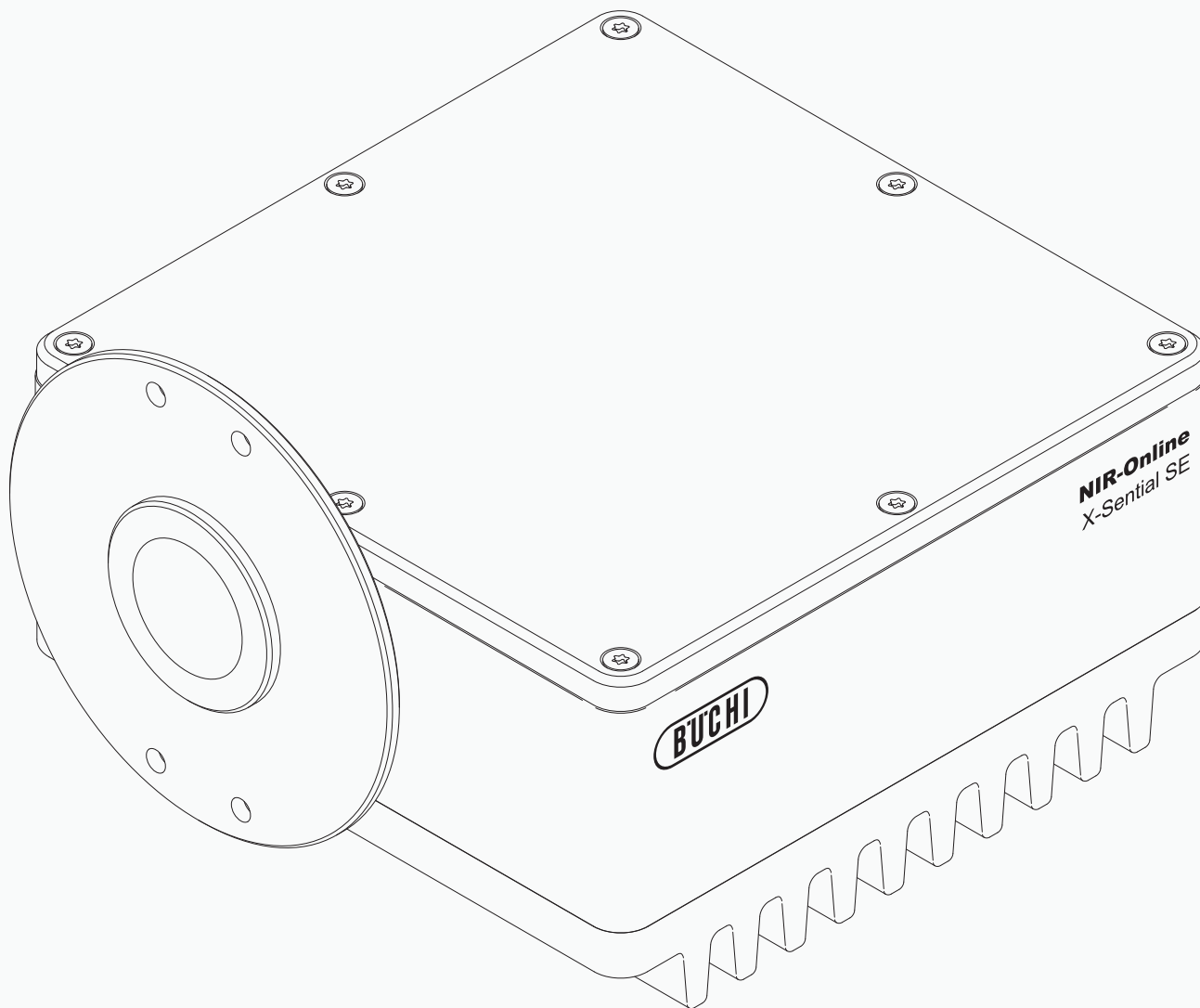




Operation Manual

# X-Sential™ SE



## **Imprint**

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BUCHI reserves the right to make changes to the manual as deemed necessary in the light of experience, especially with respect to structure, illustrations and technical details.

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# 1 About this document

This operation manual is applicable for all variants of the instrument.  
Read this operation manual before operating the instrument and follow the instructions to ensure safe and trouble-free operation.

Keep this operation manual for later use and pass it on to any subsequent user or owner.

BÜCHI Labortechnik AG accepts no liability for damage, faults and malfunctions resulting from not following this operation manual.

If you have any questions after reading this operation manual:

- Contact BÜCHI Labortechnik AG Customer Service.

<https://www.buchi.com/contact>

## 1.1 Mark-ups and symbols



### NOTE

This symbol draws attention to useful and important information.

- ☑ This character draws attention to a requirement that must be met before the instructions below are carried out.
- This character indicates an instruction that must be carried out by the user.
- ⇒ This character indicates the result of a correctly carried out instruction.

| Mark-up                   | Explanation                                  |
|---------------------------|----------------------------------------------|
| <i>Window</i>             | Software Windows are marked-up like this.    |
| <i>Tab</i>                | Tabs are marked-up like this.                |
| <i>Dialog</i>             | Dialogs are marked-up like this.             |
| <i>[Button]</i>           | Buttons are marked-up like this.             |
| <i>[Field names]</i>      | Field names are marked-up like this.         |
| <i>[Menu / Menu item]</i> | Menus or menu items are marked-up like this. |
| <b>Status</b>             | Status is marked-up like this.               |
| <b>Signal</b>             | Signals are marked-up like this.             |

## 2 Safety

### 2.1 Proper use

The sensor is used to analyze substances and samples in production and in the laboratory. The sensor is intended exclusively for that purpose.

The sensor can be used in laboratories and production facilities for the following operations:

- Quality control
- Process optimization

### 2.2 Use other than that intended

The use of the instrument other than described in proper use and specified in technical data is use other than that intended.

The operator is responsible for damages or hazards that are caused by use other than that intended.

Especially the following uses are not permitted:

Use of any other kind than that described in the section Chapter 2.1 “Proper use”, page 6 and any application that does not comply with the technical specifications (see Chapter 3.6 “Technical data”, page 15) constitutes use other than that intended.

In particular, the following applications are not permissible:

- Using the sensor in areas for which the sensors are not certified. For certification details see Chapter 3.5 “ATEX rating”, page 15.
- Use of the sensor in potentially explosive atmospheres without an overall assessment by the responsibility holder.
- Use of a sensor of which the screw sealing cap is damaged.

Damage or hazards attributable to use of the product other than as intended are entirely at the risk of the operator alone.

### 2.3 Warning notices in this document

Warning notices warn you of dangers that can occur when handling the instrument. There are four danger levels, each identifiable by the signal word used.

| Signal word | Meaning                                                                                                             |
|-------------|---------------------------------------------------------------------------------------------------------------------|
| DANGER      | Indicates a danger with a high level of risk which could result in death or serious injury if not prevented.        |
| WARNING     | Indicates a danger with a medium level of risk which could result in death or serious injury if not prevented.      |
| CAUTION     | Indicates a danger with a low level of risk which could result in minor or medium-severity injury if not prevented. |
| NOTICE      | Indicates a danger that could result in damage to property.                                                         |

## 2.4 Warning and directive symbols

The following warning and directive symbols are displayed in this operation manual or on the instrument.

| Symbol                                                                            | Meaning                      |
|-----------------------------------------------------------------------------------|------------------------------|
|  | General warning              |
|  | Dangerous electrical voltage |
|  | Material damage              |
|  | Explosive substances         |
|  | Read manual                  |

