

Short Form Manual
HASX2E-SFM-HS
10/2012

XSTREAM[®]

Gas Analyzers X-STREAM X2 Series Short Form Manual



ROSEMOUNT[®]
Analytical

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Process Management

ESSENTIAL INSTRUCTIONS

READ THIS PAGE BEFORE PROCEEDING!

Emerson Process Management (Rosemount Analytical) designs, manufactures and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you **MUST properly install, use, and maintain them** to ensure they continue to operate within their normal specifications. The following instructions **MUST be adhered to** and integrated into your safety program when installing, using and maintaining Emerson Process Management (Rosemount Analytical) products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- **Read all instructions** prior to installing, operating, and servicing the product.
- If you do not understand any of the instructions, **contact your Emerson Process Management (Rosemount Analytical) representative** for clarification.
- **Follow all warnings, cautions, and instructions** marked on and supplied with the product.
- **Inform and educate your personnel in the proper installation, operation, and maintenance of the product.**
- **Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes.** Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, **use qualified personnel** to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Emerson Process Management (Rosemount Analytical). Unauthorized parts and procedures can affect the product's performance, place the safe operation of your process at risk, **and VOID YOUR WARRANTY**. Look-alike substitutions may result in fire, electrical hazards, or improper operation.
- **Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.**

The information contained in this document is subject to change without notice.

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INTRODUCTION

The instruction manual contains information about the installation and startup of the X-STREAM® X2 series gas analyzers.

The manual covers several X-STREAM X2 analyzer models and so many contain information about configurations and/or options not applicable to your analyzer.

The installation and operation of units for use in explosive environments is **NOT COVERED** in this manual!

Analyzers intended to be used in such environments are supplied with further instruction manuals, which must be consulted in addition to the X-STREAM X2 series instruction manual.

DEFINITIONS

The following definitions explain the use of the terms **WARNING**, **CAUTION** and **NOTE** in this manual.

WARNING

Indicates an operational or maintenance procedure, a process, a condition, an instruction, etc.

Failure to comply may result in injury, death or permanent health risk.

CAUTION

Indicates an operational or maintenance procedure, a process, a condition, an instruction, etc.

Failure to comply may result in damage to or destruction of the instrument, or impaired performance.

NOTE!

Indicates an imperative operational procedure, or an important condition or instruction.

TERMS USED IN THIS MANUAL

Explosive Gas(es)

Flammable Gases and gas mixtures in a mixture with air within the explosive limits.

Flammable Gas(es)

Gases and gas mixtures are assigned to be flammable if they might become ignitable when in a mixture with air.

Infallible Containment

This term is derived from the standards of explosion protection especially from the requirements for pressurized housings: thus an infallible containment can be characterized by no intended leakage into the gas paths enabling gas to enter the inner compartment of the analyzer housing.

Intrinsically Safe Cell (IS Cell)

Cells supplied with an intrinsically safe power signal, approved by a Test Institute, to operate with explosive gases.

The design ensures the IS cells remains safe even in case of failure and explosive gases are not ignited.

Lower Explosion Limit (LEL)

Volume ratio of flammable gas in air below which an explosive gas atmosphere will not be formed: the mixture of gas and air lacks sufficient fuel (gas) to burn.

NAMUR

NAMUR is an international user association of automation technology in process industries. This organisation has issued experience reports and working documents, called recommendations (NE) and worksheets (NA).

Protection Class IP66 / NEMA 4X

Both terms are used to specify conditions for equipment to be installed outdoor.

IP stands for Ingress Protection, the first number specifies protection against solid objects (**6. = dust tight**) while the second number specifies the degree of protection against liquids (**.6 = heavy seas**).

NEMA stands for National Electrical Manufacturers Association. **4X** specifies a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice on the enclosure





Upper Explosion Limit (UEL)

Volume ratio of flammable gas in air above which an explosive gas atmosphere will not be formed: the mixture of gas and air is too rich in fuel (deficient in oxygen) to burn.

SYMBOLS USED ON AND INSIDE THE EQUIPMENT

Wherever one or more of the following symbols appear on or inside the instrument, be careful and read the instructions given in the accompanying manuals!











Strictly observe the given warnings, instructions and information to minimize hazards!

This symbol at the instrument means
	<p>dangerous voltages may be accessible. Removing covers is permitted only, if the instrument is disconnected from power - and even in this case by qualified personnel only!</p>
	<p>hot surfaces may be accessible. Removing covers by qualified personnel is permitted only, if the instrument is disconnected from power. Nevertheless several surfaces may remain hot for a limited time.</p>
	<p>more detailed information available: see instruction manual before proceeding!</p>
	<p>more detailed information available: see instruction manual before proceeding!</p>

SYMBOLS USED IN THIS MANUAL

Where one or more of the following symbols appear within this manual, carefully read the related information and instructions!

Strictly observe the given warnings, instructions and information to minimize hazards!

This symbol used in the manual means
	dangerous voltages may be exposed
	hot surfaces may be exposed
	possible danger of explosion
	toxic substances may be present
	substances harmful to health may be present
	indicates notes relating to heavy instruments
	electrical components may be destroyed by electrostatic discharges
	units must be disconnected from the power source
	indicates special instructions or information for operation at low temperatures .
	indicates basic conditions or procedures are being described. This symbol may also indicate information important for achieving accurate measurements.

SAFETY INSTRUCTIONS

INTENDED USE STATEMENT

X-STREAM series gas analyzers are intended to be used as analyzers for industrial purposes. They must not be used in medical, diagnostic or life support applications nor as safety devices.

Using X-STREAM X2 analyzers as safety devices, requiring redundant design or SIL classification, is also not permitted.

No independent agency certifications or approvals are to be implied as covering such applications!

GENERAL SAFETY NOTICE / RESIDUAL RISK

If this equipment is used in a manner not specified in these instructions, protective systems may be impaired.

Despite of incoming goods inspections, production control, routine tests and application of state-of-the-art measuring and test methods, an element of risk remains when operating a gas analyzer!

Even when operated as intended and observing all applicable safety instructions some residual risks remain, including, but not limited to, the following:

- An interruption of the protective earth line, e.g. in an extension cable, may result in risk to the user.
- Live parts are accessible when operating the instrument with doors open or covers removed.
- The emission of gases hazardous to health may even be possible when all gas connections have been correctly made.

Avoid exposure to the dangers of these residual risks by taking particular care when installing, operating, maintaining and servicing the analyzer.

ADDITIONAL LITERATURE

This manual deals with instructions on how to safely install and startup X-STREAM X2 series analyzers, intended to be operated in general purpose (safe) areas, only.

DO NOT use this manual for instruments to be installed in hazardous areas!

For comprehensive information on operating and maintain/service the instrument in a safe manner it is **MANDATORY** to read all additional instruction manuals, if not provided as printed version, see the accompanying USB stick for an electronic version (PDF)!

The following additional instruction manuals are available or referenced within this manual:

HASX2E-IM-HS X-STREAM X2 series instruction manual

HASICx-IM-H Infallible containment instruction manual

Contact your local service center or sales office when missing documents.

SAVE ALL INSTRUCTIONS FOR FUTURE USE!

Safety Instructions

AUTHORIZED PERSONNEL

In-depth specialist knowledge is an absolutely necessary condition for working with and on the analyzer.

Authorized personnel for installing, operating, servicing and maintaining the analyzer are instructed and trained qualified personnel of the operating company and the manufacturer.

It is the responsibility of the operating company to

- train staff,
- observe safety regulations,
- follow the instruction manual.

Operators must

- have been trained,
- have read and understood all relevant sections of the instruction manual before commencing work,
- know the safety mechanisms and regulations.

To avoid personal injury and loss of property, do not install, operate, maintain or service this instrument before reading and understanding this instruction manual and receiving appropriate training.

Safety Instructions

INSTALLING AND CONNECTING THIS ANALYZER

The following notices should be carefully followed to ensure compliance with the **low voltage directive (Europe) and other applicable regulations**.

1. Suitable grounding connections should be made at all connectors provided for this purpose.
2. All safety covers and grounding connections must be properly reinstated after maintenance work or troubleshooting.
3. A fuse should be provided at the installation site which will completely disconnect the unit in case of failure. Installing an isolating switch may also be beneficial. In either case, these components must be constructed to conform to recognised norms.

OPERATING AND MAINTAINING THIS ANALYZER

On leaving our factory, this instrument conformed to all applicable safety directives.

In order to preserve this state of affairs, the operator must take care to follow all the instructions and notes given in this manual and on the unit.

Before switching on the unit, ensure that the local nominal mains voltage corresponds to the factory-set operational voltage of this unit.

Any interruption of the protective earth connections, whether inside or outside of the unit, may result in exposure to the risk of electricity. Deliberately disconnected the protective earth is therefore strictly forbidden.

Removing covers may expose components conducting electric current. Connectors may also be energised. The unit should therefore be disconnected from the power supply before any kind of maintenance, repair or calibration work requiring access to the inside of the unit. Only trained personnel who are aware of the risk involved may work on an open and

energized unit.

Fuses may only be replaced by fuses of an identical type and with identical ratings. It is forbidden to use repair fuses or to bypass fuses.

Take note of all applicable regulations when using this unit with an autotransformer or a variable transformer.

Substances hazardous to health may escape from the unit's gas outlet. This may require additional steps to be taken to guarantee the safety of operating staff.

Safety Instructions

WARNING

EXPLOSION HAZARD



The units described in this manual may not be used in explosive atmospheres without additional safety measures.



WARNING

ELECTRICAL SHOCK HAZARD



Do not operate without covers secure. Do not open while energized. Installation requires access to live parts which can cause death or serious injury.



For safety and proper performance this instrument must be connected to a properly grounded three-wire source of power.

WARNING


TOXIC GASES



This unit's exhaust may contain toxic gases such as (but not limited to) e.g. sulfur dioxide. These gases can cause serious injuries. Avoid inhaling exhaust gases.



Connect the exhaust pipe to a suitable flue and inspect the pipes regularly for leaks.

All connections must be airtight to avoid leaks:  page 3-2 for instructions on performing a leak test.

CAUTION

HIGH TEMPERATURES



Hot parts may be exposed when working on photometers and/or heated components in the unit.

Safety Instructions

CAUTION

HEAVY INSTRUMENT

The field housing variations intended for outside and wall mounted use weigh between 26 kg (57 lb) and 63 kg (139 lb) depending on variation and options installed.



Two people and/or lifting equipment is required to lift and carry these units.

Take care to use anchors and bolts specified to be used for the weight of the units!

Take care the wall or stand the unit is intended to be installed at is solid and stable to support the weight!

CAUTION

CRUSHING HAZARD



Take care of crushing hazard when closing the front door of analyzer field housings!

Keep out of the closing area between enclosure cover and base!

CAUTION

OPERATION AT LOW TEMPERATURES



When operating an instrument at temperatures below 0 °C (32 °F), do NOT apply gas nor operate the internal pump before the warmup time has elapsed!

Violation may result in condensation inside the gas paths or damaged pump diaphragm!

CAUTION

HIGH TEMPERATURES



Hot parts may be exposed when working on photometers and/or heated components in the unit.

Safety Instructions

GASES AND PREPARATION OF GASES

WARNING

GASES HAZARDOUS TO HEALTH



Follow the safety precautions for all gases (sample and span gases) and gas cylinders.



Before opening the gas lines, they must be purged with air or neutral gas (N₂) to avoid danger from escaping toxic, flammable, explosive or hazardous gases.

WARNING

FLAMMABLE OR EXPLOSIVE GASES



When supplying flammable gases with concentrations of more than ¼ of the lower explosion limit, we RECOMMEND implementing one or more additional safety measures:

- purging the unit with inert gas
- stainless steel internal pipes
- flame arrestors on gas inlets and outlets
- inherently safe or failsafe measuring cells

Safety Instructions

Power supply

WARNING

CONNECTING UNITS FOR PERMANENT INSTALLATION



Only qualified personnel following all applicable and legal regulations may install the unit and connect it to power and signal cables. Failure to comply may invalidate the unit's warranty and cause exposure to the risk of damage, injury or death.



This unit may only be installed by qualified personnel familiar with the possible risks.



Working on units equipped with screw-type terminals for electrical connections may require the exposure of energized components.

Wall-mounted units have no power switch and are operational when connected to a power supply. The operating company is therefore required to have a power switch or circuit breaker (as per IEC 60947-1/-3) available on the premises. This must be installed near the unit, easily accessible to operators and labelled as a power cut-off for the analyzer.

CAUTION

HAZARD FROM WRONG SUPPLY VOLTAGE



Ensure that the local power voltage where the unit is to be installed, corresponds to the unit's nominal voltage as given on the name plate label.

CAUTION

ADDITIONAL NOTES FOR UNITS WITH SCREW-TYPE TERMINALS



Cables for external data processing must be double-insulated against mains power.

If this is not possible, cables must be laid in such a way as to guarantee a clearance of at least 5 mm from power cables. This clearance must be permanently secured (e.g. with cable ties)

General operating notes

GENERAL OPERATING NOTES

**WARNING****HAZARD TO LIFE AND EXPLOSION HAZARD BY EXHAUST GASES**

Exhaust gases may contain hydrocarbons and other toxic gases such as carbon monoxide. Carbon monoxide is toxic.



Faulty gas connections may lead to explosion and death.

Ensure that all gas connections are connected as labelled and airtight.

- The unit must be installed in a clean and dry area protected from strong vibrations and frost.
- The unit must not be exposed to direct sunlight and sources of heat. Admissible ambient temperatures (see technical details) must be adhered to.
- Gas inlets and outlets must not be interchanged. All gases must be supplied to the unit already processed. When using this unit with corrosive sample gases, ensure that these gases do not contain components harmful to the gas lines.
- Admissible gas pressure for sample and test gases is 1500 hPa.
- Exhaust lines must be laid inclined downwards, depressurized, protected from frost and according to applicable regulations.
- If it is necessary to disconnect the gas lines, the unit's gas connectors must be sealed with PVC caps to avoid polluting the internal gas lines with condensate, dust, etc.
- To ensure electromagnetic compatibility (EMC), only shielded cables (supplied by us on request, or of equivalent standard) may be used. The customer must ensure that the shielding is correctly fitted. Shielding and terminal housing must be electrically connected; submin-D plugs and sockets must be screwed to the unit.
- When using optional external adapters (submin-D to screw-type terminal), protection from electromagnetic interference can no longer be guaranteed (CE compliance pursuant to EMC guidelines). In this case the customer or operating company functions as a maker of a system and must therefore ensure and declare compliance with EMC guidelines.

Chapter 1 Technical description

The following are the main features of the Emerson Process Management X-STREAM X2 gas analyzers in brief:

- compact design with easily accessible internal components
- customizable for a wide range of applications: different housings are available while internal construction remains largely identical
- multilingual microprocessor-controlled user interface with liquid crystal (LCD) or vacuum fluorescent display (VFD) to indicate measurement value and status messages
- units for outdoor use are optionally supplied with an impact tested front panel
- widerange power supply unit for worldwide use without modification ($\frac{1}{2}$ 19in units with internal or external PSUs)

X-STREAM X2 gas analyzers can measure up to four different gas components using any combination of the following analyzing techniques (restrictions apply to $\frac{1}{2}$ 19in units):

IR = non-dispersive infrared analysis

UV = ultraviolet analysis

pO₂ = paramagnetic oxygen analysis

eO₂ = electrochemical oxygen analysis

tO₂ = trace oxygen analysis

TCD = thermal conductivity analysis

tH₂O = trace moisture measurement

Modified resistant measuring cells are available for use with corrosive gases and/or gases containing solvents.

