</li><li>· Material 1.4301 / SST 304</li><li>· Dimensions: 380 x 217 x 380 mm (WDH)</li><li>· Power supply, relays and DIN rail included</li><li>· Instrument, motor and valve-control cable 10 m (32.8 ft)</li><li>· Requires data cable, DataLab device and cable</li></ul>

## Imaging

When using an instrument with camera, the camera will be connected via a video card.

Video card	PCI or PCI express Video Interface (frame grabber card). This is the camera interface to the PC.
Video filter	Filters ground potentials and reduces LF and HF interferences. Mandatory for online installations with camera.
Video amplifier	Amplification of 4 channels video signals for installations when video cable exceeds 100m.

## Mounting accessories

The instrument flange can be directly mounted to a tube or reactor. Depending on the specific setup additional mounting accessory might be needed for implementation into the production facility.

Weld-in mounting plate For instrument in direct contact with the product	Plate with opening, fitting to instrument flange. <ul style="list-style-type: none"><li>· Dimensions: 160 x 241 x 3 mm</li><li>· Material: 1.4301 / SST304</li><li>· Thread bolts M6</li></ul>
X-Square For all free flowing powders and granulates	The cell can be inserted in the product stream or bypass <ul style="list-style-type: none"><li>· Inspection panel (Plexiglas)</li><li>· Adapted for Jacob pipes Ø150 mm</li><li>· Stainless steel 1.4301 electro polished</li></ul>

<p><b>Bypass sampler</b> For free flowing goods (mealy / grainy)</p>	<p>Bypass with feeder and sampling point</p> <ul style="list-style-type: none"> <li>· Pneumatic sampler (min. 5 bar / 72.5 psi water or oil free compressed air DIN ISO 8573 Class 1)</li> <li>· Screw-conveyor (feeding capacity 1.5 t/h)</li> <li>· Motor (380V/50Hz ATEX A22 0.25 KW)</li> <li>· ATEX magnetic coil 12 V</li> <li>· Requires bypass-installation box and a DataLab IO device</li> </ul>
<p><b>Weld-in flange</b> Provides the ability to remove instrument while keeping the process sealed</p>	<p>Flange with sapphire window and purge port for welding.</p> <ul style="list-style-type: none"> <li>· Adapter plate, ø140/106 mm, for wall thickness up to 8,5 mm</li> <li>· Stainless steel DIN 1.4404 (SST316Ti)</li> <li>· Purge port M5 (ø4mm tube adapter provided) to prevent condensation or detect leakage</li> <li>· High grade sapphire crystal optical lens, polished for reduced adhesion</li> <li>· Sealing material FFKM White G74S, FDA compliant 15°C (+59°F) to 260°C (+500°F)</li> <li>· Operating pressure -0.5 to 30 bar, peak pressure 100 bar max.</li> <li>· Dead volume max. 60 mm<sup>3</sup></li> </ul>
<p><b>Varinline DN50 adapter</b> For opaque products like powder or granules</p>	<p>In combination with a path length adapter also for transparent liquid, gel or pasty products.</p> <ul style="list-style-type: none"> <li>· Material 1.4404 (SST316L), C max.0,03%</li> <li>· Operating pressure up to 10 bar</li> <li>· Build for DN50 DIN 32676</li> <li>· Sealing material FFKM Viton extreme, FDA compliant</li> <li>· Product temp. -14 °C(+5 °F) to 230 °C (+446 °F)</li> <li>· Path length adapter, pressure test with TÜV certificate upon request</li> </ul>
<p><b>X-Cell</b> For gas, liquid and paste-like products</p>	<p>The cell can be inserted in the product stream or bypass</p> <ul style="list-style-type: none"> <li>· Material 1.4404 (SST316L), C max.0,03 %</li> <li>· Operating pressure up to 10 bar (145 psi)</li> <li>· Measurement slit 26 mm, configurable between 1 and 15 mm with additional adapter</li> <li>· DN 50 flange (other sizes upon request)</li> <li>· Clearance volume max. 120 mm<sup>3</sup></li> </ul> <p>Cells can be customized with different diameter and flanges.</p>
<p><b>Path length adapter</b> To measure transparent liquids with the X-Cell</p>	<p>The reflector reduces the length of the optical path</p> <ul style="list-style-type: none"> <li>· Material 1.4404 (SST316L) C max 0.03 %</li> <li>· Gap 1 / 2 / 5 / 10 / 15 mm available</li> </ul>
<p><b>Air nozzle</b> To improve instrument cooling</p>	<p>Reduces dust deposit on cooling fins and increases heat exchange of the instrument cooler</p> <ul style="list-style-type: none"> <li>· Fits for all instruments</li> <li>· N<sub>2</sub> or air DIN ISO 8573 Class1, min. 1 bar continuously</li> <li>· Connections for 8/6 mm hose (without hose)</li> <li>· Cooling power performance unspecified</li> </ul>
<p><b>Purge adapter</b> Reduces dust deposit on the measurement window</p>	<p>Extension for contactless measurement with X-Beam only</p> <ul style="list-style-type: none"> <li>· Stainless steel DIN 1.4404</li> <li>· Tube length 60 mm, Ø 53 mm (outside)</li> <li>· Pneumatic connection M5 (N<sub>2</sub> or pressurized air DIN ISO 8573 Class 1)</li> </ul>



Water chiller  
For maximum cooling

- If product is warmer than 40 °C, additional cooling with the chiller may be needed.
- Can be used with all instruments, only in combination with X-cell and weld-in flange.
  - Product temperature over 40 °C to 130 °C, for a product temperature of 130 °C at least a flow of 5 l/h @20 °C is needed.
  - 40 °C Over temp switch for external alarm purpose, NO (Normally open) circuit
  - Water connectors for 8/6 mm hose (without hose)

## Functional principle

One instrument is mounted to one measurement point. The installation box provides electrical power and connects the instrument with a PC. The PC is running the SX-Suite and calculates the results. These are shown as numbers and trend charts. Optionally the results can be transferred to a process control system or remote PC.