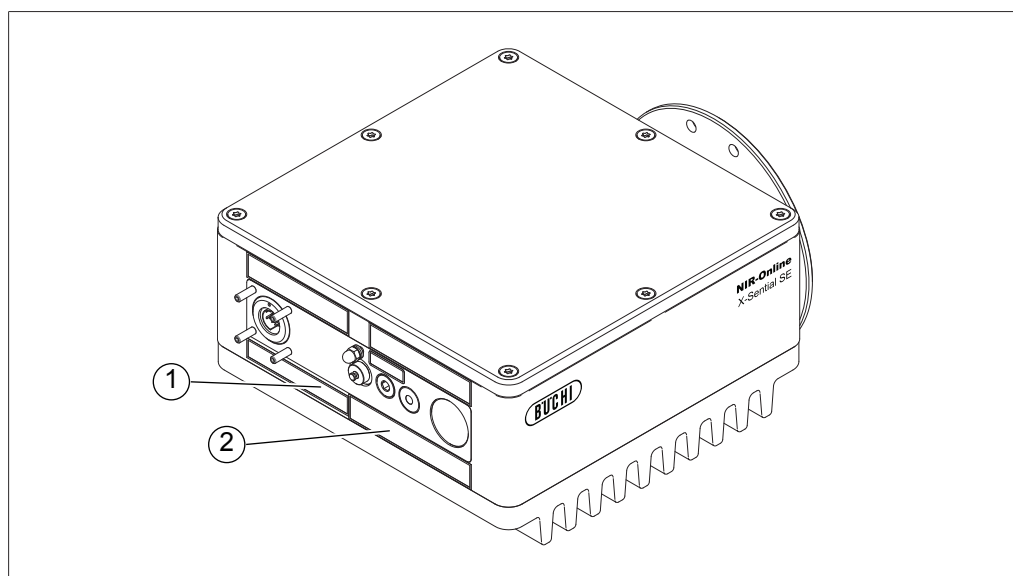


Fig. 1: Location of safety notices and warning signs on the instrument

1



General warning, read manual

**Clean unit when dust exceeds  
5 mm thickness**

2



General warning, read manual

**Do not separate when ener-  
gized**

**Do not open in hazardous area.**

## 2.5 Residual risks

The instrument has been developed and manufactured using the latest technological advances. Nevertheless, risks to persons, property or the environment can arise if the instrument is used incorrectly.

Appropriate warnings in this manual serve to alert the user to these residual dangers.

### 2.5.1 Risk of explosion from opening up the sensor

Opening up the sensor in potentially explosive atmospheres can cause an explosion.

- ▶ Do not open up the sensor housing.

### 2.5.2 Risk of explosion in potentially explosive atmospheres from unplugging the device power plug

Risk of explosion in potentially explosive atmospheres from unplugging the device power plug when the power is switched on.

- ▶ Do not unplug the sensor when the power is switched on.

### 2.5.3 Risk of eye damage from light exposure

Exposure to the light beam can result in eye damage.

- ▶ Do not look directly or indirectly into the light beam that exits the measurement window.

### 2.5.4 Risk of sensor failure from overheating

Inadequate heat exchange can cause overheating and lead to sensor failure.

- ▶ Do not cover the sensor during operation.
- ▶ Keep the sensor free of dust buildup greater than 5 mm.

### 2.5.5 Risk of instrument damage from additional load

The sensor's mountings are designed only for loads expected in the process environment.

- ▶ Do not place any items on the sensor after installation.

## 2.6 Staff qualification

Unqualified persons are unable to identify risks and are therefore exposed to greater dangers.

The instrument must be operated by suitably qualified laboratory staff.

The instrument must be commissioned and serviced by suitably qualified technicians.

These operating instructions are aimed at the following target groups:

### Users

The users are persons that meet the following criteria:

- They have been instructed in the use of the instrument.
- They are familiar with the contents of these operating instructions and the applicable safety regulations and apply them.
- They are able, on the basis of their training or professional experience, to assess the risks associated with the use of the instrument.

### **Operator**

The operator (generally the laboratory manager and qualified technicians) are responsible for the following aspects:

- The instrument must be correctly installed, commissioned, operated and serviced.
- Only suitably qualified staff must be assigned the task of performing the operations described in these operating instructions.
- The staff must comply with the local applicable requirements and regulations for safe and hazard-conscious working practices.
- Safety-related incidents that occur while using the instrument should be reported to the manufacturer (quality@buchicom).

### **BUCHI service technicians**

Service technicians authorized by BUCHI have attended special training courses and are authorized by BÜCHI Labortechnik AG to carry out special servicing and repair measures.

## **2.7 Personal protective equipment (production)**

Follow the rules regarding personal protective equipment that are applicable at the installation site.

The operation of the sensor does not require additional protective equipment.

## **2.8 Personal protective equipment (laboratory)**

Depending on the application, hazards due to heat and/or corrosive chemicals may arise.

- ▶ Always wear appropriate personal protective equipment such as safety goggles, protective clothing and gloves.
- ▶ Make sure that the personal protective equipment meets the requirements of the safety data sheets for all chemicals used.

## **2.9 Modifications**

Unauthorized modifications can affect safety and lead to accidents.

- ▶ Use only genuine BUCHI accessories, spare parts and consumables.
- ▶ Carry out technical changes only with prior written approval from BUCHI.
- ▶ Only allow changes to be made by BUCHI service technicians.

BUCHI accepts no liability for damage, faults and malfunctions resulting from unauthorized modifications.

## 3 Product description

### 3.1 Description of function

#### Overview

X-Sential™ SE is an optical instrument for non-destructive analysis of substances and their concentrations in a sample. Each sample absorbs and reflects light across the visible (VIS) and near-infrared (NIR) regions of the spectrum.

The light behavior varies based on the sample's color, physical properties, and chemical composition. This results in a unique optical signature, or spectrum, which can be analyzed to identify and quantify specific compounds.

To create this optical signature, the sensor utilizes a lamp that emits both VIS and NIR radiation.

#### Light interaction

In the VIS region, radiation is primarily absorbed by pigments, chromophores, or color-bearing compounds. In the NIR region, the light interacts with molecular bonds, causing specific molecular vibrations. The differing responses in the VIS and NIR regions provide valuable, complementary data about the sample's chemical and physical properties.

The reflected light is collected by two sets of fiber optics and directed toward two spectrophotometers: one optimized for the VIS range and the other for the NIR range.

#### VIS light collection

In the visible spectrophotometer, a diffraction grating spatially disperses the incoming light by wavelength. The light then reaches a silicon photodiode array, consisting of multiple sensor elements that measure the light intensity at specific wavelength intervals. This enables high-resolution analysis of visible spectrum characteristics related to color and chromophores.

#### NIR light collection

The NIR spectrophotometer similarly uses a diffraction grating to disperse the light by wavelength, but it employs an indium-gallium-arsenide (InGaAs) photodiode array with multiple sensor elements.

NIR wavelengths are particularly sensitive to molecular vibrations associated with bonds like C-H, N-H, and O-H, making it highly effective for analyzing organic compounds and water content within the sample.

#### Analysis

Once the measurements are taken, the data is converted into digital sequences, which are transmitted to a computer. Specialized software then compares the data sequence curve against a pre-established calibration model, often created through techniques such as Partial Least Squares (PLS) regression. By comparing these sequences, the program can accurately determine the chemical composition and concentration of various substances in the sample. This technique provides rapid, precise, and non-destructive analysis.

## 3.2 Configuration

### 3.2.1 Front view

#### X-Sential™ SE with standard flange or overbelt (X-Beam) version

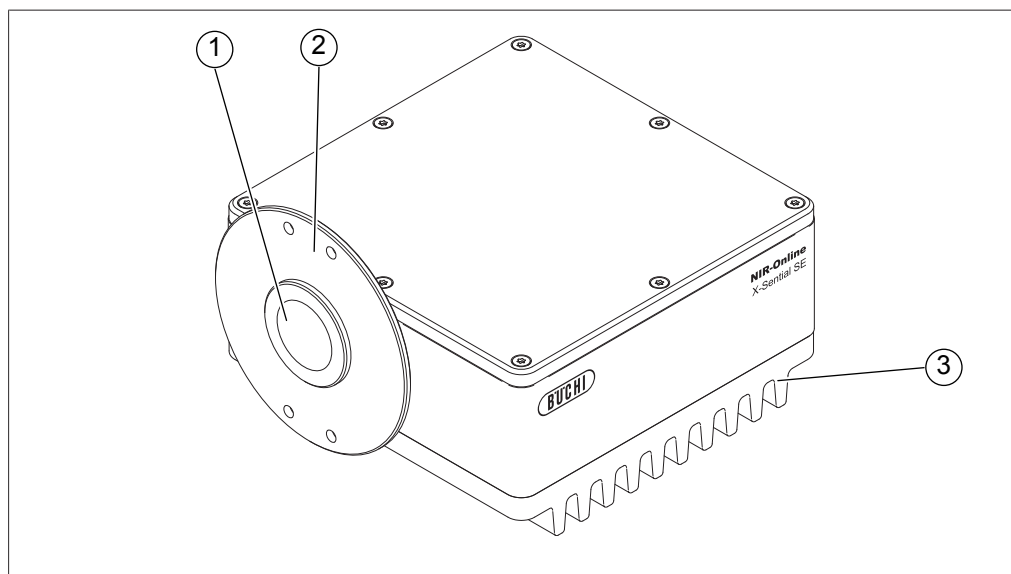


Fig. 2: Front view with standard flange or overbelt (X-Beam) version

- |   |                    |   |        |
|---|--------------------|---|--------|
| 1 | Measurement window | 2 | Flange |
| 3 | Heat sink          |   |        |