Special configurations (e.g. intrinsically safe or infallible measuring cells) for the analysis of combustible gases are also available.

WARNING

EXPLOSION HAZARD



X-STREAM X2 analyzers MUST NOT be used in explosive environments (hazardous areas) without additional safety features.

This instruction manual does NOT describe the special conditions necessary to operate gas analyzers in hazardous areas.

Please refer to the separate instruction manual, supplied with units for use in hazardous areas.

X-STREAM X2

1.1 Overview

1.1 Overview

1.1.1 Housings


Different housings allow X-STREAM analyzers to be tailored to many different applications:

- Tabletop units in ½19in modular design, with IP 20 protection class. Can be installed into a rack or used as a table top instrument. Optionally featuring a handle enabling mobile measurements at different sampling points.
- Tabletop and rack mountable units in 19in modular design, with IP 20 protection class.
- Stainless steel wall mountable field housing with IP 66 / NEMA 4X protection class enables outdoor use (operating temperature -20°C to +50°C).
- Cast aluminium wall mountable field housing with IP 66 / NEMA 4X protection class for outdoor use (operating temperature -20 °C to +50 °C). Specially designed to meet hazardous area certifications, but also suitable for non-hazardous locations with requirements for robust designed equipment.

1.1.2 The Front Panel / User Interface

All X-STREAM X2 gas analyzers feature an easy-to-use LCD alphanumeric user interface, which displays measurement values, status and error messages, and menus for the input of parameters.

All analyzer types also feature three LEDs on the front panel which display status information in addition to the plain text messages.

The colors of the LEDs are based on the NAMUR NE 44 specifications. The LEDs are activated in accordance with the NE 107 standards, and indicate “Failure”, “Function check”, “Out of specification” and “Maintenance request”. For further information, see  X-STREAM X2 instruction manual, chapter 8.

The analyzer software is operated by means of only six keys.

For ease of use, during operation the user can select one of three languages for the display. Beside the preselected languages English and German, a third language can be selected at time of ordering the instrument: French, Italian, Portuguese or Spanish).

Wall-mounted units can alternatively, be fitted with a vacuum fluorescent display, increasing legibility in brighter environments. Their display is protected with an impact tested glass panel.

1.1 Overview

- 1 4x20 character alphanumeric display
- 2 LED (red)
- 3 LED (red)
- 4 LED (green)
- 5 "Measure" key
- 6 "Enter" key
- 7 4 keys for settings and menu navigation

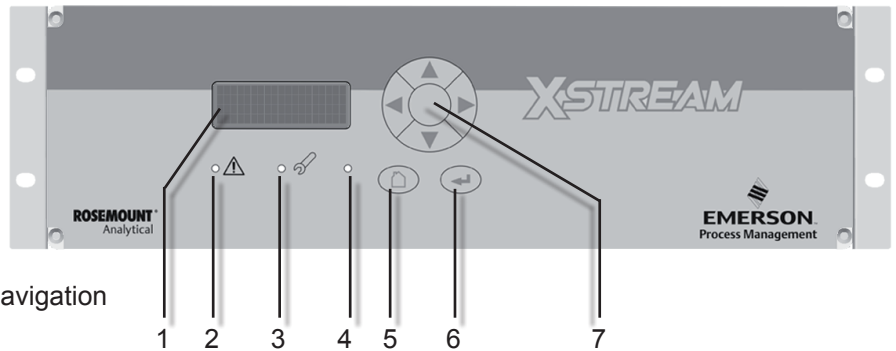


Fig. 1-1: X-STREAM front panel (here the X-STREAM X2GP)

1.1.3 Interfaces

All analyzer variations are fitted with one analog electrical output for each channel and four status relays as standard.

As an option, further interfaces can be added:

- additional analog outputs
- additional relay outputs
- digital inputs
- Modbus Ethernet
- Modbus serial

Depending on the unit configuration, the interfaces are accessible via either SubminD connectors or screw terminals.

X-STREAM X2

1.2 Comparison of Analyzer Models

1.2 Comparison of the Various X-STREAM Analyzer Models

X-STREAM X2GK



X-STREAM X2GP



<p>1/2 19 in housing, table-top or rackmountable, optional with carrying handle protection type: IP 20</p>
<p>Internal wide range power supply, or 24V input with external power supply unit</p>
<p>Max. 3 channels in many combinations max. 8 gas connections, including 1 optional purge gas connection</p>
<p>Options for gas lines: Valve block, sample gas pump, flow sensor, pressure sensor, infallible gas lines</p>
<p>1–4 analog outputs, 4 relay outputs optional: 1 interface card with 7 digital inputs and 9 digital outputs 1 Modbus interface (serial or Ethernet) electrical interfaces accessible via sockets on back of unit)</p>
<p>LCD</p>
<p>Operational ambient temperature^{?)}: 0 °C to +50 °C (32 °F to 122 °F)</p>
<p>Available w/o front plate controls as module XCC</p>
<p>Size: (DxHxW): max. ca. 460x128.7x213 mm Weight: ca. 8–12 kg (17.6–26.5 lb)</p>

<p>1/2 19 in housing, table-top or rackmountable, protection type: IP 20</p>
<p>Internal wide range power supply unit</p>
<p>Max. 4 channels in any combination max. 8 gas connections, 1 optional extra connection for purge gas</p>
<p>Options for gas lines: Flow sensor, pressure sensor, heating for physical components, sample gas pump, 1 or 2 valve blocks, infallible gas lines</p>
<p>1–4 analog outputs, 4 relay outputs optional: 1 or 2 interface cards, each with 7 digital inputs and 9 digital outputs 1 Modbus interface (serial or Ethernet) electrical interfaces accessible via sockets on back of unit, optionally: screw-type terminal adapters (except for Ethernet)</p>
<p>LCD</p>
<p>Operational ambient temperature^{?)}: 0 °C to +50 °C (32 °F to 122 °F)</p>
<p>Available w/o front plate controls as module XCA</p>
<p>Size: (DxHxW): max. ca. 411x133x482 mm Weight: ca. 11–16 kg (24–35 lb)</p>

^{?)}: Limitations apply to selected measurement principles and ranges,

 Measurement specifications!

1.2 Comparison of Analyzer Models

X-STREAM X2XF



X-STREAM X2FD



<p>Stainless steel wallmountable field housing, protection type: IP66 / NEMA 4X Single (XLF) or dual (XXF) compartment design</p>
<p>Internal wide range power supply unit</p>
<p>Max. 4 channels in any combination max. 8 gas connections, <i>1 optional extra connection for purge gas</i></p>
<p><i>Options for gas lines: Flow sensor, pressure sensor, heating for physical components, sample gas pump, 1 or 2 valve blocks, infallible gas lines</i></p>
<p>1–4 analog outputs, 4 relay outputs <i>optional:</i> <i>1 or 2 interface cards, each with 7 digital inputs and 9 digital outputs</i> <i>1 Modbus interface (serial or Ethernet)</i> electrical interfaces on internal screw-type terminal adapters (except for Ethernet)</p>
<p>LCD, <i>optionally: vacuum fluorescent display, impact tested front panel</i></p>
<p>Operational ambient temperature^{*)}: -20 °C to +50 °C (-4 °F to 122 °F)</p>
<p>Models available for use in explosive environments</p>
<p>Size: (DxHxW): ca. 265x400 (815)x550 mm Weight: max. ca. 26/45 kg (57 lb)</p>

<p>Cast aluminium wallmountable field housing, protection type: IP66 / NEMA 4X</p>
<p>Internal wide range power supply unit</p>
<p>Max. 4 channels in any combination max. 8 gas connections, <i>including 1 optional purge gas connection</i></p>
<p><i>Options for gas lines: Flow sensor, pressure sensor, heating for physical components, sample gas pump, 1 or 2 valve blocks, infallible gas lines</i></p>
<p>1–4 analog outputs, 4 relay outputs <i>optional:</i> <i>1 or 2 interface cards, each with 7 digital inputs and 9 digital outputs</i> <i>1 Modbus interface (serial or Ethernet)</i> electrical interfaces on internal screw-type terminal adapters (except for Ethernet)</p>
<p>LCD, impact tested front panel <i>optionally: vacuum fluorescent display</i></p>
<p>Operational ambient temperature^{*)}: -20 °C to +50 °C (-4 °F to 122 °F)</p>
<p>Flameproof enclosure: approved for use in explosive areas</p>
<p>Size: (DxHxW): max. ca. 222x512x578 mm Weight: max. ca. 63 kg (138.5 lb)</p>
<p>This model is not covered by this manual! See the separate X-STREAM Ex d manual for hazardous area applications!</p>

X-STREAM X2

1.3 X-STREAM X2GK


1.3 X-STREAM X2GK: ½ 19 Inch Table-Top Unit

This compact model for general purposes can be fitted with up to three measurement channels in various combinations. Power is supplied by an internal wide range power supply or a separate external power supply unit. By default the units are configured for tabletop use. A carrying handle is optional available which makes it easy to take the instrument to varying sampling points. For rack mounting a X2GK is fixed by screws located at the front panel.

Connection to power supply

AC is supplied by an IEC chassis plug with power switch and fuse holders. The internal wide range power supply unit enables the analyzers to be used worldwide. Optionally DC 24 V power is supplied via a 3-pin socket at the rear of the unit.

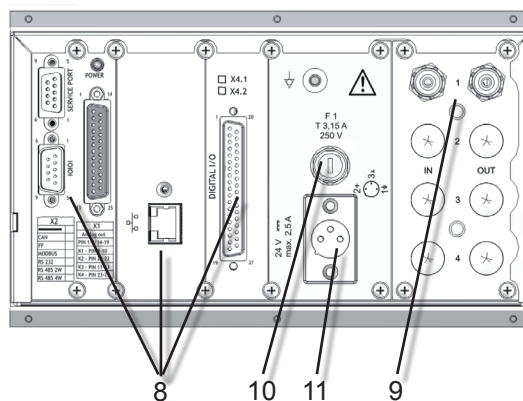
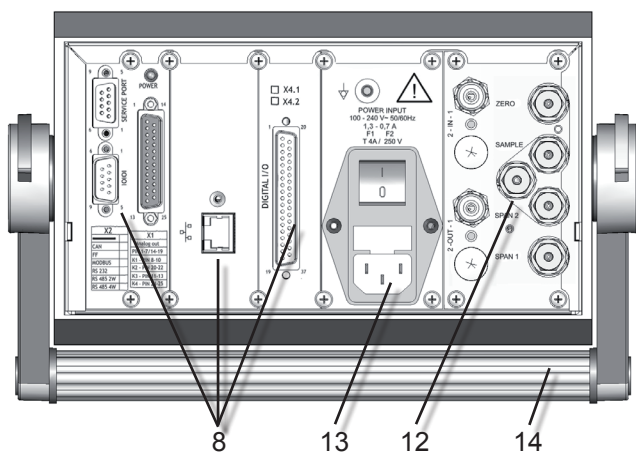
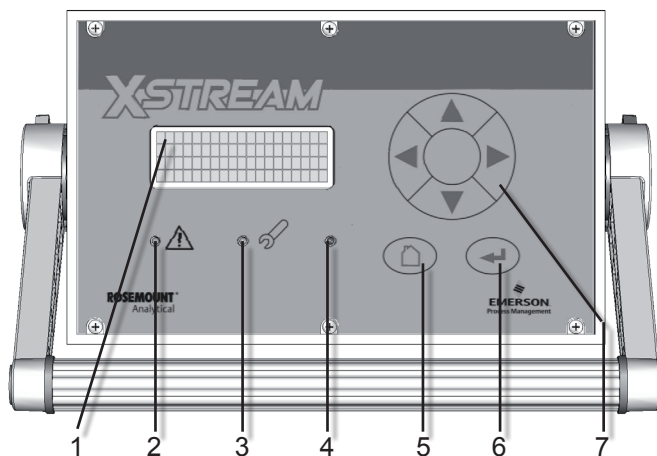
Interfaces

Electrical connections for interface signals are provided via submin-D and Ethernet connectors mounted on the rear panel of the device ( Fig. 1-2).

Gas connections

Depending on the configuration of the unit (number of measurement channels and serial or parallel connection), sample and calibration gases are fed into the unit via up to 8 tube fittings mounted on the rear panel. Any free tube fittings can be used for purging the device to minimize interference from the ambient atmosphere, or when measuring corrosive and/or flammable gases.

1.3 X-STREAM X2GK



Note!
 Figures show optional components!

- 1 4x20 character alphanumeric display
- 2 LED (red)
- 3 LED (red)
- 4 LED (green)
- 5 "Measure" key
- 6 "Enter" key
- 7 4 keys for adjustment and menu selection

- 8 Signal connectors (some optional)
- 9 Gas fittings
- 10 DC power input fuse
- 11 DC power input
- 12 Valve block
- 13 AC power input with integral fuses and switch
- 14 Carrying handle

Fig. 1-2: X-STREAM X2GK

1.4 X-STREAM X2GP

1.4 X-STREAM X2GP: 19 Inch Table-Top or Rackmount Design

This model can be fitted with up to four measurement channels in any combination. The physical components can optionally be encased in a cover. This area can be held at a specific temperature of up to 60 °C to minimize interference from changes in external temperature.

Units configured for rack mounting can be converted for tabletop use by removing the lateral mounting brackets and attaching the four feet supplied as accessories.

Connection to power supply

Main power is supplied via the IEC chassis plug mounted on the rear panel, with integrated power switch and fuse holders. The internal wide range power supply unit enables the analyzers to be used worldwide.

Interfaces

Electrical connections for interface signals are provided via submin-D connectors mounted on the rear panel of the device (👉 Fig. 1-3).

For applications where screw-type terminals are preferred, optional adapters are available, which are mounted directly onto the submin-D connectors.

Up to two digital I/O cards may be installed.

Gas connections

Depending on the configuration of the unit (number of measurement channels and serial or parallel connection), sample and calibration gases are fed into the unit via up to 8 threaded connectors mounted on the rear panel. The configuration of the connectors is indicated on an adhesive label located near the connectors.

A further optional tube fitting enables the housing to be purged to minimize interference

from the ambient atmosphere, or when measuring corrosive and/or flammable gases.

1.4 X-STREAM X2GP

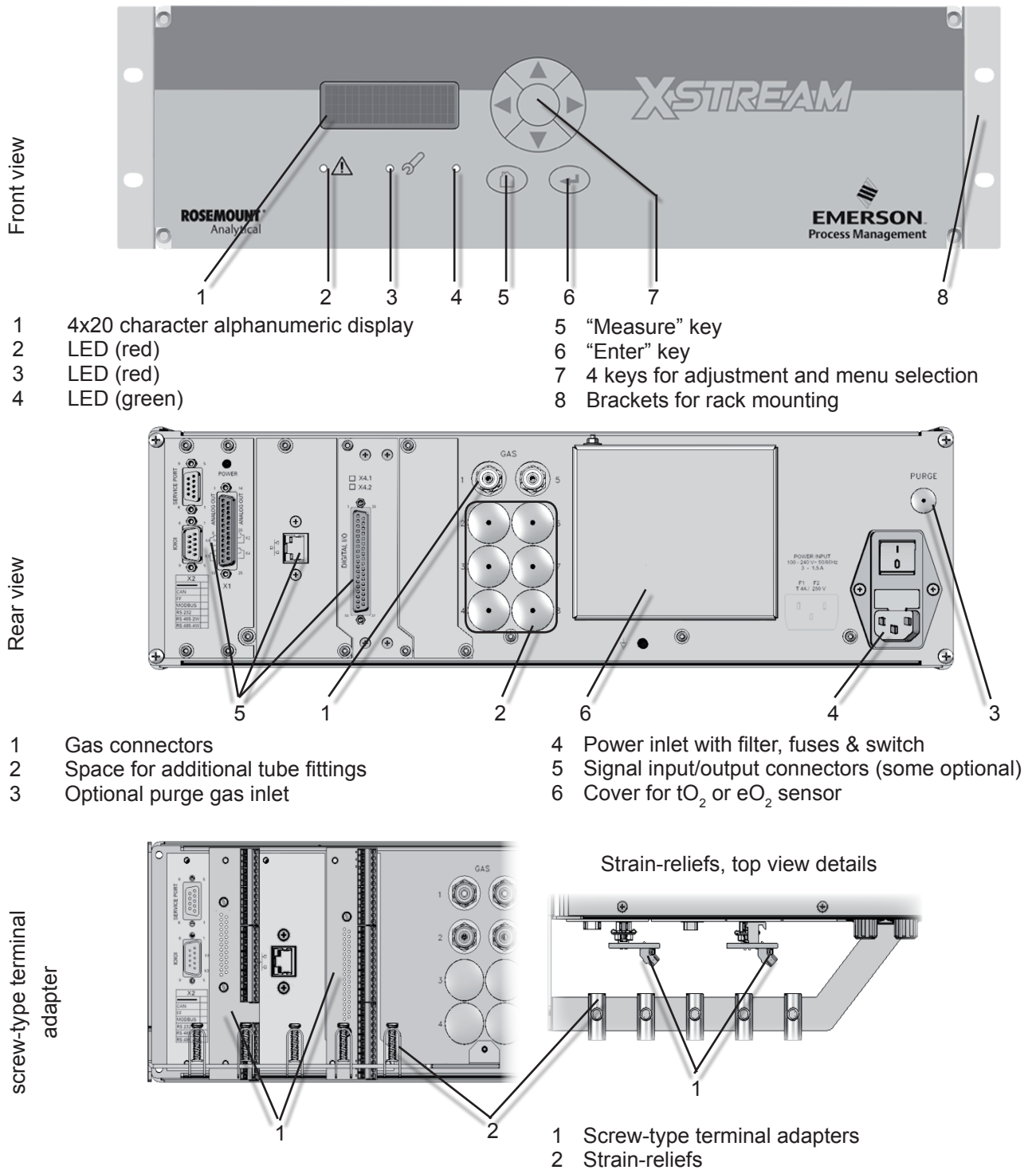


Fig. 1-3: X-STREAM X2GP - Details

X-STREAM X2

1.5 X-STREAM X2XF Field Housings

1.5 X-STREAM X2XF: Field Housing With Single (XLF) or Dual (XXF) Compartment

The field housing model is conceived for outdoor use and wall-mounting. The coated stainless steel housing has a protection class rated IP66 / NEMA Type 4X, offering protection against water and dust entering the device:

IPx6: In case of occasional flooding, e.g. heavy seas, water shall not enter in harmful quantities


IP6x: Protection against penetration by dust. Live or internal moving parts are completely protected.

An X-STREAM field housing can be fitted with up to four measurement channels in any combination. The physical components can optionally be encased in a cover. This separate volume can be held at a specific temperature of up to 60 °C to minimize interference from changes in external temperature.

Front panel

The analyzer's display is covered by an impact tested glass for enhanced protection against breakage in harsh environments.

Electrical connections

Electrical connections are provided via internal tube fittings, the cables being fed through cable glands at the right side of the unit ( Fig. 1-5). The front cover of the housing swings open to the left once the fasteners have been released.

Connection to power supply

Mains power is supplied via screw-type terminals with integrated fuse holders at the right side of the housing, near the front. The internal wide range power supply unit allows the analyzers to be used worldwide.

Interface signals

Up to two digital I/O cards may be installed. If so, on a label nearby, they are labeled "X4.1" for the first I/O board, and "X4.2" for the second.

Gas connections

Sample and calibration gases are supplied via up to eight fittings, located at the bottom side of the enclosure. The assignment is given on a label nearby.

An additional fittings enables purging the enclosure to minimize cross interference by ambient air, or as a protective measure when analyzing corrosive or flammable gases.

1.5 X-STREAM X2XF Field Housings

Dual compartment version XXF

The dual compartment field housing XXF not only provides more space for additional internal components, such as signal converters, etc, but also gives the option to separate the physics from the electronics: Physics is installed into the lower compartment, electronics into the upper. Also, the separation can be gas tight, e. g. for measuring corrosive gases.

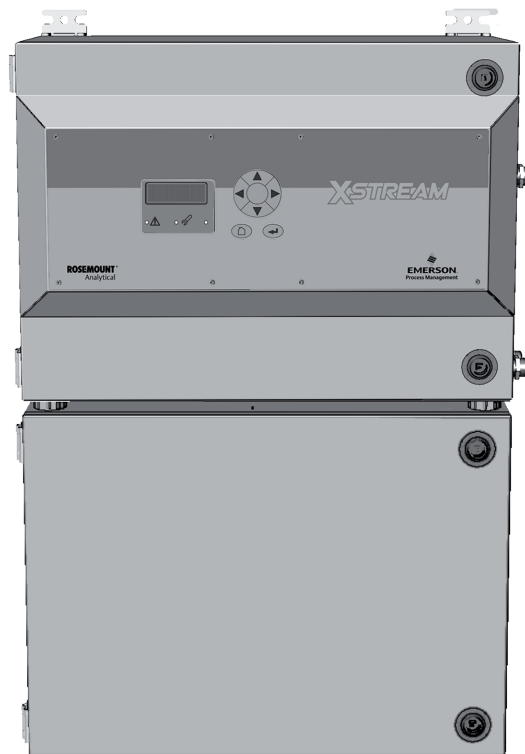
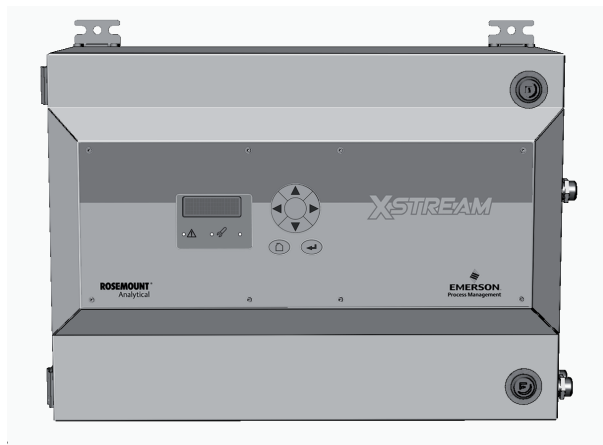


Fig. 1-4: X-STREAM XLF / XXF- Front views

CAUTION

HEAVY INSTRUMENT

The X-STREAM field housing, intended for outside and wall mounted use, weighs approx. 26 kg/57 lb (XLF) or 45 kg/99 lb (XXF), depending on options installed.

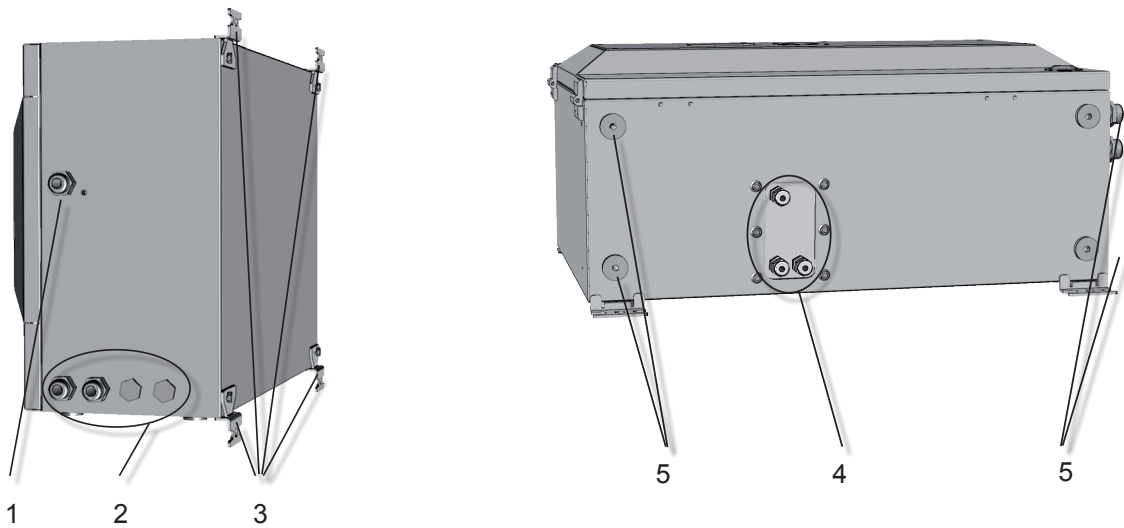


Two people and/or lifting equipment is required to lift and carry these units.

Take care to use anchors and bolts specified to be used for the weight of the units!

Take care the wall or stand the unit is intended to be installed at is solid and stable to support the weight!

1.5 X-STREAM X2XF Field Housings



- 1 Cable gland for power cable
- 2 Cable glands for signal cables
- 3 4 brackets for wall-mounting
- 4 Gas in- & outlets (max. 8)
- 5 Cutouts, to combine 2 housings (here closed)

Note!
In case of XXF, the cable glands are located at the upper compartment, while the gas in- & outlets are at the bottom side of the lower compartment.
Also only 2 brackets are at each compartment.

Fig. 1-5: X-STREAM XLF - Side and Bottom View

Note!
In case of XXF, the terminals and connectors are located at the upper compartment, while physical components and gas fittings are in the lower compartment.

- 1 Screw-type terminals for signal cables
- 2 Power line filter
- 3 Cable glands
- 4 Power supply terminals with integrated fuses
- 5 Ethernet connector (option)

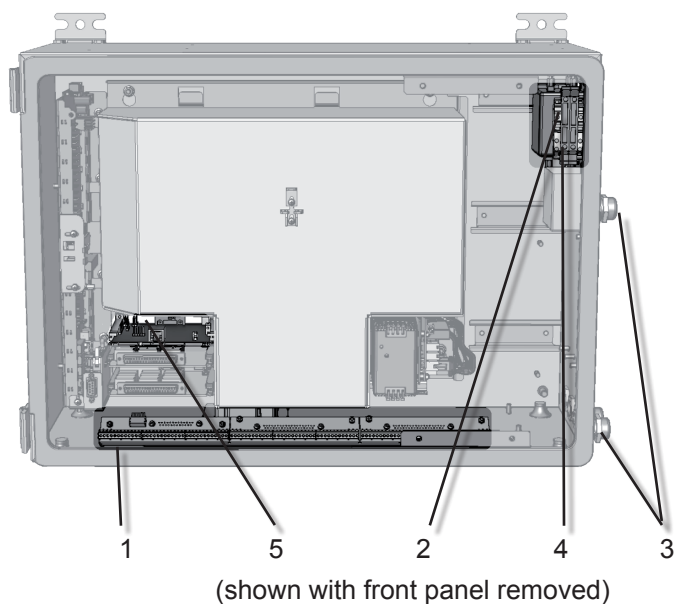


Fig. 1-6: X-STREAM XLF - Power Supply and signal terminals

1.5 X-STREAM X2XF Field Housings

1.5.1 X2XF Field Housings for Installation in Hazardous Areas (Ex-Zones)

WARNING

EXPLOSION HAZARD BY MISSING PROTECTIVE MEASURES



X-STREAM XLF and XXF models MUST not be used in explosive environments (hazardous areas) without additional safety features.

This instruction manual does NOT describe the special conditions necessary to operate gas analyzers in hazardous areas.

Please refer to the separate instruction manual supplied with units for use in hazardous areas.

Special X-STREAM X2XF field housing analyzer variations can be used in Ex-zones 1, 2 or Div 2:

X-STREAM XLFN/XXFN:

These analyzer variations feature a protection concept called "non-incendive" (Ex n), which means that non-sparking and non-arcing components, installed within a protecting enclosure, enable installation in an European Ex-zone 2 for measuring non-flammable gases. No further measures, such as a supply of protective gas, are necessary.

X-STREAM XLFS/XXFS:

Equipped with a simplified pressurization system, these field housings can be used to measure non-flammable gases in European Ex-zone 2. A protective gas (e.g. pressurized air) must be supplied when operating this model.

X-STREAM XLFZ/XXFZ:

Equipped with a simplified pressurization system (z-purge), these models can be used to measure non-flammable gases in American zone Div 2. A protective gas (e.g. pressurized air) must be supplied when operating this model.

Please contact your local EMERSON Process Management office if you require analyzers for use in hazardous areas.

1.6 Measurement Specifications

1.6 Measurement Specifications

Sample gas components and measuring ranges (standard configurations)

In total, more than 60 gases are detectable, so the following table gives an overview only. Consult with Emerson for gases / configurations not listed.

Not all data is applicable to all analyzer variations. The sample gas(es) and measuring ranges for your specific analyzer are given by the order acknowledgement and on the analyzer's name plate label.