#### X-Sential™ SE with hygienic inline flange

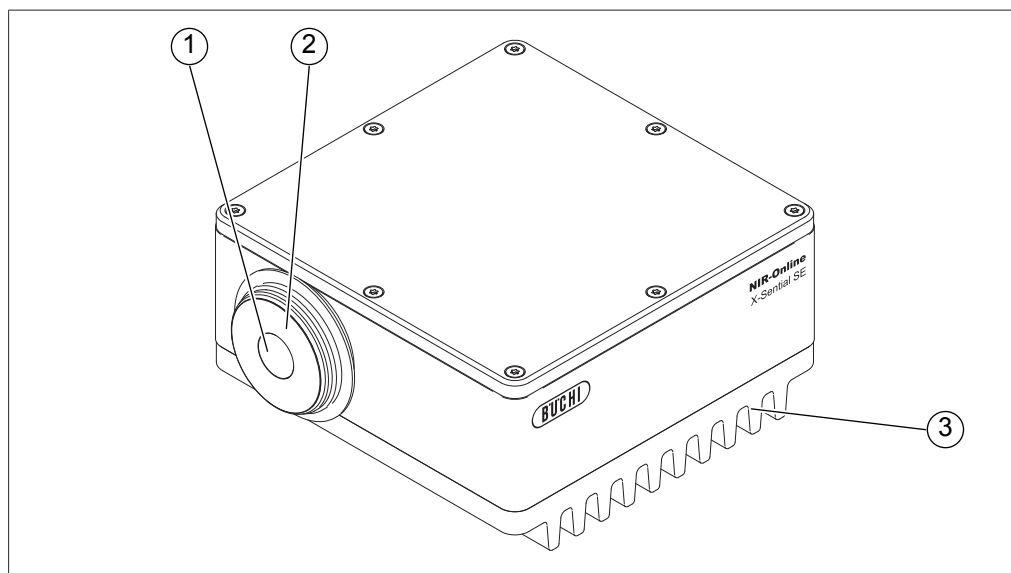


Fig. 3: Front view with hygienic inline flange

- |   |                            |   |                             |
|---|----------------------------|---|-----------------------------|
| 1 | Measurement window (23 mm) | 2 | (3A) hygienic inline flange |
| 3 | Heat sink                  |   |                             |

### 3.2.2 Rear view

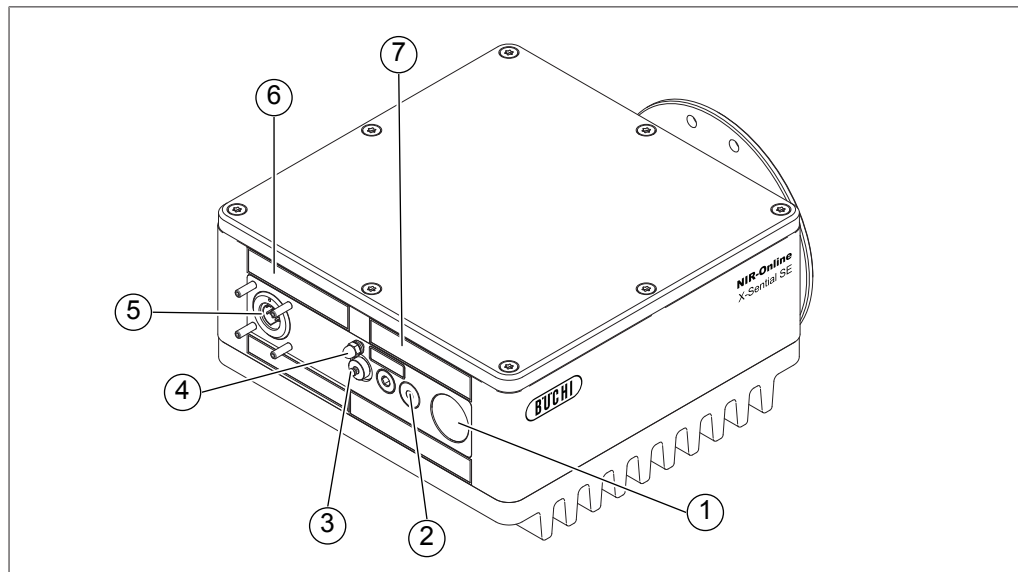


Fig. 4: Rear view

- |   |                              |   |                                              |
|---|------------------------------|---|----------------------------------------------|
| 1 | Journal Button               | 2 | Power and scanning indicator light           |
| 3 | ACC connection (optional)    | 4 | Ground connection<br>(Equipotential bonding) |
| 5 | Connector (power and signal) | 6 | Type plate (part)                            |
| 7 | Type plate (part)            |   |                                              |

### 3.2.3 Heat sink

The standard heat sink supports the stabilization of the spectrometer's operating temperature within product temperatures of -10 °C to +70 °C and environmental temperatures of -10 °C to +40 °C.



#### NOTICE

##### Material damage from covered instrument or mechanical overload

Overheating and mechanical overload can lead to material damage, sensor failure and incorrect measurements.

- Do not cover the heat sink or sensor housing.
- Do not place anything on the heat sink or sensor housing.

### 3.3 Scope of delivery



#### NOTE

The scope of delivery depends on the configuration of the purchase order.

Components and accessories are supplied according to the requirements specified in the purchase order, confirmed through the order confirmation, and listed on the delivery note.

The product number that identifies the configuration can be found on the type plate. See Chapter 3.4 “Type plate”, page 14.

Any optional accessories or additional items requested are included as specified, ensuring alignment with the agreed-upon term.

#### 3.3.1 Order codes

Please refer to the order code matrix below to identify the configuration.

|                                                             | 1 | 1 | X | E |  |  |  |  |  |  | 0 | 0 | 0 |
|-------------------------------------------------------------|---|---|---|---|--|--|--|--|--|--|---|---|---|
| 1 Spectrometer                                              |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 0 NIR only                                                  |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 1 NIR + VIS                                                 |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 2 VIS only                                                  |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 2 Process integration                                       |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 0 Standard flange, FM                                       |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 1 Hygienic inline flange, HIF                               |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 2 Overbelt, OB                                              |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 3 Sealing material                                          |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 0 EPDM                                                      |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 1 FKM                                                       |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 4 Accessory control                                         |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 0 No accessory control, IP 69                               |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 1 Yes, ACC (prepared for XL-Feeder, X-Rot, X-Feeder), IP 6X |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 5 Ex protection                                             |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 9 None (general purpose only), GP                           |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 2 Dust-Ex ATEX, Zone 22, Dc                                 |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 6 Cooling                                                   |   |   |   |   |  |  |  |  |  |  |   |   |   |
| 0 Passive cooling                                           |   |   |   |   |  |  |  |  |  |  |   |   |   |

### 3.4 Type plate



#### NOTE

##### Labeling

Instruments without  mark.

- Instruments without ATEX mark are not suitable for ATEX operation. See Chapter 3.5 “ATEX rating”, page 15

The type plate identifies the instrument. See Chapter 3.2.2 “Rear view”, page 12.

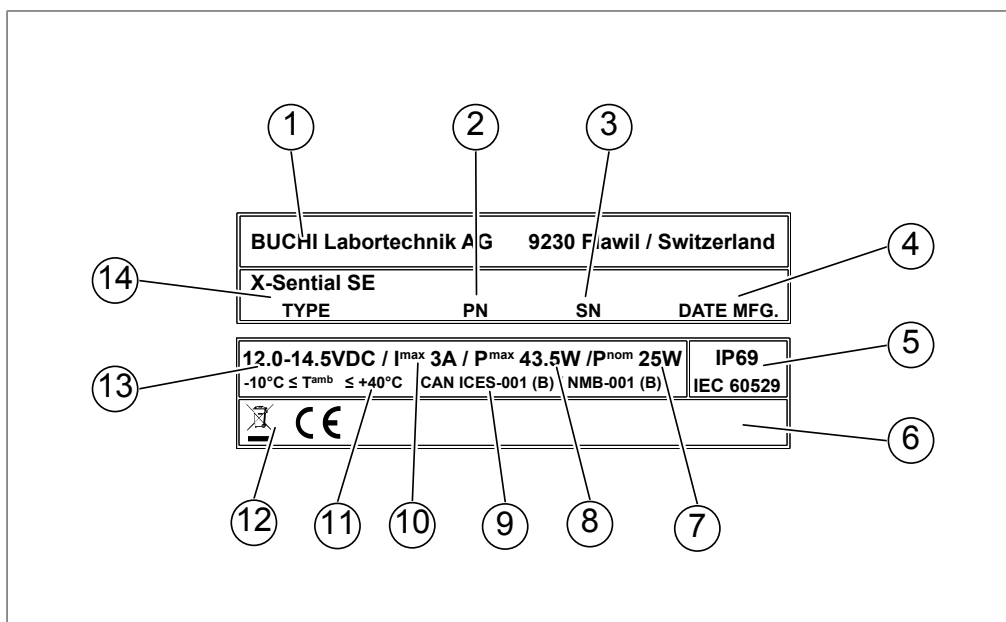


Fig. 5: Type plate

- |    |                                |    |                                                                                        |
|----|--------------------------------|----|----------------------------------------------------------------------------------------|
| 1  | Company name and address       | 2  | Product code                                                                           |
| 3  | Serial number                  | 4  | Production date                                                                        |
| 5  | IP class                       | 6  | ATEX information, if applicable<br>(depends on configuration, see label on instrument) |
| 7  | Power consumption<br>(nominal) | 8  | Power consumption<br>(maximum)                                                         |
| 9  | EMC marking Canada             | 10 | Current consumption<br>(maximum)                                                       |
| 11 | Ambient temperature            | 12 | Certificates                                                                           |
| 13 | Operating voltage              | 14 | Product type                                                                           |

### 3.5 ATEX rating

This operation manual applies to ATEX and non-ATEX instruments. Please check the label on the instrument to confirm its configuration.

The sensor is declared according to the following European Union ATEX Directive ratings:

|    |    |    |    |      |       |    |
|----|----|----|----|------|-------|----|
| II | 3D | Ex | tc | IIIC | T85°C | Dc |
|----|----|----|----|------|-------|----|

#### Meaning of the rating marks:

| Rating | Meaning according to Directive 2014/34/EU                                      |
|--------|--------------------------------------------------------------------------------|
| II     | Device group approved for all Ex zones except mining                           |
| 3D     | Device category approved for dust zone 22                                      |
| Ex     | Explosion proof                                                                |
| tc     | Protection class protected by enclosure                                        |
| IIIC   | Dust group conductive dusts                                                    |
| T85 °C | Temperature classification max. surface temperature = 85° C                    |
| Dc     | Equipment protection level. Dc - zone 22, adequate safety in regular operation |

### 3.6 Technical data

#### 3.6.1 X-Sential™ SE

| Specifications                  | X-Sential™ SE                                                                                                                                                                                                   | X-Sential™ SE with hygienic inline flange                                                                                                                                                                       |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dimensions (W × D × H)          | 229 × 220 × 115 mm                                                                                                                                                                                              | 241 × 220 × 115 mm                                                                                                                                                                                              |
| Weight                          | 8 kg                                                                                                                                                                                                            | 8 kg                                                                                                                                                                                                            |
| Max. operating pressure         | 30 bar                                                                                                                                                                                                          | 30 bar                                                                                                                                                                                                          |
| Product temperature (at flange) | -10 °C to +70 °C                                                                                                                                                                                                | -10 °C to +110 °C                                                                                                                                                                                               |
| Vibrations                      | 0.2 G at 0.1–150 Hz                                                                                                                                                                                             | 0.2 G at 0.1–150 Hz                                                                                                                                                                                             |
| Wavelength spectrum             | 950–1,700 nm                                                                                                                                                                                                    | 950–1,700 nm                                                                                                                                                                                                    |
| NIR range                       |                                                                                                                                                                                                                 |                                                                                                                                                                                                                 |
| Wavelength spectrum             | 450–950 nm                                                                                                                                                                                                      | 450–950 nm                                                                                                                                                                                                      |
| VIS range                       |                                                                                                                                                                                                                 |                                                                                                                                                                                                                 |
| Measurement window size         | 40 mm                                                                                                                                                                                                           | 23 mm                                                                                                                                                                                                           |
| Number of pixels NIR            | 256                                                                                                                                                                                                             | 256                                                                                                                                                                                                             |
| Number of pixels VIS            | 256                                                                                                                                                                                                             | 256                                                                                                                                                                                                             |
| Detector technology NIR/VIS     | Diode array                                                                                                                                                                                                     | Diode array                                                                                                                                                                                                     |
| Average measurement time        | 20 spectra/s                                                                                                                                                                                                    | 20 spectra/s                                                                                                                                                                                                    |
| 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. | 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. |
| IP Code                         | Depends on digit 4 of order code                                                                                                                                                                                | Depends on digit 4 of order code                                                                                                                                                                                |
| Light source                    | Tungsten-halogen dual lamp <sup>1</sup>                                                                                                                                                                         | Tungsten-halogen dual lamp <sup>1</sup>                                                                                                                                                                         |
| Lamp lifetime                   | 18,000 h (2 × 9,000 h)                                                                                                                                                                                          | 18,000 h (2 × 9,000 h)                                                                                                                                                                                          |

| Specifications                                                                                  | X-Sential™ SE                       | X-Sential™ SE with<br>hygienic inline flange |
|-------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------|
| Minimum clearance on all sides                                                                  | 100 mm                              | 100 mm                                       |
| Connection voltage                                                                              | 12.0–14.5 VDC ±10%<br><200 mVpp     | 12.0–14.5 VDC ±10%<br><200 mVpp              |
| Power consumption                                                                               | Nominal 25 W<br>Maximum 43.5 W      | Nominal 25 W<br>Maximum 43.5 W               |
| Overvoltage category                                                                            | II                                  | II                                           |
| Appliance class                                                                                 | III                                 | III                                          |
| Pollution degree                                                                                | 2                                   | 2                                            |
| ATEX (option)  | Dust: II 3D Ex tc IIIC T85 °C<br>Dc |                                              |
| EMC environment                                                                                 | Industrial environment              | Industrial environment                       |
| EMC emission class                                                                              | Class B                             | Class B                                      |
| EMC standard                                                                                    | IEC 61326-2-3                       | IEC 61326-2-3                                |

<sup>1</sup> Single lamp module for overbelt variant.

### 3.6.2 Connector (power and signal)

The pin assignment on the instrument connector is shown below, as viewed from the rear of instrument.

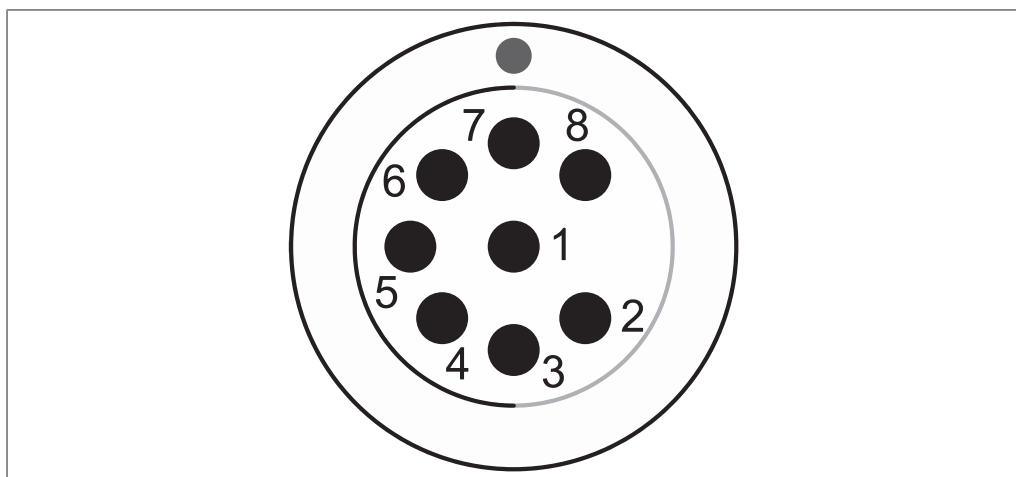


Fig. 6: Pin assignment

- |   |                               |   |                               |
|---|-------------------------------|---|-------------------------------|
| 1 | PIN 1- blue, ground           | 2 | PIN 2- red, 12.7 VDC          |
| 3 | PIN 3- green, RxD-            | 4 | PIN 4- yellow, TxD+           |
| 5 | PIN 5- white, TxD-            | 6 | PIN 6- brown, RxD+            |
| 7 | PIN 7- grey, external button+ | 8 | PIN 8- pink, external button- |

### 3.6.3 ACC connector (optional)

The software-controlled ACC connector operates a variety of accessories, such as the XL-Feeder, X-Rot and X-Feeder.