Gas component		Principle	Special Specs or Conditions	Standard Specs (see Tab. 1-2 – 1-4)	
			Lowest Range	Lowest Range	Highest Range
Acetone ¹	CH ₃ COCH ₃	UV		0–400 ppm	0–3 %
Acetone ¹	CH ₃ COCH ₃	IR		0–500 ppm	0–3 %
Acetylene	C ₂ H ₂	IR		0–3 %	0–100 %
Ammonia	NH ₃	IR		0–100 ppm	0–100 %
Argon	Ar	TCD		0–50 %	0–100 %
Carbon dioxide	CO ₂	IR	0–5 ppm ⁵	0–50 ppm	0–100 %
Carbon monoxide	CO	IR	0–10 ppm ⁵	0–50 ppm	0–100 %
Chlorine	Cl ₂	UV		0–300 ppm	0–100 %
Ethane	C ₂ H ₆	IR		0–1000 ppm	0–100 %
Ethanol ¹	C ₂ H ₅ OH	IR		0–1000 ppm	0–10 %
Ethylene	C ₂ H ₄	IR		0–400 ppm	0–100 %
Helium	He	TCD		0–10 %	0–100 %
Hexane ¹	C ₆ H ₁₄	IR		0–100 ppm	0–10 %
Hydrogen ⁴	H ₂	TCD		0–1 %	0–100 %
Hydrogen Sulfide	H ₂ S	UV		0–2 %	0–10 %
Hydrogen Sulfide	H ₂ S	IR		0–10 %	0–100 %
Methane	CH ₄	IR		0–100 ppm	0–100 %
Methanol ¹	CH ₃ OH	IR		0–1000 ppm	0–10 %
n-Butane	C ₄ H ₁₀	IR		0–800 ppm	0–100 %
Nitrogen dioxide ¹	NO ₂	UV	0–25 ppm ³	0–50 ppm	0–10 %
Nitrogen monoxide	NO	IR		0–100 ppm	0–100 %
Nitrous oxide	N ₂ O	IR		0–100 ppm	0–100 %
Oxygen	O ₂	electrochem.		0–5 %	0–25 % ²
Oxygen	O ₂	paramagn.		0–1 %	0–100 %
Oxygen, Trace	O ₂	electrochem.		0–10 ppm	0–10 000 ppm
Propane	C ₃ H ₈	IR		0–1000 ppm	0–100 %
Propylene	C ₃ H ₆	IR		0–400 ppm	0–100 %
Sulfur dioxide	SO ₂	UV	0–25 ppm ³	0–50 ppm	0–1 %
Sulfur dioxide	SO ₂	IR		0–1 %	0–100 %
Sulfur hexafluoride	SF ₆	IR	0–5 ppm ³	0–20 ppm	0–2 %
Toluene ¹	C ₇ H ₈	UV		0–300 ppm	0–5 %
Vinyl chloride	C ₂ H ₃ Cl	IR		0–1000 ppm	0–2 %
Water vapor ¹	H ₂ O	IR		0–1000 ppm	0–8 %
Water vapor, Trace ¹	H ₂ O	capacitive		0–100 ppm	0–3000 ppm

¹ Dew point below ambient temperature

² Higher concentrations decrease sensor lifetime

³ Daily zero calibration required for ranges below lowest standard spec range

⁴ Special "refinery" application with 0–1% H₂ in N₂ available

⁵ see Tab. 1-5

Tab. 1-1: Gas Components and Measuring Ranges, Examples

1.6 Measurement Specifications

Measurement Performance Specifications

	NDIR/UV/VIS	Thermal Conductivity (TCD)
Detection limit (4σ) ^{1 4}	≤ 1 %	≤ 1 %
Linearity ^{1 4}	≤ 1 %	≤ 1 %
Zero-point drift ^{1 4}	≤ 2 % per week	≤ 2 % per week
Span (sensitivity) drift ^{1 4}	≤ 0.5 % per week	≤ 1 % per week
Repeatability ^{1 4}	≤ 1 %	≤ 1 %
Response time (t_{90}) ³	4 s ≤ t_{90} ≤ 7 s ⁵	15 s ≤ t_{90} ≤ 30 s ⁶
Permissible gas flow	0.2–1.5 l/min.	0.2–1.5 l/min. (± 0.1 l/min)
Influence of gas flow ^{1 4}	≤ 0.5 %	≤ 1 % ¹¹
Maximum gas pressure ^{8 14}	≤ 1500 hPa abs. (≤ 7 psig)	≤ 1500 hPa abs. (≤ 7 psig)
Influence of pressure ²		
– At constant temperature	≤ 0.10 % per hPa	≤ 0.10 % per hPa
– With pressure compensation ⁷	≤ 0.01 % per hPa	≤ 0.01 % per hPa
Permissible ambient temperature ⁹	0 (-20) to +50 °C (32 (-4) to 122 °F)	0 (-20) to +50 °C (32 (-4) to 122 °F)
Influence of temperature ^{1 13} (at constant pressure)		
– On zero point	≤ 1 % per 10 K	≤ 1 % per 10 K
– On span (sensitivity)	≤ 5 % (0 to +50 °C / 32 to 122 °F)	≤ 1 % per 10 K
Thermostat control ^{6 12}	none / 60 °C (140 °F) ⁵	none / 60 °C (140 °F) ¹⁰
Warm-up time ⁶	15 to 50 minutes ⁵	approx. 50 minutes

Note! 1 psi = 68.95 hPa

¹ Related to full scale
² Related to measuring value
³ From gas analyzer inlet at gas flow of 1.0 l/min (electronic damping = 0 s)
⁴ Constant pressure and temperature
⁵ Dependent on integrated photometer bench

⁶ Depending on measuring range
⁷ Pressure sensor is required
⁸ Limited to atmospheric if internal sample pump
⁹ Temperatures below 0 °C (-4 °F) with thermostat control only
¹⁰ Thermost. controlled sensor: 75 °C (167 °F)

¹¹ Flow variation within ± 0.1 l/min
¹² Optional thermostatically controlled box with temperature 60 °C (140 °F), not X2GK
¹³ Temperature variation: ≤ 10 K per hour
¹⁴ Special conditions apply to model X2FD

Tab. 1-2: IR, UV, VIS, TCD - Measurement Performance Specifications

Important Notes Concerning Measurement Specification Data

The specifications given in these tables always apply to the physical measuring ranges, as listed e.g. in the INFO-RANGES.. menu (parameters „MinRange“ and „MaxRange“).



Scaling or zooming cannot improve analog output specifications to values better than specified by the physical measuring ranges

All performance data is verified during the manufacturing process for each unit by the following tests:

- Linearization and sensitivity test
- Long term drift stability test
- Climate chamber test
- Cross interference test (if applicable)

1.6 Measurement Specifications

	Oxygen Sensors		
	Paramagnetic (pO ₂)	Electrochemical (eO ₂)	Trace (tO ₂)
Detection limit (4 σ) ^{1 4}	≤ 1 %	≤ 1 %	≤ 1 %
Linearity ^{1 4}	≤ 1 %	≤ 1 %	≤ 1 %
Zero-point drift ^{1 4}	≤ 2 % per week	≤ 2 % per week	≤ 1 % per week
Span (sensitivity) drift ^{1 4}	≤ 1 % per week	≤ 1 % per week	≤ 1 % per week
Repeatability ^{1 4}	≤ 1 %	≤ 1 %	≤ 1 %
Response time (t ₉₀) ³	< 5 s	approx. 12 s	20 to 80 s
Permissible gas flow	0.2–1.5 l/min	0.2–1.5 l/min.	0.2–1.5 l/min.
Influence of gas flow ^{1 4}	≤ 2 % ¹⁰	≤ 2 %	≤ 2 %
Maximum gas pressure ^{7 14}	≤ 1500 hPa abs. (≤ 7 psig) ¹³	≤ 1500 hPa abs. (≤ 7 psig)	≤ 1500 hPa abs. (≤ 7 psig)
Influence of pressure ²			
– At constant temperature	≤ 0.10 % per hPa	≤ 0.10 % per hPa	≤ 0.10 % per hPa
– With pressure compensation ⁶	≤ 0.01 % per hPa	≤ 0.01 % per hPa	≤ 0.01 % per hPa
Permissible ambient temperature ⁸	0(-20) to +50 °C (32 (4) to 122 °F)	5 to +45 °C (41 to 113 °F)	5 to +45 °C (41 to 113 °F)
Influence of temperature ^{1 12} (at constant pressure)			
– On zero point	≤ 1 % per 10 K	≤ 1 % per 10 K	≤ 1 % per 10 K ⁵
– On span (sensitivity)	≤ 1 % per 10 K	≤ 1 % per 10 K	≤ 1 % per 10 K ⁵
Thermostat control	60 °C (140 °F) ¹¹	none	none ⁹
Warm-up time	Approx. 50 minutes	-	Approx. 50 minutes

Note! 1 psi = 68.95 hPa

¹ Related to full scale

² Related to measuring value

³ From gas analyzer inlet at gas flow of 1.0 l/min (electronic damping = 0 s)

⁴ Constant pressure and temperature

⁵ Range 0–10...200 ppm: ≤ 5 % (5 to 45 °C / 41 to 113 °F)

⁶ Pressure sensor is required

⁷ Limited to atmospheric if internal sample pump

⁸ Temperatures below 0 °C (-4 °F) with thermostat control only

⁹ Thermost. controlled sensor: 35 °C (95 °F)

¹⁰ For ranges 0–5...100 % and flow 0.5...1.5 l/min

¹¹ Optional thermostatically controlled sensor with temperature 60 °C (140 °F)

¹² Temperature variation: ≤ 10 K per hour

¹³ No sudden pressure surge allowed

¹⁴ Special conditions apply to model X2FD

Note! Take care of the tO₂ sensor's documentation, providing important calibration instructions!

Tab. 1-3: Oxygen - Standard Measurement Performance Specifications

Note 1!

Not all data listed are applicable to all analyzer versions (e.g. 60 °C thermostatically controlled box is not available for electrochemical and trace oxygen nor for 1/219 in instruments).

Note 2!

For NDIR/UV/VIS measurements, take into account that

- sample gas may diffuse or be released by leakages into the analyzer enclosure
- if existent in the analyzer surroundings, the component to be measured may enter the enclosure.

Concentrations then may increase inside the enclosure. High concentrations of the component to be measured inside the enclosure may influence the measurement by unintended absorption, which could cause drift of the measurement.

A remedy for this issue is to purge the housing with gas not containing the component of interest.

1.6 Measurement Specifications

Trace Moisture (tH ₂ O)	
Measurement range	-100 to -10 °C dew point (0–100...3000 ppm)
Measurement accuracy	±2 °C dew point
Repeatability	0.5 °C dew point
Response time (t ₉₅)	5 min (dry to wet)
Operating humidity	0 to 100 % r.h.
Sensor operating temperature	-40 to +60 °C
Temperature coefficient	Temperature compensated across operating temperature range
Operating pressure	Depending on sequential measurement system, see analyzer specification ¹ max. 1500 hPa abs / 7 psig ²
Flow rate	Depending on sequential measurement system, see analyzer specification ¹ 0.2 to 1.5 NI/min

¹ If installed in series to another measurement system, e. g. IR channel
² Special conditions apply to model X2FD

Note! 1 psi = 68.95 hPa

Note! Do not calibrate, see special calibration notes in the X-STREAM X2 manual!

Tab. 1-4: Trace Moisture - Standard Measurement Performance Specifications

Special Performance Specifications for Gas Purity Measurements (ULCO & ULCO₂)

	0–10...< 50 ppm CO 0–5...< 50 ppm CO ₂
Detection limit (4 σ) ^{1 2}	< 2 %
Linearity ^{1 2}	< 1 %
Zero-point drift ^{1 2 3}	< 2 % resp. < 0.2 ppm ⁹
Span (sensitivity) drift ^{1 2 4}	< 2 % resp. < 0.2 ppm ⁹
Repeatability ^{1 2}	< 2 % resp. < 0.2 ppm ⁹
Response time (t ₉₀) ⁷	< 10 s
Permissible gas flow	0.2–1.5 l/min.
Influence of gas flow ^{1 2}	< 2%
Maximum gas pressure ^{10 11}	≤ 1500 hPa abs. (≤ 7 psig)
Influence of pressure ⁵	
– At constant temperature	≤ 0.1 % per hPa
– With pressure compensation ⁸	≤ 0.01 % per hPa
Permissible ambient temperature	+15 to +35 °C (59 to 95 °F) +5 to +40 °C (41 to 104 °F)
Influence of temperature ⁶ (at constant pressure)	
– On zero point	< 2 % per 10 K resp. < 0.2 ppm per 10 K ⁹
– On span (sensitivity)	< 2 % per 10 K resp. < 0.2 ppm per 10 K ⁹
Thermostat control	none 60 °C (140 °F)

Note! 1 psi = 68.95 hPa

¹ Related to full scale
² Constant pressure and temperature
³ Within 24 h; daily zero calibration requested
⁴ Within 24 h; daily span calibration recommended
⁵ Related to measuring value
⁶ Temperature variation: ≤ 10 K per hour
⁷ From gas analyzer inlet at gas flow of 1.0 l/min
⁸ Barometric pressure sensor is required
⁹ Whichever value is higher
¹⁰ Limited to atmospheric if internal sample pump
¹¹ Special conditions apply to model X2FD

Tab. 1-5: Special Performance Specifications for Gas Purity Measurements (ULCO & ULCO₂)

Chapter 2 Installation

This chapter describes the proper installation procedure for the various X-STREAM analyzer versions.

On receipt, check the packaging and its contents thoroughly for damage.

Inform the carrier immediately of any damage to packaging or contents, and keep damaged parts until clarification.

Store the instrument at a dry and clean place, considering the acceptable environmental conditions. We recommend to keep the packaging available for future transportation, because only the original packaging ensures proper protection!

2.1 Scope of Supply

WARNING

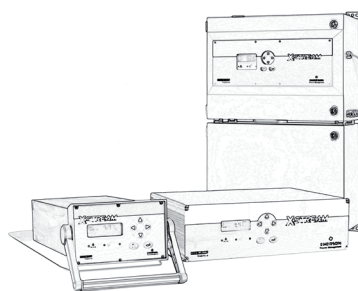
HAZARDS FROM MISSING INFORMATION



Compare the contents of your package with the pictures below.

Analyzers for hazardous areas need additional parts, described in the accompanying documentation referring to hazardous area installations.

Call your local sales office if something is missing, and **DO NOT** continue to install your analyzer, until all parts are at hand!



Analyzer



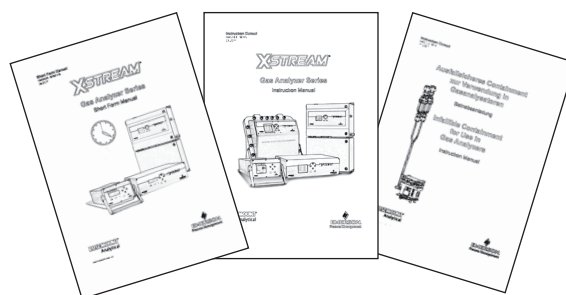
USB stick



external power supply
with DC power cable
(X2GK, option)



Trace oxygen cell
(if applicable)



Manuals, some of which either as paper or electronic version on USB stick:

- this short form manual
- X-STREAM X2 series manual
- infallible containment instruction manual (if applicable to your instrument)

Fig. 2-1: X-STREAM X2 Analyzers - scope of supply

2.2 Installation - Introduction

2.2 Introduction

WARNING

DANGER OF ELECTROCUTION



Before connecting the analyzer to mains power, please read the chapter on safety warnings and the following instructions carefully.



The place of installation must be clean, dry and protected against strong vibrations and frost. Please observe the admissible operating temperatures given in the technical data.

Units must not be subjected to direct sunlight or sources of heat.

For outdoor installation it is recommended to install the unit in a cabinet. It should at least be protected against rainfall.

In order to comply with regulations on electromagnetic compatibility, it is recommended to use only shielded cables which can be supplied by Emerson Process Management. The customer must ensure that the shielding is correctly connected to the signal cable plug housing. Submin-d plugs and sockets must be screwed to the analyzer.