| Specifications       | X-Sential™ SE                                | X-Sential™ SE with<br>hygienic inline flange |
|----------------------|----------------------------------------------|----------------------------------------------|
| ACC connector type   | Binder series 712<br>(PN 09 0408 00 03)      | Binder series 712<br>(PN 09 0408 00 03)      |
| ACC connector output | 5.1 V, 1.0 A<br>Open drain PWM, 1 kHz, 8 bit | 5.1 V, 1.0 A                                 |

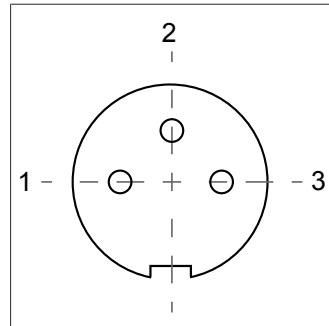


Fig. 7: View onto ACC connector

- 1 Pin 1: 5.1 V
- 3 Pin 3: open drain

- 2 Pin 2: not connected

### 3.6.4 Ambient conditions

For indoor and outdoor use.

| Specifications                | X-Sential™ SE                                                                                         | X-Sential™ SE with<br>hygienic inline flange                                                          |
|-------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Ambient temperature           | -10 to +40 °C                                                                                         | -10 to +40 °C                                                                                         |
| Max. relative air humidity    | 80% for temperatures up to<br>31 °C<br><br>decreasing linearly to 50% rel-<br>ative humidity at 40 °C | 80% for temperatures up to<br>31 °C<br><br>decreasing linearly to 50% rel-<br>ative humidity at 40 °C |
| Max. altitude above sea level | 2,000 m                                                                                               | 2,000 m                                                                                               |
| Storage temperature           | max. 45 °C                                                                                            | max. 45 °C                                                                                            |

### 3.6.5 Materials

| Component                  | Materials of construction                                                                                         |
|----------------------------|-------------------------------------------------------------------------------------------------------------------|
| Casing                     | 1.4404                                                                                                            |
| Passive cooler GP          | Aluminum with coating, EPOFLON FDA Compliant                                                                      |
| Passive Cooler DustEX      | Aluminium with coating, EPOFLON conductive, FDA compliant                                                         |
| Seals (housing and flange) | EPDM or FKM (depends on configuration), all interface sealings<br>are FKM, all sealing materials are FDA approved |
| Hygienic inline flange     | Gold-soldered                                                                                                     |

### 3.6.6 Software

The sensor is controlled via the SX-Suite software package. It consists of the following components:

| Name      | Description                                    | Typical usage                | User      | Occurrence                       |
|-----------|------------------------------------------------|------------------------------|-----------|----------------------------------|
| SX-Server | Instrument driver / usage of special functions | Read out instrument status   | Operator  | As required                      |
|           |                                                | Setup of instrument hardware | NIR admin | For installation and maintenance |

| Name      | Special function          | Description                                                    | User      | Occurrence  |
|-----------|---------------------------|----------------------------------------------------------------|-----------|-------------|
| SX-Server | Conveyor belt             | Optimized for measurement of moving objects on a conveyor belt | NIR admin | As required |
|           | Mix                       | Control end-point of mixing processes                          | NIR admin | As required |
|           | Sample movement detection | Verify sample flow                                             | NIR admin | As required |

| Name      | Description                      | Typical usage                                                  | User      | Occurrence                              |
|-----------|----------------------------------|----------------------------------------------------------------|-----------|-----------------------------------------|
| SX-Center | User interface (online/lab mode) | Recipe/product and calibration management                      | Operator  | Daily workflow (if not fully automated) |
|           |                                  | View results (table, trend, charts, reports)                   |           |                                         |
|           |                                  | Reference data management                                      |           |                                         |
| SX-Backup | Data backup scheduler            | Automated backup of measurement data, results and calibrations | NIR admin | During installation                     |

| Name   | Special function | Description                                   | User | Occurrence  |
|--------|------------------|-----------------------------------------------|------|-------------|
| SX-Run | Software restart | Automatic software restart in case of a crash | -    | As required |

### 3.6.7 Computer system requirements

The system requirements for the computer are as follows:

|                               |                                                                                                                                                                             |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating system              | Windows 11, Windows 10 until EOL                                                                                                                                            |
| Central processing unit       | For single sensor: Intel Core i5 (12 <sup>th</sup> Gen or newer), equivalent AMD<br><br>For multiple sensors: Intel Core i7 (12 <sup>th</sup> Gen or newer), equivalent AMD |
| RAM                           | At least 16 GB                                                                                                                                                              |
| Hard disk space               | At least 512 GB SSD and 1 TB HDD of free disk space<br><br>Use a hard disk suitable for continuous operation (average 20 GB per sensor per year)                            |
| Data backup                   | At least 1 TB of free disk space                                                                                                                                            |
| Network or external hard disk | 50 GB per sensor per year                                                                                                                                                   |
| Screen resolution             | At least 1920x1080<br><br>Recommended 2560x1440                                                                                                                             |
| LAN                           | At least 1 x 100 Mbit/s LAN                                                                                                                                                 |
| USB 2.0/3.0                   | At least 1 USB connection per sensor and 1x USB per DataLab I/O box                                                                                                         |
| PCI/PCIe                      | 1 slot for Profibus card<br><br>(for Profibus connection)                                                                                                                   |
| Software                      | Microsoft Word and Microsoft Excel 2010 or later<br><br>PDF reader for operation manual                                                                                     |

### 3.6.8 Installation site (laboratory)

- The installation site has a firm, level surface.
- The installation site meets the safety requirements. See Chapter 2 “Safety”, page 6
- The installation site has enough space that cables can be routed safely.
- The installation site has no obstacles (e.g. water taps, drains, etc.).
- The installation site has an own mains outlet socket for the instrument.
- The installation site is not exposed to external thermal loads, such as direct solar radiation.
- The installation site allows that the power supply can be disconnected or switched off at any time in an emergency.
- The installation site meets the specifications according to the technical data (e.g. weight, dimension, etc.). See Chapter 3.6 “Technical data”, page 15

### 3.6.9 Installation site (production)

- The installation site has a firm, level surface.
- The installation site meets the safety requirements. See Chapter 2 “Safety”, page 6.
- The installation site has enough space that cables can be routed safely.
- The installation site is not exposed to external thermal loads, such as direct solar radiation.
- The installation site meets the specifications according to the technical data (e.g. weight, dimension, etc.). See Chapter 3.6 “Technical data”, page 15.
- The installation site meets the specifications according to the installation point. See Chapter 5.1 “Establishing the installation point”, page 23.
- The installation site has an own mains connection for the instrument.
- The installation site allows that the power supply can be disconnected or switched off at any time in an emergency.
- The installation site has a sample removal point at a distance of  $< 1$  m.
- The installation site allows a direct product measurement.
- The installation site has constant product flow.
- The layer thickness of the product to be measured is at least 30 mm.

## 4 Transport and storage

### 4.1 Transport



#### NOTICE

##### **Risk of breakage due to incorrect transportation**

- ▶ Make sure that all parts of the instrument are safely packed in such a way as to prevent breakage, ideally in the original box.
  - ▶ Avoid sharp movements during transit.
- 
- ▶ After transportation, check the instrument for damage.
  - ▶ Damage that has occurred in transit should be reported to the carrier.
  - ▶ Keep packing for future transportation.

### 4.2 Storage

- ▶ Make sure that the ambient conditions are complied with (see Chapter 3.6 “Technical data”, page 15).
- ▶ Wherever possible, store the device in its original packaging.
- ▶ After storage, check the device for damage and replace if necessary.

## 5 Installation

### 5.1 Establishing the installation point

#### 5.1.1 Standard flange

The fixing points or bolts must conform to M6 with A2-70 torque of 7.3 Nm (5.4 lbft). Determine the installation point according to the specified data of the flange.

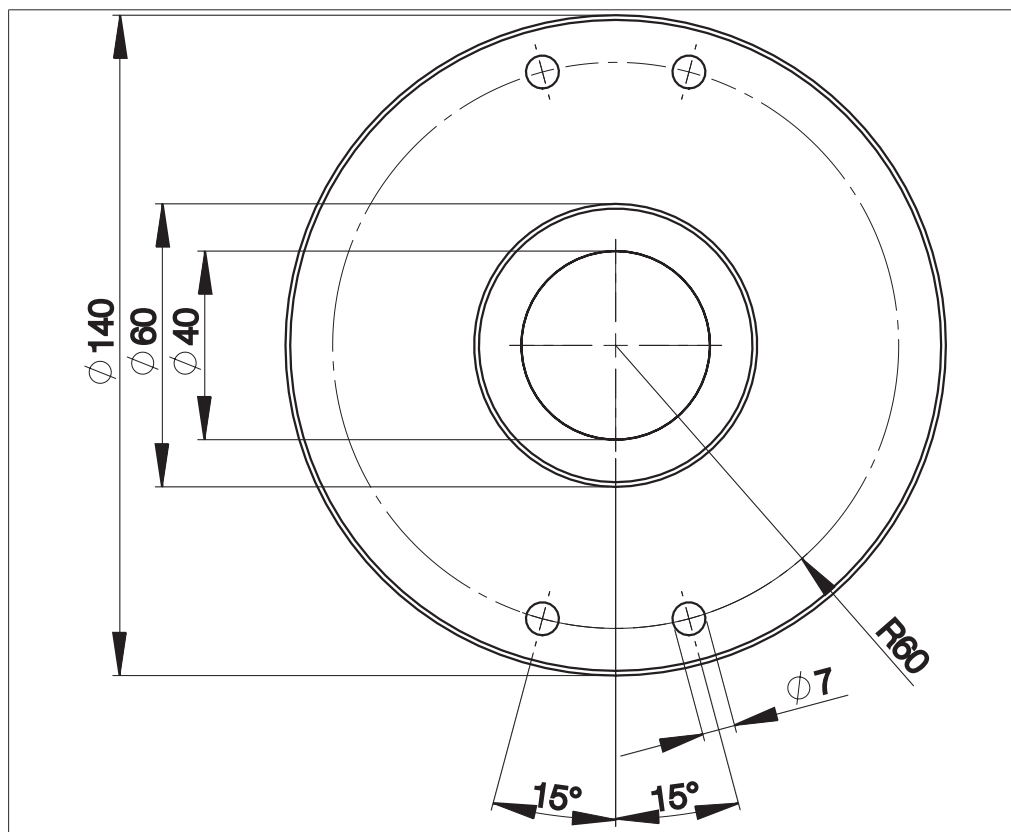


Fig. 8: Dimensions of flange

### 5.1.2 (Hygienic) inline flange

The fixing nuts on the clamp rings must conform to the following specifications:

- Suitable for Varinline housings Type N
- M6 with A2-70 torque of 9 Nm (6.6 lbft)
- M8 with A2-70 torque of 22 Nm (16.2 lbft)

Adhering to these values ensures the secure installation of the clamp rings.

Additionally, determine the installation point according to the specified data of the flange and housing.

## 5.2 Installation point in piping system (example)

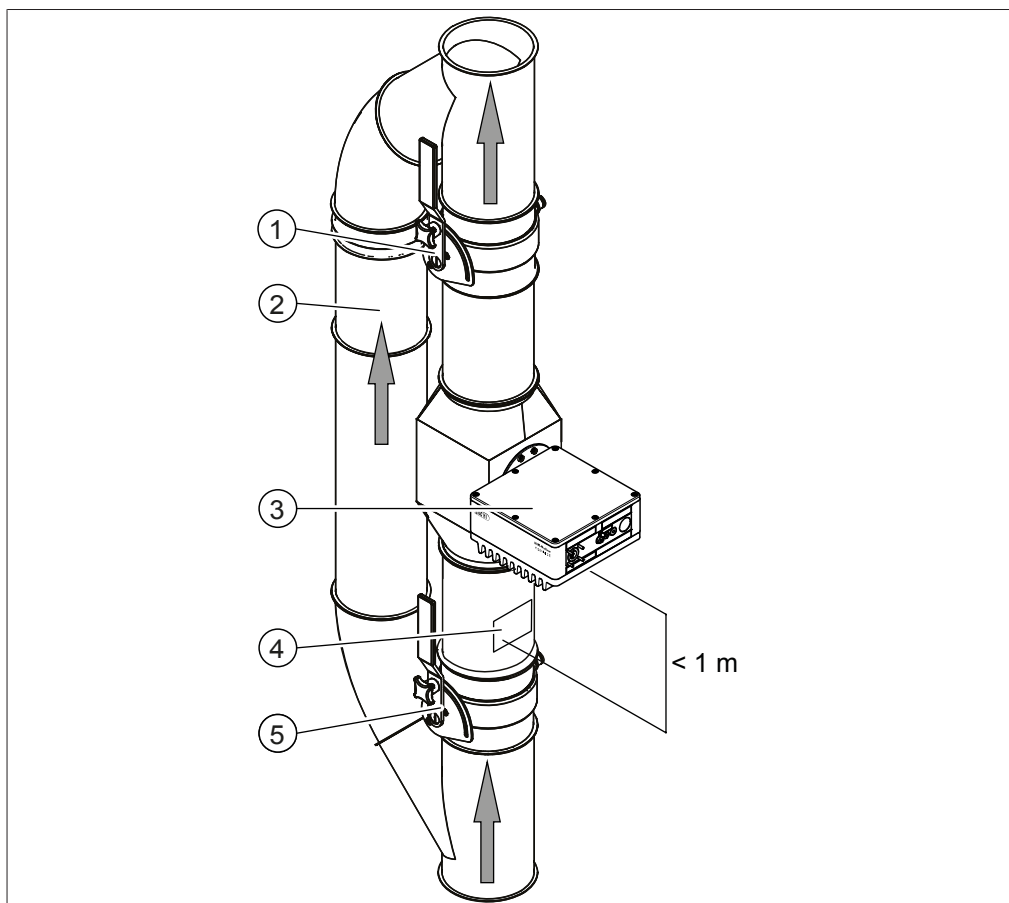
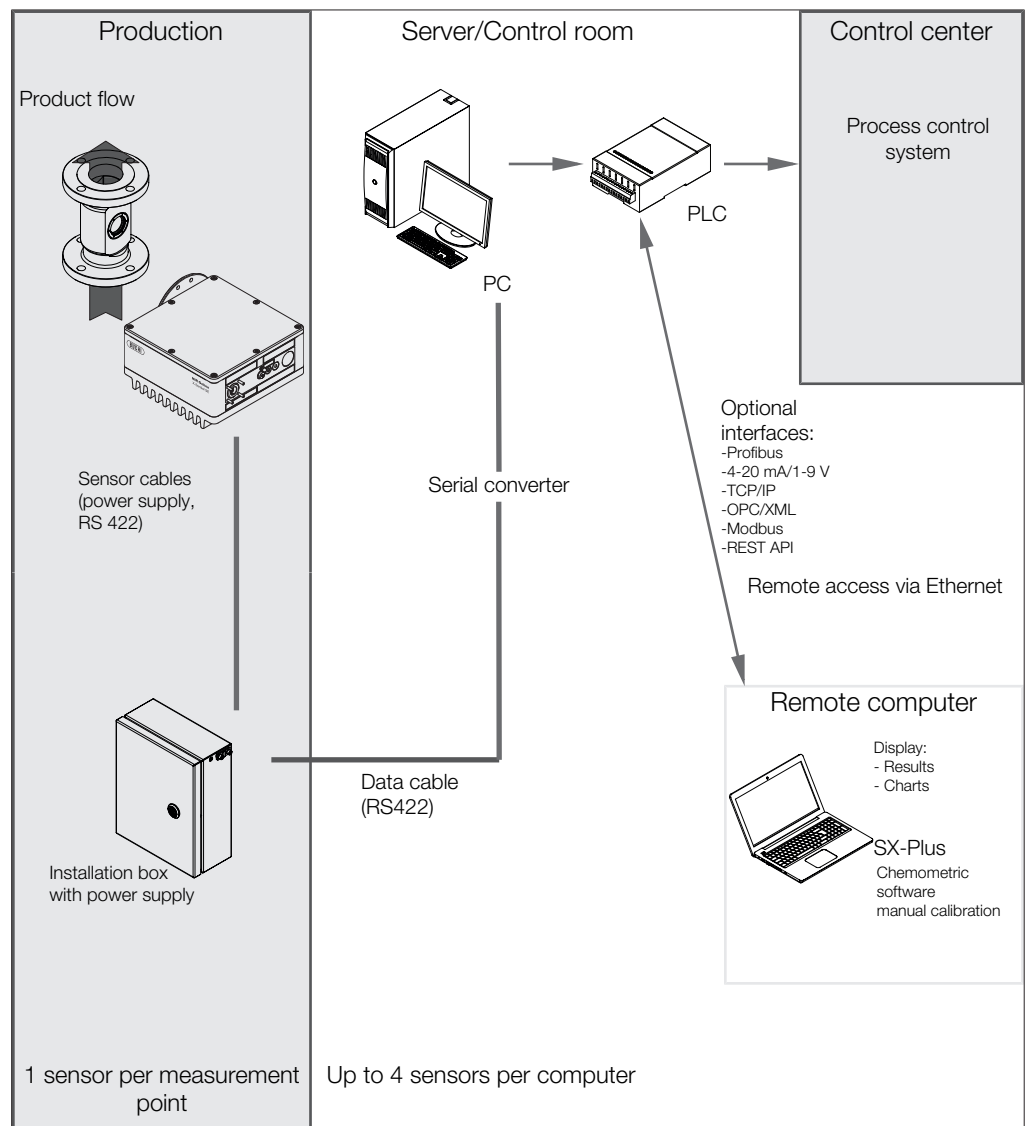