The use of external submin-d to screw-type terminal adapters affects electromagnetic compatibility. In such a case the customer must take appropriate measures to comply with the regulations, and must declare conformity when this is legally required (e.g. European EMC guidelines).

2.3 Installation - Technical Data

2.3 Technical Data

Before intending to start to install the analyzer, verify the site of installation meets the specifications, given in the following sections!

2.3.1 Common Technical Data

Site of installation	
Humidity (non-condensing)	< 90 % RH at +20 °C (68 °F) < 70 % RH at +40 °C (104 °F)
Degree of pollution	2
Installation category	II
Elevation	0 to 2000 m (6560 ft) above sea level
Ambient atmosphere	Units may not be operated in corrosive, flammable or explosive environments without additional safety measures.
Analyzer Certifications	
Electrical safety	
CAN / USA 	CSA-C/US, based on CAN/CSA-C22.2 No. 61010-1-04 / UL 61010-1, 2nd edition
Europe 	CE, based on EN 61010-1
Electromagnetic compatibility	
Europe	CE, based on EN 61326
Australia	C-Tick
others	NAMUR

2.3 Installation - Technical Data

2.3.2 Specific Technical Data

	X2GK		X2GP	X2XF
Temperatures				
operational	0...+50 °C 32...122 °F			0 (-20)...+50 °C 32 (-4)...122 °F
storage	-20...+70 °C -4...-158 °F			-20...+70 °C -4...158 °F
Weight, max	8...12 kg 17.6...26.5 lb		12...16 kg 26.5...35.3 lb	XLF: 25 kg / 55.1 lb XXF: 45 kg / 99.2 lb
IP or Type rating	IP 20 indoor use, protected against dripping water and direct sun light			IP 66 / Type 4X outdoor use , protected against direct sun light
Gas connections				
max number	8			
max for purging (separate / incl.)	2 incl.		1 separate, 1 incl.	1 separate, 1 incl.
material	PVDF; stainless steel (opt.)			stainless steel
sizes	6/4 mm; ¼"			
Power supply unit	external (option)	wide range, internal		
Power supply				
nominal voltage	24 V _{DC}	100–240 V _{AC} 50 / 60 Hz		
voltage range	10... 30 V _{DC}	85–264 V _{AC} 47–63 Hz		
nominal input current				
standard, max	2.5 A	1.3–0.7 A	1.3–0.7 A	XLF: 1.3–0.7 A XXF: 1.5–0.8 A
w/ temperature control, max	n.a.		3–1.5 A	XLF: 3–1.5 A XXF: 5.5–3 A
Power input fuses	AC 230 V T 3.15 A 5x20 mm	AC 230 V T 4 A 5x20 mm	AC 230 V T 4 A 5x20 mm	AC 230 V T 6.3 A 5x20 mm

2.4 Installation - Gas Conditioning

2.4 Gas Conditioning

In order to ensure trouble-free operation, special attention must be paid to the preparation of the gases:




All gases must be conditioned before supplying to the analyzer, to ensure they are

- dry,
- free of dust and
- free of any aggressive components which may damage the gas lines (e.g. by corrosion or solvents) .



Flammable gases must not be supplied without suitable protective measures.

Pressure and gas flow must remain within the values given in the  „Measurement Specifications“ section within this manual.

If moisture cannot be avoided, it is necessary to ensure that the dew point of the gases is at least 10 °C (18 °F) below the ambient temperature to avoid condensate in the gas lines.

The X-STREAM field housings can optionally be fitted with heated piping to enable the use of gases with a maximum dew point of 25 °C (77 °F).

Hints for selected gases

- **Calibration gases for CO and NO** need to be moistured by supplying them via a cooler.

2.4 Installation - Gas Conditioning

Enclosure purge option

The purge medium (e.g. to minimize CO₂ interference or for enhanced safety while measuring corrosive or poisonous gases)

- **must be dry, clean and free of corrosives or components containing solvents.**
- **has to be free of components to be measured, to minimize cross interferences.**

Its temperature must correspond to the ambient temperature of the analyzer, but be at least within the range 20...35 °C (68...95 °F).

For information about values for pressure and flow, please contact your nearest EMERSON Process Management sales office.



We recommend to always purge the analyzer enclosure, if gases are supplied, which may harm analyzer components, if due to a leak released into the analyzer enclosure!

Open reference option

In some cases, the measuring cell has an open reference side, to be supplied with nitrogen.


This nitrogen

- **at least should be of quality 5.0, which means nitrogen of purity $\geq 99.999\%$.**

If such gas is not available, the substitute

- **must be dry, clean and free of corrosives or components containing solvents.**
- **has to be free of components to be measured, to minimize cross interferences.**

In any case, the gas temperature must correspond to the ambient temperature of the analyzer, but at least be within the range 20...35 °C (68...95 °F).




Pressure and gas flow must remain within the values given in the  „Measurement Specifications“ section within this manual.






Perform a calibration each time the source of this gas (e. g. bottle) has changed!

2.5 Installation - Gas Connections

2.5 Gas Connections

	WARNING
	TOXIC GAS HAZARDS
	
	<p>Take care that all external gas pipes are connected in the described way and that they are gastight to avoid leakages!</p> <p>Faulty connected gas pipes lead to explosion hazard or even to mortal danger!</p> <p>Don't take a breath of the emissions! Emissions may contain hydrocarbons or other toxic components (e.g. carbon monoxide)! Carbon monoxide may cause headache, sickness, unconsciousness and death.</p>

	CAUTION
	<p>Do not confuse gas inlets and outlets. All gases supplied must be prepared beforehand. When supplying aggressive gases, ensure that the gas lines are not damaged.</p> <p>Max. admissable pressure: 1500 hPa!</p> <p>Exhaust lines must be installed to incline downwards and be unpressurized and protected against frost, and conform to legal requirements.</p>

	 TRACE OXYGEN MEASUREMENTS
	<p>The sensor for trace oxygen measurements is a consumable. Remaining lifetime counts down when the sensor is in contact with oxygen.</p> <p>For above reasons, the analyzer is shipped with the sensor as extra item in a sealed bag! The sensor must be installed before analyzer startup, according the instructions shipped with the sensor!</p> <p>Do not use plastic tubing for trace oxygen measurements as it can permeate oxygen from the ambient air and cause higher than expected oxygen readings.</p>

2.5 Installation - Gas Connections

The number of gas connections and their configuration may vary according to analyzer version and installed options.

All gas connectors are labelled and can be found on the

- analyzer's rear panel (X-STREAM X2GP, X-STREAM X2GK)
- underside of the analyzer (X-STREAM field housings)

Should it be necessary to open the gas lines, the gas connectors should be sealed with PVC caps to prevent pollution by moisture, dust, etc.

	IN	OUT
1	SAMPLE	SAMPLE
2		
3		
4		PURGE GAS

Fig. 2-2: Labelling of gas connectors (example)

The analyzer should be mounted close to the sample gas source to minimize transport time. A sample gas pump can be used to reduce the reaction time; this requires that the analyzer be operated in bypass mode or fitted with

a pressure control valve to protect against excessive gas flow and pressure (Fig 1-2).

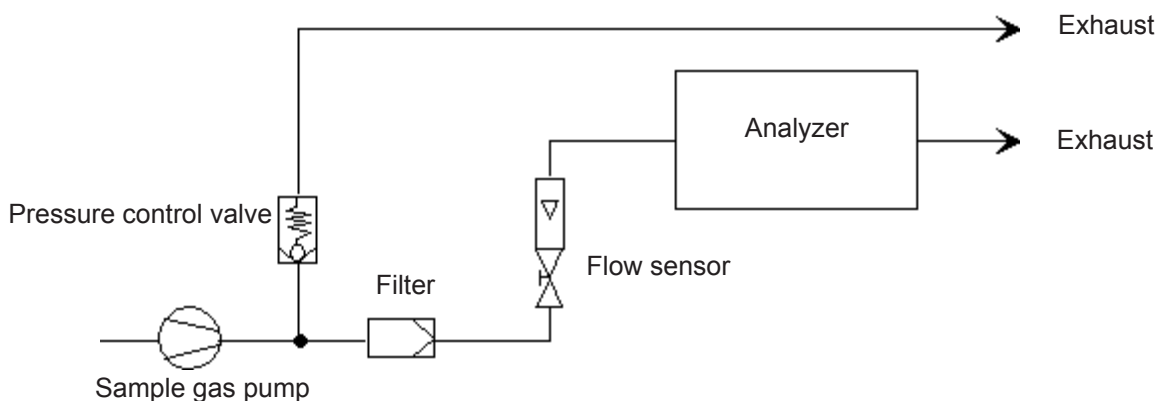


Fig. 2-3: Installation in bypass mode

2.6 Installation - Electrical Connections

2.6 Electrical Connections

WARNING

ELECTRICAL SHOCK HAZARD

Only qualified personnel, observing all applicable technical and legal requirements, may install these devices and connect power and signal cables.

Failure to comply may render the guarantee void and cause exposure to risk of damage, injury or death.

The devices may only be installed by personnel who are aware of the possible risks. Working on units with screw-type terminals for electrical connections may require exposure to energized components.

Wall-mounted X-STREAM analyzers are not fitted with power switches and are operational as soon as they are connected to a power supply.

For these analyzers a switch or circuit breaker (IEC 60947-1/-3) must be installed on the premises. The switch or breaker must be located near the analyzer, easily accessible and labelled as a power supply cut-off for the analyzer.

Units with screw-type terminals must be de-energized by unplugging it or operating the separate cut-off switch or circuit breaker when working on the power connections.

To avoid the risk of electrocution, all units must be earthed. For this reason, the power cable with a protective earth wire must be used.

Any break in the earth wire inside or outside the unit may cause exposure to the risk of electrocution and is therefore prohibited.



2.7 Detailed Instructions for Installation

2.7 Detailed Instructions for Installation

Important note for X-STREAM X2FD!




*Due to the special conditions which must be observed when installing units in EX zones, the installation of the flameproof **X-STREAM X2FD** version is described in a separate **instruction manual HASXMDE-IM-EX**.*

Even if you do not install your X-STREAM X2FD in an EX zone, refer to this separate manual for installation instructions.

Important note for analyzers measuring traces of oxygen!

The electrochemical sensor used for this measurement is a consumable. Remaining lifetime counts down when the sensor is in contact with oxygen.

For above reasons, concerned analyzers are shipped with the sensor as extra item in a sealed bag! The sensor must be installed before analyzer startup, according the instructions shipped with the sensor!

Installation instructions:	X-STREAM X2GK, X2GP		page 2-11
	X-STREAM X2XF Field housings		page 2-16
Notes for wiring signal inputs and outputs			page 2-24

2.7 Installation - X-STREAM X2GK, X-STREAM X2GP

2.7.1 X-STREAM X2GK, X-STREAM X2GP

Plugs and sockets required for the electrical connections are on the rear panel of the units (Fig. 2-4 & Fig. 2-5).

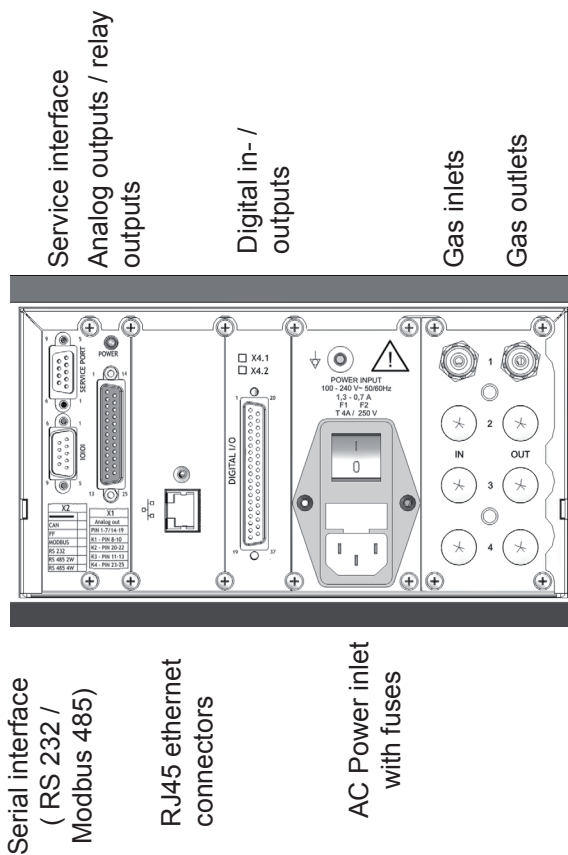
X-STREAM X2GP analyzers provide an internal wide range power supply for worldwide use.

X-STREAM X2GK analyzers are powered by an internal wide range power supply for worldwide use, or by an external DC 24 V power supply unit, optionally supplied with the unit.

If an external PSU is not included in delivery, another unit can be used instead, provided it conforms to the specifications given by the X-STREAM X2 instruction manual.

X-STREAM X2GK / X2GP analyzers should be operated in a horizontal position.

Six screws at the front panel enable to install X2GK models into a rack. The external PSU is optionally available for rack mounting, too. X2GP can be installed into a rack by adding two optional brackets to the left and right hand side of the instrument.



CAUTION

HAZARD BY RACK INSTALLATION

The front panel and its screws are not designed to carry the weight of the instrument!

Support the instrument, when installed into a rack!

Disregarding may cause personal injury and damaged equipment.



Alternative DC Power inlet and separate fuse

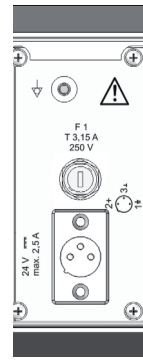


Fig. 2-4: X-STREAM X2GK - rear panel

2.7 Installation - X-STREAM X2GK, X-STREAM X2GP

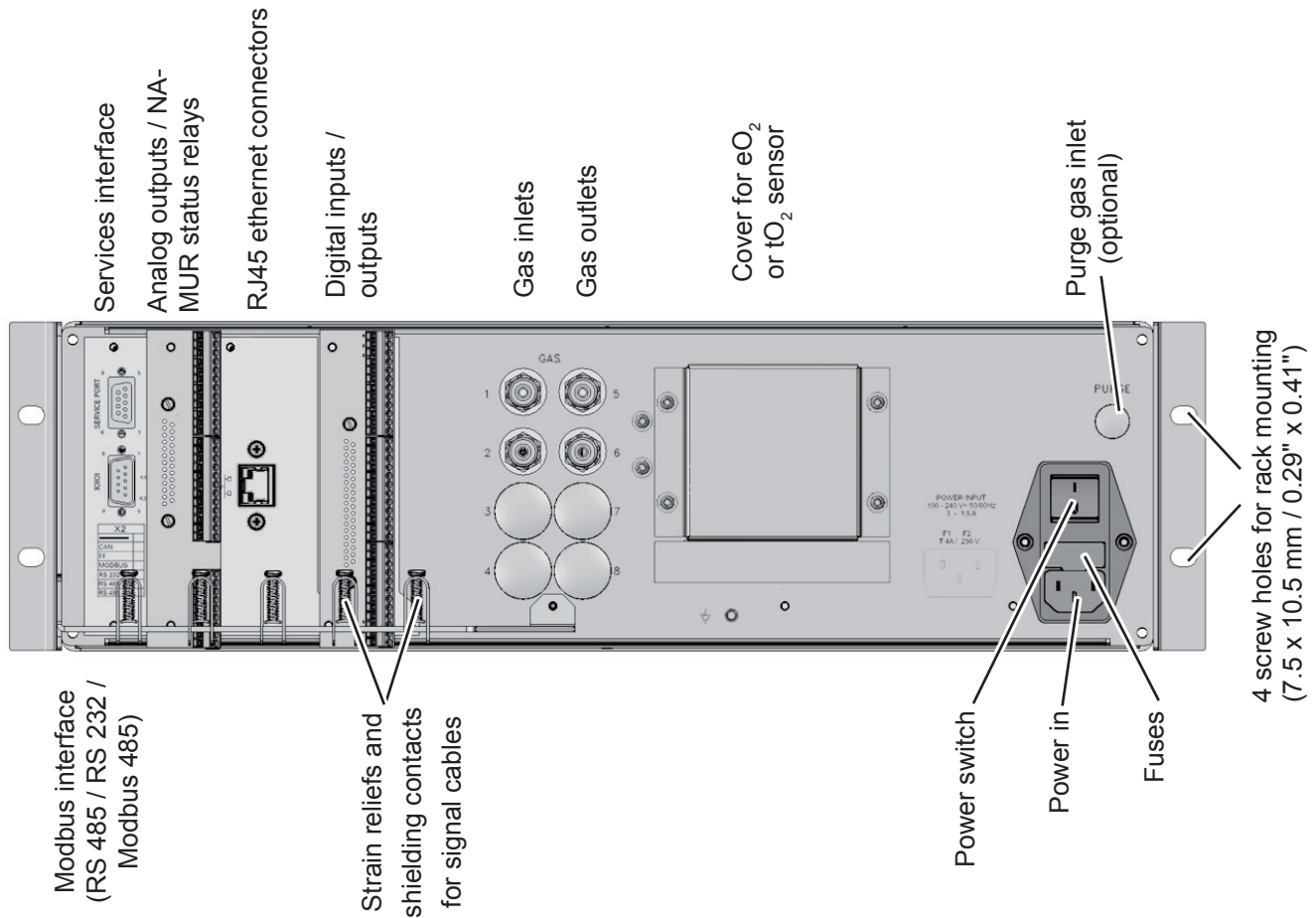


Fig. 2-5: X-STREAM X2GP - rear panel, shown with options

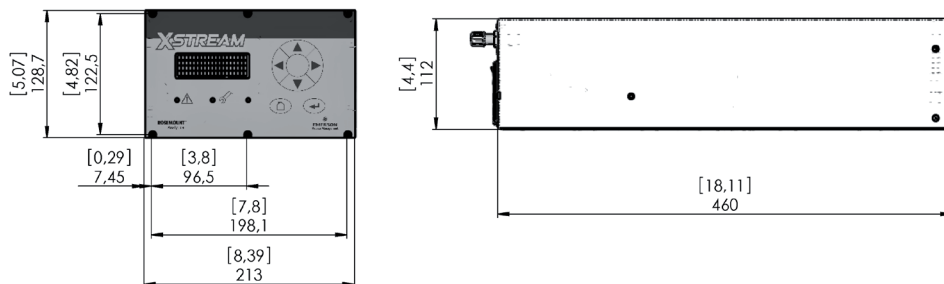
The number and configuration of the gas inlets and outlets vary from model to model and are indicated on the notice on the rear of the instrument.

To simplify installation, we recommend labelling the gas lines as in the Figures above (In1, Out1, ..., In4, Out4 or 1, 2, ... 7, 8). This avoids confusion in case the analyzer ever has to be disconnected.

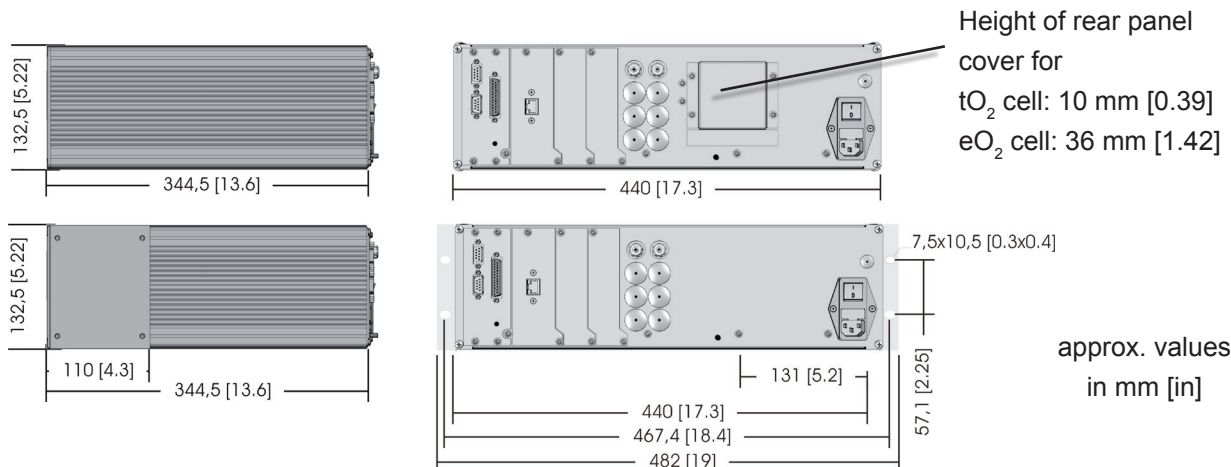
	X2GK	X2GP
Gas connections		
max number	8	8
max for purging (incl. / separate)	2 incl.	1 incl. & 1 separate
material	PVDF; stainless steel (opt.)	
sizes	6/4 mm; 1/4"	

2.7 Installation - X-STREAM X2GK, X-STREAM X2GP

X2GK



X2GP



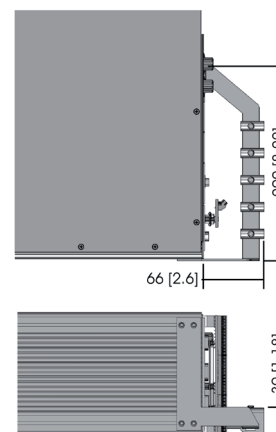
CAUTION

HAZARD BY RACK INSTALLATION

The front panel and its screws are not designed to carry the weight of the instrument!

Support the instrument, when installed into a rack!

Disregarding may cause personal injury and damaged equipment.



Strain relief bracket, detail
 (model with clamping adapters)

Fig. 2-6: X-STREAM X2GK & X2GP - dimensions

2.7 Installation - X-STREAM X2GK, X-STREAM X2GP

Signal inputs and outputs (basic configuration)

The number of signal outputs actually available varies according to the unit's configuration.

Analog signals

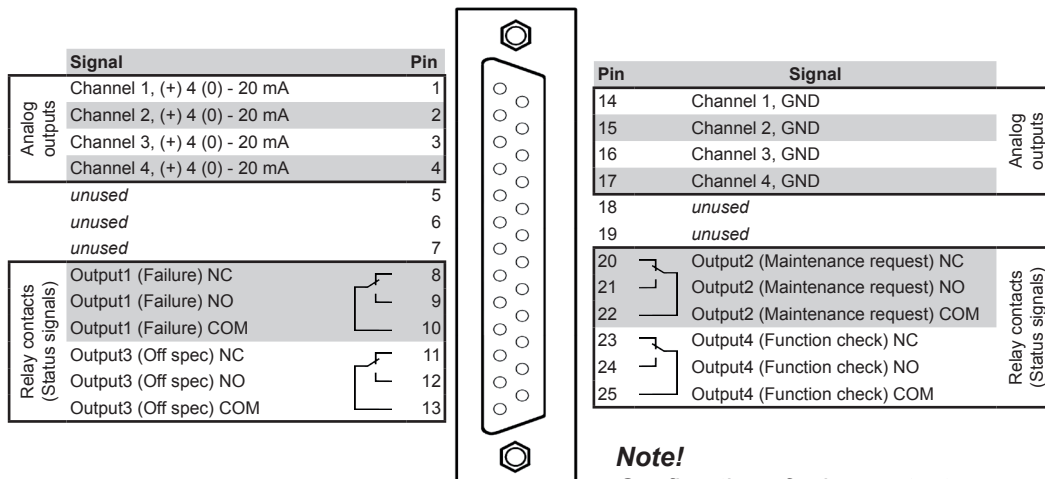
Relay outputs

Analog signals and relay outputs are located on a shared 25-pin submin socket X1, or on an optional terminals adaptor XSTA (👉 page 2-21; not for X2GK).

Specification of analog signal outputs:	4(0)–20 mA; burden: $R_B \leq 500 \Omega$
Specification of relay outputs 1–4:	Dry relay change-over contacts can be used as NO or NC.
Electrical specification:	max. 30 VDC, 1 A, 30 W

Note!

- Consider the installation notes in section 2.7.
- Technical data and installation information for further available interfaces are given in the X-STREAM X2 instruction manual. Connector layouts are part of the appendix of this manual.



Note!
Configuration of relay contacts as per standard factory setting (NAMUR status signals)

Fig. 2-7: Socket X1 - Analog Outputs & Digital Outputs 1-4

2.7 Installation - X-STREAM X2GK, X-STREAM X2GP

Power supply

X-STREAM X2GK and X2GP

AC power is supplied to the unit by means of a three-pin IEC connector on the rear panel of the instrument.

Optional DC Supply for X-STREAM X2GK

24 VDC is supplied to the unit by means of a three-pin XLR connector on the rear panel of the instrument.

Depending on the order, the following is supplied as an accessory: either

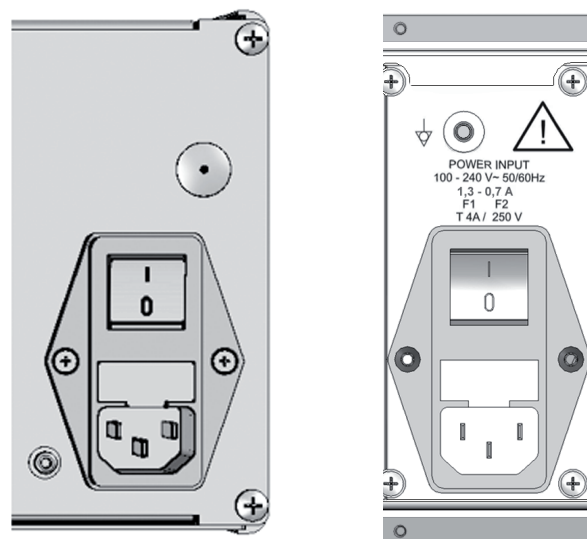
- an external power supply unit which can be connected directly to the analyzer using the supplied cable

or

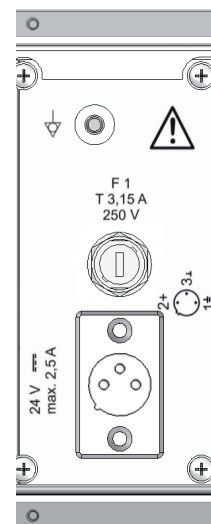
- a connector which can be used with a cable and PSU as specified by the customer.

Note the configuration of the connector's pins (👉 Fig. 2-8).

Details of any PSUs supplied with the unit are given by the X-STREAM instruction manual.



X2GP AC connectors X2GK



DC connector X2GK

Fig. 2-8: Power supply connectors

2.7 Installation - X-STREAM X2XF Field Housings

2.7.2 X-STREAM X2XF

Fitted with four eyebolts and featuring IP66/Type 4X protection, the X-STREAM XE field

housing can be mounted in the open air on a wall or frame with no extra work.

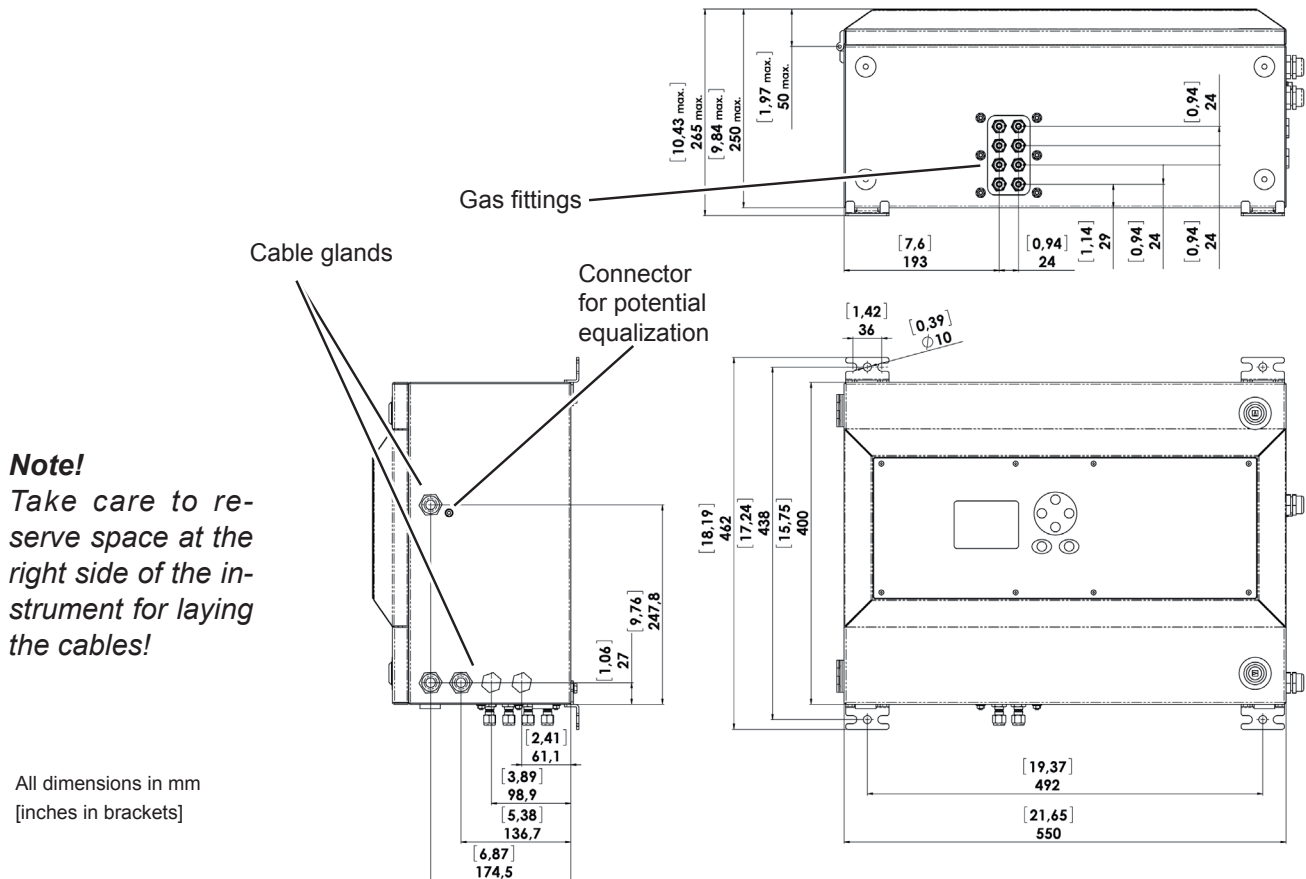


Fig. 2-9: X-STREAM XLF - dimensions for installation

CAUTION

HEAVY INSTRUMENT

X-STREAM field housings, intended to be wall mounted or outdoor installed, weigh up to 45 kg (99 lbs), depending on the chosen options!