Fig. 9: Configuration

- |   |                 |   |                      |
|---|-----------------|---|----------------------|
| 1 | Flow restrictor | 2 | Bypass               |
| 3 | Analyser        | 4 | Sample removal point |
| 5 | Flow restrictor |   |                      |

### 5.3 Installation (example)



## 5.4 Sensor installation



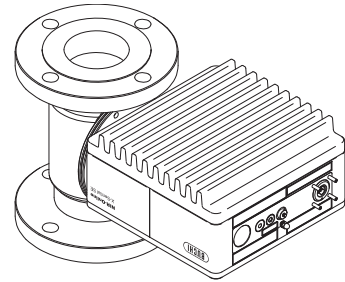
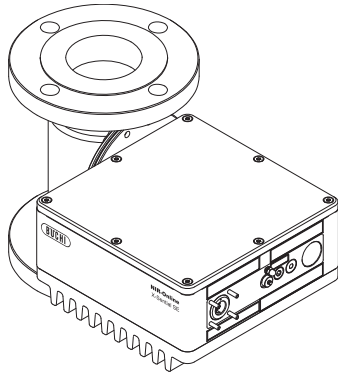
### **DANGER**

#### **Use of an unsuitable flange in potentially explosive atmospheres.**

The use of an unsuitable flange may cause an explosion.

- In potentially explosive atmospheres use a double flange.

The following installation positions are possible:



#### **X-Sential™ SE with standard flange**

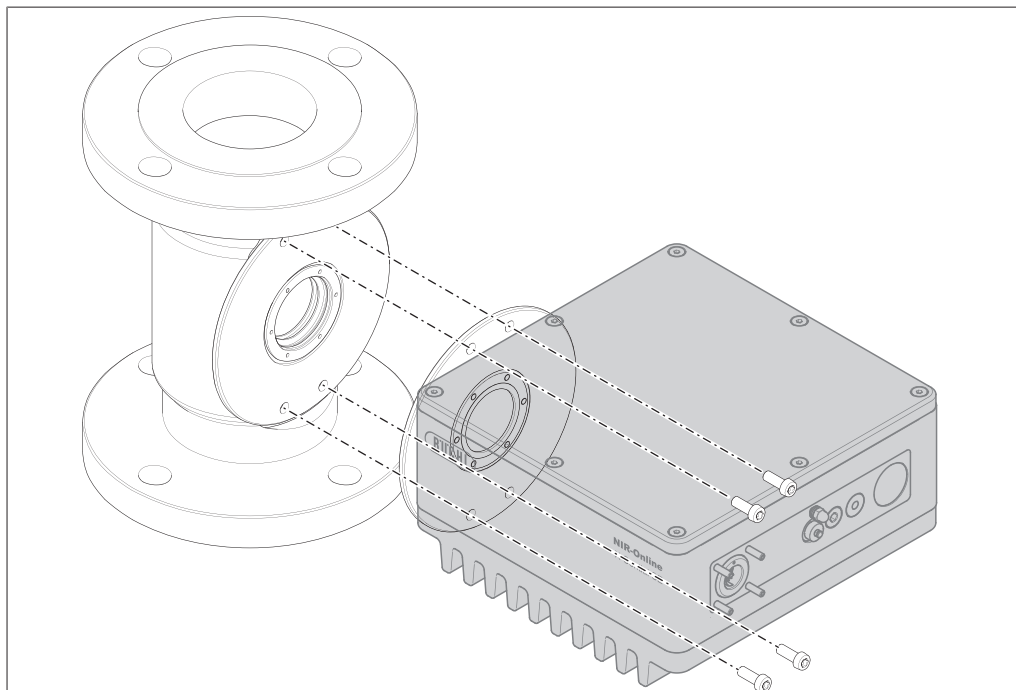


Fig. 10: Fixing sensor with screws (standard flange)

Tools required:

- Torque wrench, size Torx T30

Tightening torque: 8.4 Nm  $\pm$ 1

Precondition:

- ☒ Installation point has been established. See Chapter 5.1 "Establishing the installation point", page 23.
- ☒ The fixing points or bolts conform to M6 A2-70 15 mm
- Fix the sensor to the installation point using the bolts.

## X-Sential™ SE with hygienic inline flange

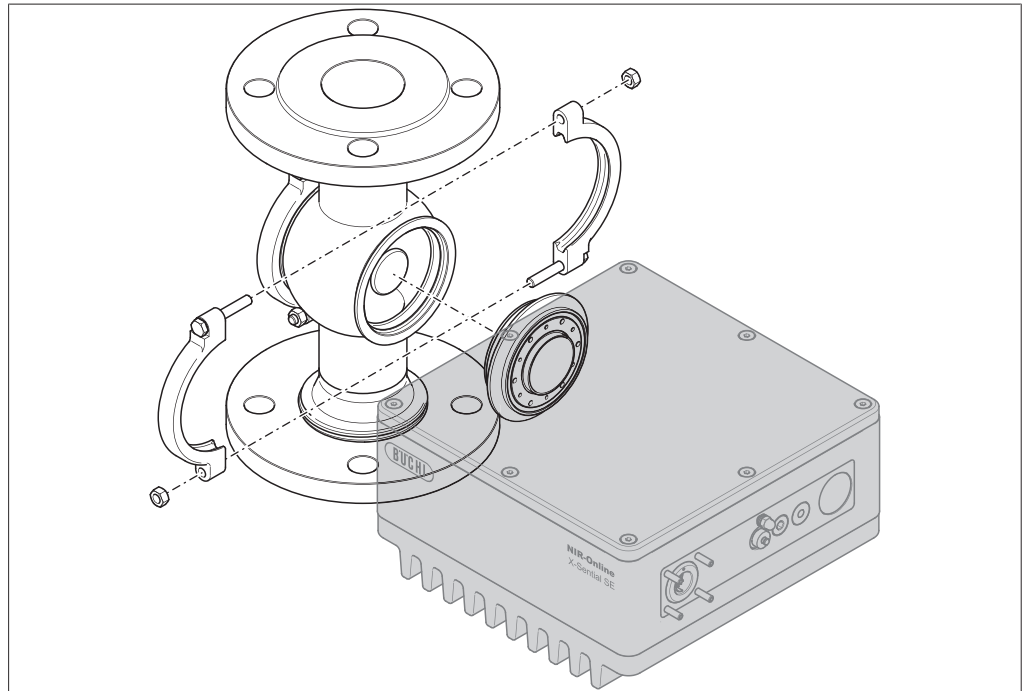


Fig. 11: Fixing sensor with screws (hygienic inline flange)

Tools required:

- Torque wrench, size Torx T30

Tightening torque:

- M6: 9 Nm (6.6 lbft)
- M8: 22 Nm (16.2 lbft)

Precondition:

- ☑ Installation point has been established. See Chapter 5.1 “Establishing the installation point”, page 23.
- ▶ Ensure the sensor and O-rings are clean and undamaged.
- ▶ Insert the sensor with the O-rings into the housing, checking the alignment.
- ▶ Position the sensor correctly to avoid sealing issues.
- ▶ Place the clamp ring evenly over the flange.
- ▶ Tighten the M6 and M8 nuts.
- ▶ Conduct a final inspection to ensure proper assembly and alignment

## 5.5 Connecting the sensor

Tools required:

- Torque wrench, size 7 mm AF



### NOTE

Make sure that the power is not switched on when connecting the sensor.