Use two persons and/or suitable tools for transportation and lifting these instruments!

Take care to use anchors and bolts specified to be used for the weight of the instruments!

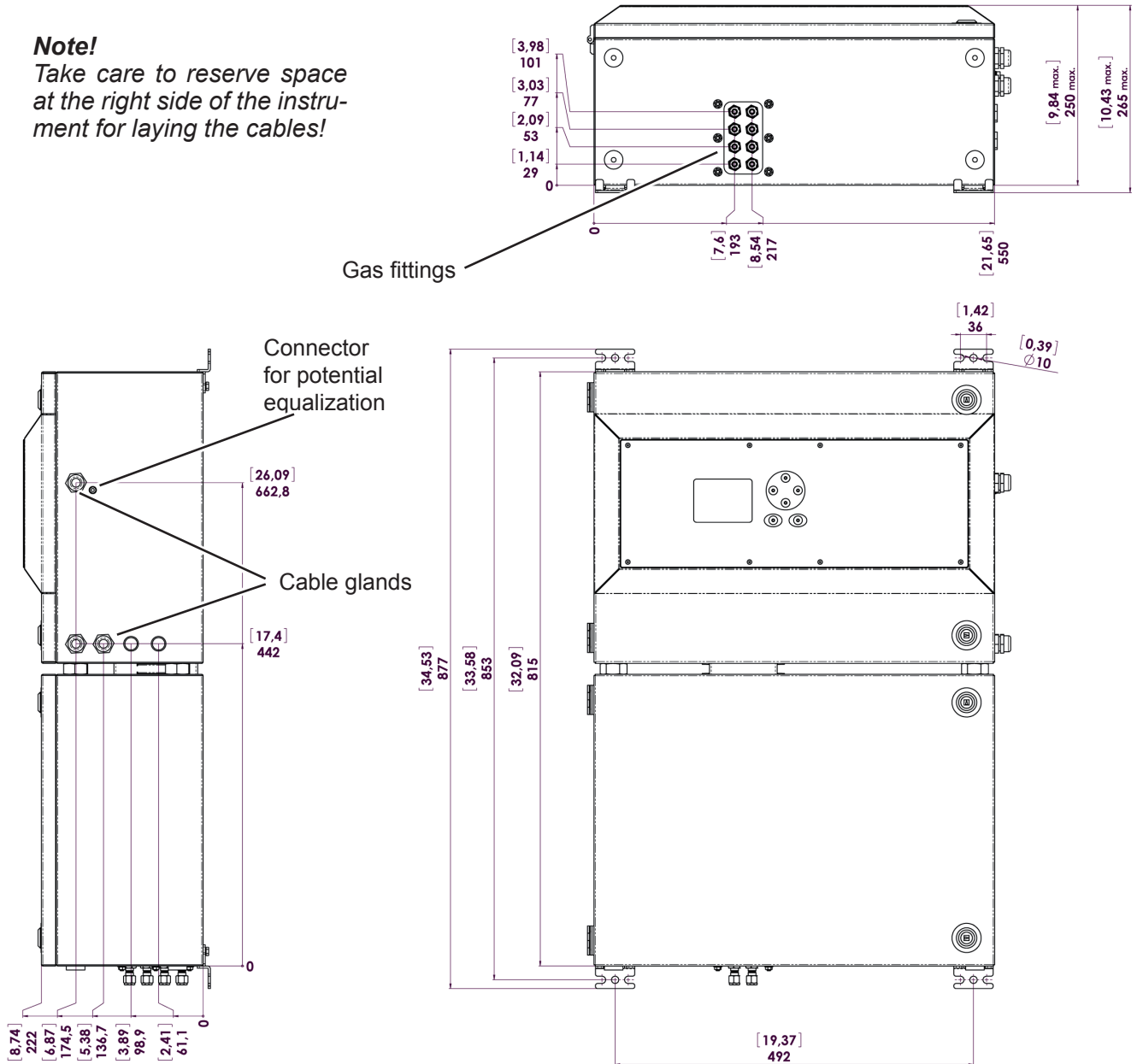
Assure that the wall / device for installation is sufficiently attached and stable to carry the instrument!



2.7 Installation - X-STREAM X2XF Field Housings

Note!

Take care to reserve space at the right side of the instrument for laying the cables!



All dimensions in mm
 [inches in brackets]

Fig. 2-10: X-STREAM XXF - dimensions for installation

2.7 Installation - X-STREAM X2XF Field Housings

Power and signal cables are connected using internal screw-type terminals. This requires opening the unit, which in turn requires releasing the fasteners on the housing.


Gas connectors are accessible from the outside, on the underside of the instrument.

The number and configuration of the gas inlets and outlets depends on the analytical application, and is noted on a sticker on the underside of the instrument next to the connectors.

To simplify installation, we recommend labeling the gas lines in accordance with these markings. This avoids confusion should the analyzer need to be disconnected for maintenance.

CAUTION

GASKETS AT LOW TEMPERATURES



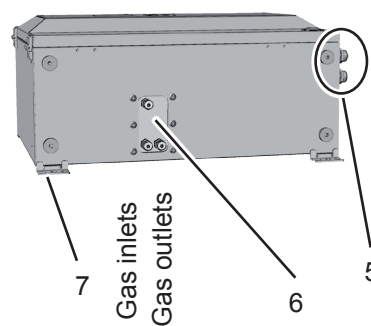
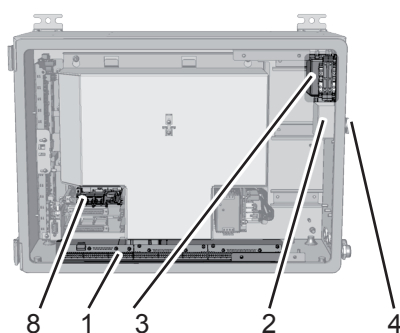
Consider that enclosure gaskets may be frozen when the instrument is installed outdoors. Carefully open the enclosure at temperatures below -10 °C to not damage the gaskets.

Damaged gaskets void the ingress protection, possibly causing property damage, personal injury or death.

Note on XXF!

Differing from single compartment XLF,

- the electrical connections are established in the **upper compartment**,
- the gas connection fittings are at the **lower compartment**.



- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Terminals for signal cables 2 Mains filter 3 Power connections with integrated fuses 4 Glands for power cable | <ul style="list-style-type: none"> 5 Glands for signal cables 6 Gas inlets and outlets 7 Plugs for openings to connect housings 8 Ethernet connectors (optional) |
|--|--|

Fig. 2-11: X-STREAM X2XF Field housing - terminals, cable glands and gas connectors

2.7 Installation - X-STREAM X2XF Field Housings

Gas connections

Gas connections	
max number	8
max for purging (incl. / separate)	2 incl.
material	PVDF; stainless steel (opt.)
sizes	6/4 mm; 1/4"

Signal in- and outputs

Preparation of signal cables

All signal cables are connected to screw-type terminals located inside the housing. Access to the internal components is gained by releasing the two fasteners at the top of the unit and opening the front panel downwards.

All cables must be fed through cable glands and secured with a gland nut.

Properly installed, the glands act as a strain relief and guarantee EMC (electromagnetic compatibility):

Installing cable glands with shielded cables



1. Strip the cable
2. Expose braided shield



6. Push clamping insert into body and tighten dome nut
7. Assemble into housing and you're done!



3. Feed cable through dome nut and clamping insert
4. Fold braided shield over clamping insert
5. Make sure that braided shield overlaps the O-ring by 2 mm (3/32")

2.7 Installation - X-STREAM X2XF Field Housings

WARNING

ELECTRICAL SHOCK HAZARD



Verify the power supply at installation site meets the specification given on the analyzer's nameplate label, before installing the instrument!

Verify power cables are disconnected and/or instrument is de-energized prior to working at the terminals!

Verify the power cord is layed with a distance of at least 1 cm (0.4 in) to any signal cable to ensure proper insulation from signal circuits!

The number of actually available signal outputs, and also the number of built-in modules with screw-type terminals, varies according to the configuration of the unit.

A maximum of three modules with 36 terminals each can be fitted.

The terminals can be accessed by opening the front panel of the instrument.

Characteristics of terminals:

Accepted wire gauge:	0.14...1.5 mm ² (AWG 26...AWG 16), end sleeves not required
Skinning length:	5 mm (0.2")
Thread:	M2
Min. tightening torque:	0.25 Nm (2.21 in.lb)


2.7 Installation - X-STREAM X2XF Field Housings

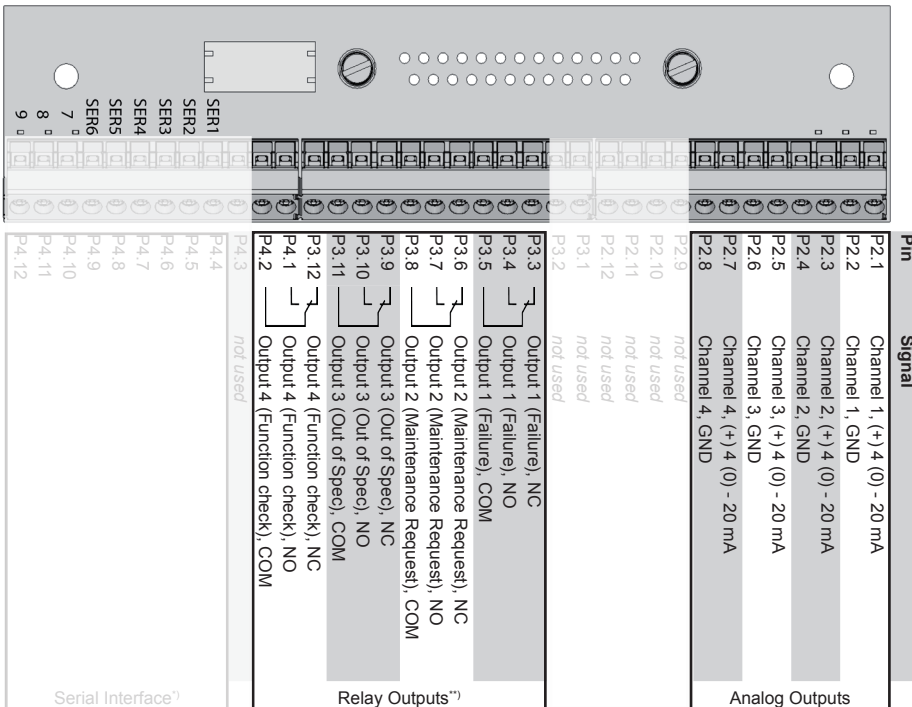
Analog signals
 Relay outputs 1-4

Terminals for analog signals and relay outputs 1 - 4 are located on the outer left module (terminal block X1).

Specification of analog signal outputs:	4 (0) – 20 mA; burden: $R_B \leq 500 \Omega$
Specification of relay outputs:	Dry relay change-over contacts can be used as NO or NC.
Electrical specification:	max. 30 VDC, 1 A, 30 W

Notes!

- Consider
 - the installation notes in section 2.7
 - the notes on installing cable glands on  page 2-19.
- Technical data and installation information for further available interfaces are given in the X-STREAM X2 instruction manual. Connector layouts are part of the appendix of this manual.



**) Configuration of relay output terminals as per standard factory setting (NAMUR status signals)

Fig. 2-12: Terminal block X1 - Analog Outputs & Digital Outputs 1-4 (XSTA)

2.7 Installation - X-STREAM X2XF Field Housings

Connecting the power cord

The power cord is connected to screw-type terminals located inside the housing.

Accepted wire gauge:	0.2...4 mm ² (AWG 24...AWG 12)
Recommended wire gauge	min. 1.5 mm ² (AWG 15), end sleeves not required
Skinning length:	8 mm (0.315")
Thread:	M3
Min. tightening torque:	0.5 Nm (4.4 in.lb)

WARNING

ELECTRICAL SHOCK HAZARD



Verify the power supply at installation site meets the specification given on the analyzer's nameplate label, before installing the instrument!

Verify power cables are disconnected and/or instrument is de-energized prior to working at the terminals!

Verify the power cord is layed with a distance of at least 1 cm (0.5") to any signal cable to ensure proper insulation from signal circuits!

Feed the power cable through the cable gland at the instrument's right side and strip the outer insulation. Strip the individual wires and connect to the terminals (a label is located next to the terminals on the mains filter housing).

Finally, tighten the outer dome nut to secure the power cable.

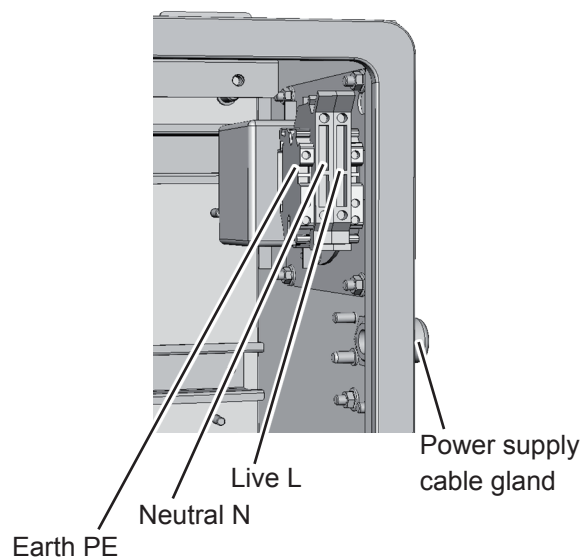


Fig. 2-13: Power supply connections

2.7 Installation - X-STREAM X2XF Field Housings

WARNING

ELECTRICAL SHOCK HAZARD



Before completing the electrical connection of the instrument, verify cables are inserted and connected in correct manner!

Ensure the earthing conductor (protective earth; PE) is connected!

When all connections are correctly made and checked,

- close the front panel and secure with the two fasteners.

2.8 Installation - Notes on Wiring

2.8 Notes On Wiring Signal Inputs and Outputs

Emerson Process Management has made every effort during the development process to ensure that the X-STREAM analyzer series ensures electromagnetic compatibility (EMC) with respect to emission and interference resistance, as confirmed by EMC measurements.

However, EMC is not wholly influenced by the design of the instrument, but to a large degree by the on-site installation process. Please observe the following sections and precautions to guarantee the safe and problem-free operation of this analyzer.

2.8.1 Electrical shielding of cables

In order to minimise ambient electromagnetic interference, it is necessary to take care making all electrical connections between the analyzer and any other devices:

We recommend using only shielded signal cables. The shielding must be connected at both ends to the housing (Fig. 2-14).