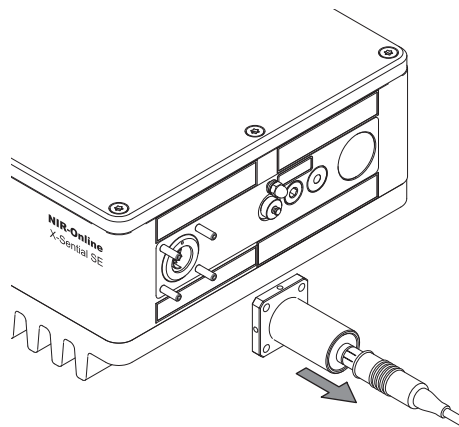


### NOTE

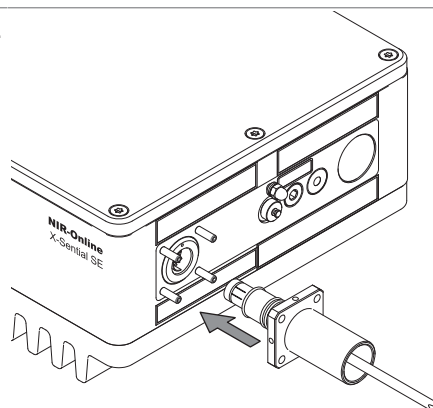
Loss of performance due to use of unsuitable device cables

Max. cable length between installation box and sensor 10 m.

- Put the cable guard over the sensor cable.

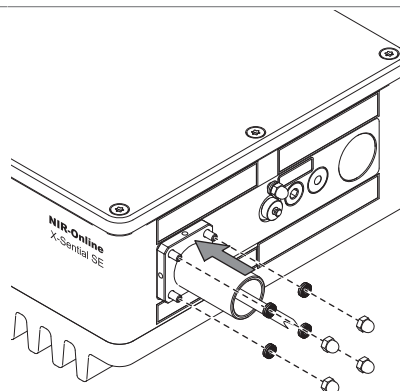


- Connect the sensor cable to the sensor.
- Secure the connector.



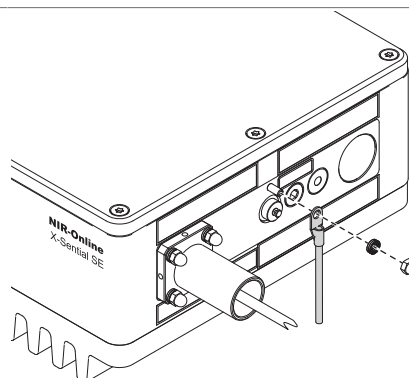
Tightening torque:  $2.5 \text{ Nm} \pm 0.5$

- Attach the cable guard to the sensor.



Tightening torque:  $2 \text{ Nm} \pm 0.5$

- Attach the ground cable to the sensor.



## 5.6 Establishing electrical connections



### NOTICE

#### **Risk of instrument damage because of not suitable power supply cables.**

Not suitable power supply cables can cause bad performance or an instrument damage

- ▶ Use only BUCHI power supply cables.

Precondition:

- ☒ The electrical installation is as specified on the type plate.
- ☒ The electrical installation is equipped with a proper grounding system.
- ☒ The electrical installation is equipped with suitable fuses and electrical safety features.
- ☒ The installation site is as specified in the technical data. See Chapter 3.6 "Technical data", page 15
- ▶ Connect the power supply cable to the connection on the instrument. See Chapter 3.2 "Configuration", page 11
- ▶ Connect the mains plug to an own mains outlet socket.

## 6 Operation

The instrument is controlled via the SX-Suite software, installed on a connected computer. Detailed operational instructions are provided in both the *SX-Suite User Manual* and *SX-Plus User Manual* which offer in-depth guidance on the instrument's software interface, functionality, and troubleshooting.

### 6.1 Journal button



#### ⚠ CAUTION

**Burn hazard from hot *Journal* button.**

A product temperature over 60 °C, the ***Journal*** button can cause burns.

- ▶ Wear protective gloves.
- ▶ Consider using an external ***Journal*** button.

The ***Journal*** button on the instrument is critical for tracking and recording calibration events. Pressing this button automatically generates a new entry in the software's journal system, which records details such as the date, time, and action taken. This feature is essential for maintaining a detailed history of calibration checks, ensuring quality control over time, and supporting audit requirements. The timestamped entries are valuable for later analysis and verification.

#### 6.1.1 External Journal button

Parallel to the (internal) ***Journal*** button, an external ***Journal*** button with identical functionality can be installed. To use it, an Installation Box with a circuit for an external button is needed. See Chapter 9.2.1 "Accessories", page 33.

## 6.2 Creating journal entries and entering reference data

For calibration and continuous accuracy verification, reference data must be systematically entered into the journal.

This process aids in calibration improvements and is essential for monitoring consistency and precision according to the specific requirements of the production process.

The frequency and specifics of these checks are typically determined by quality assurance protocols or regulatory standards relevant to the industry in which the instrument is being used.



#### NOTE

Each journal entry is automatically timestamped with the exact date and time of the action.

- ▶ Press and hold the ***Journal*** button for one second.
  - ⇒ The connected software creates a journal entry (with current date, time, and preset identifiers associated with the operator/instrument).
- ▶ Remove the sample at the sample removal point, following the appropriate procedure to avoid contamination or errors.
- ▶ Mark the sample with critical identifiers (date, time and sensor number) to ensure traceability.
- ▶ Carry out a laboratory analysis to obtain reference values.
- ▶ Insert the reference data into the journal to create/update the calibration model.

For additional instructions, consult the *SX-Suite User Manual* and *SX-Plus User Manual*, which provide comprehensive guidelines for journal management, calibration practices, and specific instructions for data entry.

## 7 Cleaning and servicing



### NOTE

- ▶ Carry out only the service and cleaning operations described in this section.
- ▶ Do not carry out any servicing and cleaning operations that involve opening the housing.
- ▶ Use only genuine BUCHI spare parts in order to ensure correct operation and preserve the warranty.
- ▶ Carry out the service and cleaning operations described in this section to extend the lifetime of the instrument.

### 7.1 Notes on servicing



### NOTICE

#### Risk of property damage due to failure to remove dust from heat sink

If dust is not cleaned off the heat sink it may cause the sensor to fail.

- ▶ Make sure that the layer of dust is no thicker than 5 mm.

### 7.2 Regular maintenance work

| Component       | Action                                                                                             | Interval |
|-----------------|----------------------------------------------------------------------------------------------------|----------|
| Casing          | ▶ Wipe down the casing with a damp cloth.                                                          | Weekly   |
| Warning symbols | ▶ Check that the warning symbols on the sensor are legible.<br>▶ If they are dirty, clean them.    | Weekly   |
| Optics          | <b>NOTICE! Have operation carried out by BUCHI service technician</b><br>▶ Replace lamps.          | Annually |
| Casing          | <b>NOTICE! Have operation carried out by BUCHI service technician</b><br>▶ Check and replace seals | Annually |

## 8 Taking out of service and disposal

### 8.1 Disposal

The operator is responsible for proper disposal of the instrument.

- ▶ When disposing the equipment observe the local regulations and statutory requirements regarding waste disposal.
- ▶ When disposing, observe the disposal regulations of the materials used. For the used materials see Chapter 3.6 “Technical data”, page 15 or the material labeling on the parts.

### 8.2 Returning the instrument

Before returning the instrument, contact the BÜCHI Labortechnik AG Service Department.

<https://www.buchi.com/support/contact>

## 9 Appendix

### 9.1 Certificates

#### 9.1.1 ATEX certificate


**NOTE**

Labeling

Instruments without  mark.

- Instruments without ATEX mark are not suitable for ATEX operation. See Chapter 3.5 “ATEX rating”, page 15

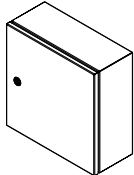
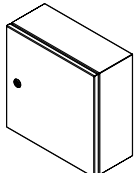
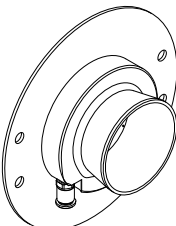
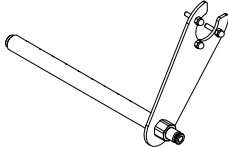
### 9.2 Spare parts and accessories

Use only genuine BUCHI consumables and spare parts in order to ensure correct, safe and reliable operation of the system.


**NOTE**

Any modifications of spare parts or assemblies are only allowed with the prior written permission of BUCHI.

#### 9.2.1 Accessories

| Description                  | Order no. | Image                                                                                 |
|------------------------------|-----------|---------------------------------------------------------------------------------------|
| Installation Box Standard    | 11060744  |  |
| Installation Box Standard EB | 11063054  |  |
| Purge Adapter                | 11085208  |  |
| Air Cooler                   | 11085413  |  |



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