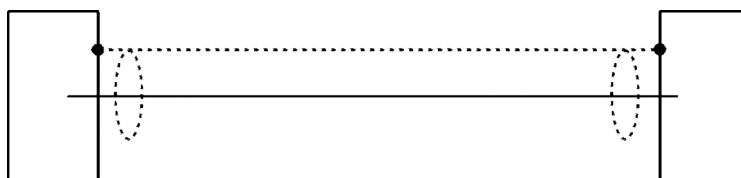


Fig. 2-14: Shielded signal cable, shielding connected at both ends.

On-site conditions often differ from test environments and may require special precautions. Such a case arises when strong electromagnetic fields which could induce an interference current in the shielding. This type of current creates a potential difference between the connected housings.

Two possible methods of eliminating this are described here. Fitters familiar with EMC problems must decide which method should be employed.

- The shielding is connected only at one end (connecting to the analyzer is recommended): this gives better protection against external interference, and interference currents are prevented because the ground loop is interrupted.

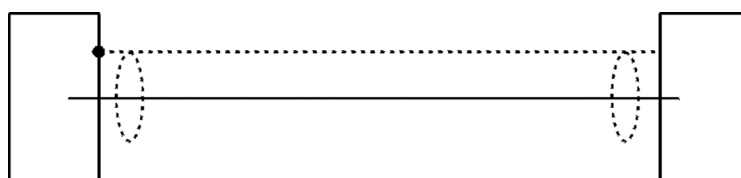


Fig. 2-15: Shielded signal cable, shielding connected at one end.

2.8 Installation - Notes on Wiring

- Cables with double shielding are used: in this case, one shielding is connected to the analyzer housing, the other shielding to the external device. This is advantageous when both units are supplied from different grids (e.g. when installed in different buildings).

This method is more expensive, but gives the best protection against external interference and against interference currents.

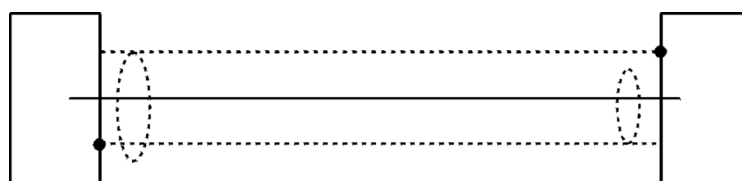


Fig. 2-16: Signal cable with double shielding, shieldings connected at alternate ends.

X-STREAM X2GP with XSTA or XSTD terminal adapters

In order to avoid measured values being influenced by external interference signals when terminal adapters are in use, the signal cable shieldings must be connected to the analyzer housing by means of shield connector terminals:

- uncover the signal cable shielding to a length of 20 cm (8 in),
- pull up the contact part of the shield connector terminal,
- feed through the cable as illustrated in Fig 2-17,
- bring down the contact part onto the shielding.

This results in a secure contact with the cable shielding and improves the unit's interference resistance.

The individual wires are then connected as described in section 2.6.



Fig. 2-17: Shield connector terminal with cable

The shield connector must be properly ordered to fit the cable diameter, and can be retrofitted:

- Ø 1.5 - 6.5 mm: part # ETC02019
- Ø 5 - 11 mm: part # ETC02020
- Ø 10 - 17 mm: part # ETC02021
- Ø 16 - 24 mm: part # ETC02022

2.8 Installation - Notes on Wiring

2.8.2 Wiring inductive loads

Switching inductive loads creates electromagnetic interference:

When an inductive load (e.g. relay, valve) is switched off, the magnetic field resists the change in current; this induces a high voltage across the coil contacts (several hundred volts). This impulse propagates through the connected cables and can influence any electrical devices nearby or destroy signal inputs and outputs. This can be avoided with a simple precaution:

- A silicon diode is connected in parallel to the load's contacts. The induced impulse is thus short-circuited at its source. The cathode must be connected to the positive end of the coil, the anode to the negative end (Fig 2-18).

Compatible filter components for standard valves are available on request.

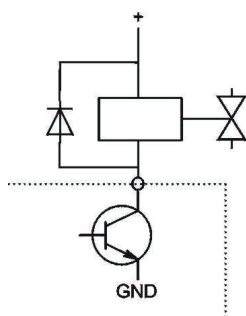


Fig. 2-18: Suppressor diode for inductive loads.

2.8.3 Driving high-current loads

Loads which draw a current in excess of the specifications for X-STREAM series analyzer outputs (>30 mA / >1 A) may not be directly driven from digital or relay outputs.

Such loads require external relays serving as de-coupling modules: the X-STREAM output drives the external relay, which in turn drives the load.

In order to avoid interference, we recommend supplying the analyzer and the high-current loads from different sources (Fig 2-18).

As previously described, the use of suppressor diodes for inductive loads is highly recommended.

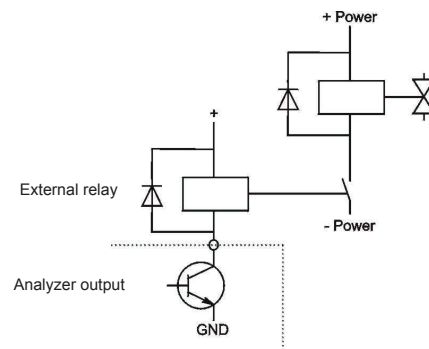


Fig. 2-19: Driving high-current loads

2.8 Installation - Notes on Wiring

2.8.4 Driving multiple loads

Frequently, several loads in one system are controlled by several analyzer outputs, whereby the power for the loads derives from a common source.

Special care is needed when wiring the loads to minimize interference from switching these loads:

- **avoid** connecting the loads in series:

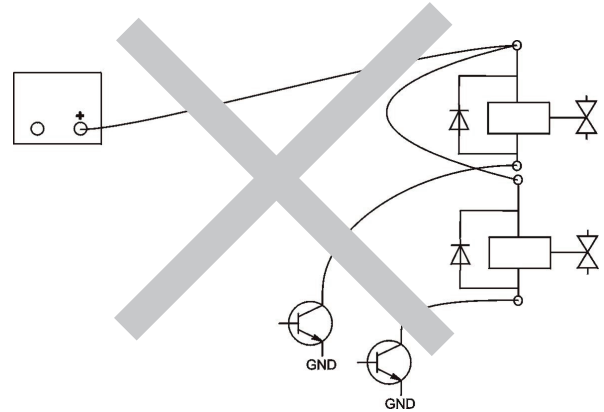


Fig. 2-20: Loads in series

- **It is recommended** to wire the loads in parallel, and to separately connect each load to the power supply: Beginning at the distribution point, lay both the + and the - wires for each load together to the load (Fig. 2-21). Interference is further reduced if a twisted multi-core cable is used.

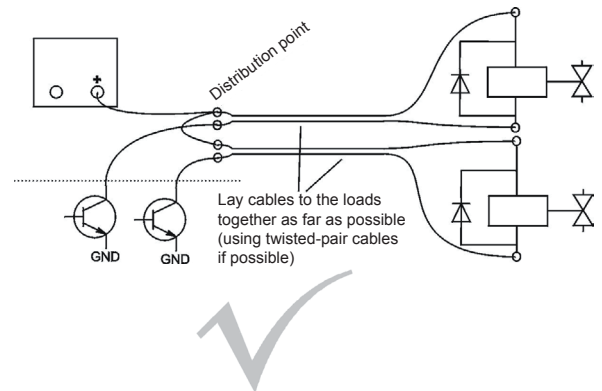


Fig. 2-21: Loads in parallel

Chapter 3 Startup

Once the unit has been unpacked and installed, it is recommended to make some adjustments (e.g. select the language) and to perform some basic procedures (leak test and calibrations).

In order for the information in this chapter to be of any relevance, the unit must have

been installed according to the instructions in chapter 2.

For more detailed information on the topics described in this chapter, read chapter 5 of the X-STREAM X2 instruction manual.

CAUTION

OPERATION AT LOW TEMPERATURES



When operating an instrument at temperatures below 0 °C (32 °F), do NOT apply gas nor operate the internal pump before the warmup time has elapsed!

Violation may result in condensation inside the gas paths or damaged pump diaphragm!

Consider the related instructions in the X-STREAM X2 series manual!

The USB-Stick shipped with your analyzer contains important analyzer specific data in the subfolder "Analyzer Documentation"!



To protect against data loss,

- **print out and store in a safe place all the files**

or

- **copy the subfolder to another data storage medium!**

3.1 Performing a Leak Test

3.1 Performing a Leak Test

Before starting up the instrument, it appears to be appropriate to perform a leak test, thus ensuring the gas path system does not have leaks, and to achieve best and proper measuring results.

The following procedure describes how to perform a leak test with focus on the instrument.

The gas path system should be leak tested at least on a bimonthly basis and after maintenance, replacement or repair of gas path parts.

Note!

It is recommended to include external equipment (e.g. cooler, dust filters, etc.) into a leak test!

Required tools




- U-turn manometer for max. 1.45 psi (100 mbar)
- Stop valve

Procedure

- Connect the water filled u-turn manometer to the analyzer's sample gas output (disconnect external gas lines).
- Install the stop valve between gas input fitting and a Nitrogen (N₂) supply.
- Open the stop valve until the internal gas path is under pressure of approx. 0.725 psi/50 mbar (corresponding to 19.7 inch/500 mm water column)
- Close the stop valve. After a short time for the water to balance, the water level must not change over a time period of approx. 5 minutes!

WARNING

HAZARD FROM GASES

Before opening gas paths they must be purged with ambient air or neutral gas (N₂) to avoid hazards caused by toxic, flammable, explosive or harmful to health sample gas components!

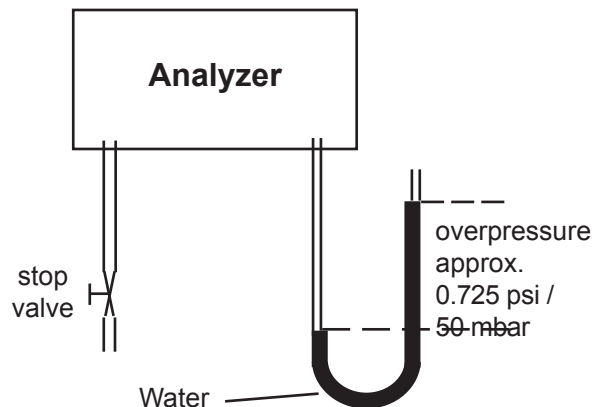



Fig. 3-1: Leak Testing with U-turn Manometer



Max. pressure 7.25 psig (500 mbar)!

Multi channel instruments: Analyzers with parallel tubing require separate leak tests for each gas path !

3.2 The User Interface

3.2 The User Interface

All X-STREAM gas analyzers have an alphanumeric display with four lines of 20 characters to display measuring and status information and the easy-to-use menu-based user interface for entering parameters. For ease of understanding, the user can at any time select one of three languages stored in the unit (currently available: English, French, German, Italian and Spanish in various combinations).

Units are operated using six keys on the front panel.

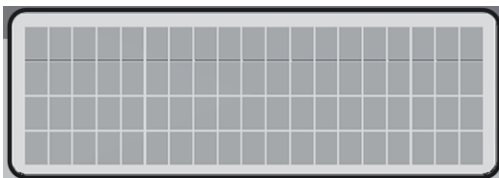
Three LEDs on the front panel enable the operating status to be recognised instantly.



Fig. 3-2: X-STREAM front panel

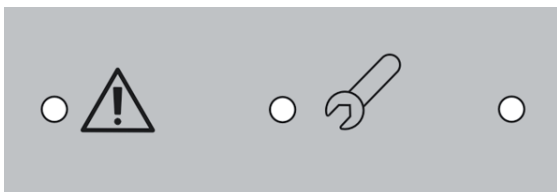
3.2 The User Interface

3.2.1 Display



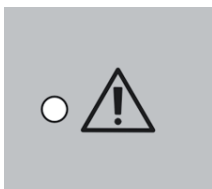
The display has 4x20 characters, either liquid crystal or vacuum fluorescent (LCD or VFD). What information is displayed depends on the currently displayed menu.

3.2.2 Status LED

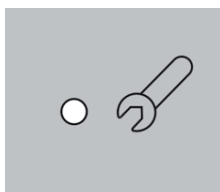


Three status LED indicate the unit's status, recognisable from a distance.

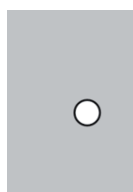
Status is indicated in accordance with the German NAMUR NE 44 recommendations.



"Failure" is indicated when this red LED is lit.



A flashing red LED in the middle indicates "Maintenance request", "Function check" or "Off-spec operation".



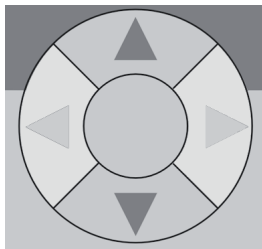
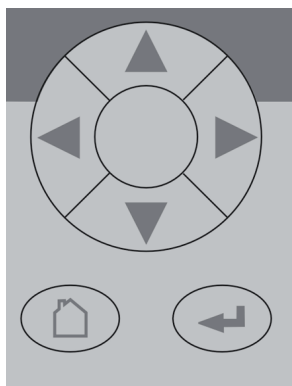
The third, green LED indicates the power supply status:

on: power supply OK

off: power supply interrupted

3.2 The User Interface

3.2.3 Keys



Six keys enable the use of the menu system. Depending on the operational mode (measuring, browsing menus, editing) they have the following functions:

ENTER key:

Mode	Function
Measuring	Leaves the measurement display
Browsing	Accesses submenu (..) or executes command (!)
Editing	Confirms new entry

MEASURE key:

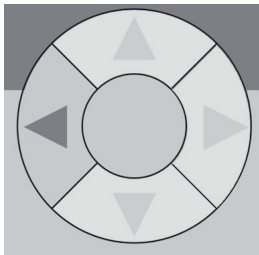
Mode	Function
Measuring	(no function)
Browsing	Returns to measurement display
Editing	Cancels entry

UP / DOWN keys:

Mode	Function
Measuring	Leaves the measurement display
Browsing	Selects menu line
	Goes to previous/next page, when currently in a line beginning with ▲/▼
Editing	Changes current parameter

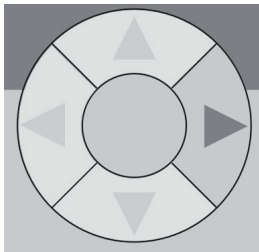
3.2 The User Interface

LEFT key:



Mode	Function
Measuring	Leaves the measurement display
Browsing	Goes up 1 level or page in menu system
Editing	Moves cursor 1 space
	Leaves channel selection
	Cancels editing of given parameter
	Goes to previous page, when ▲ showing in first line

RIGHT key:




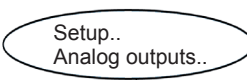
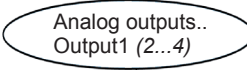
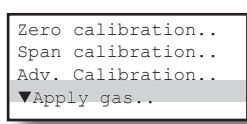




Mode	Function
Measuring	Leaves the measurement display
Browsing	Accesses submenu (..)
Editing	Goes to next page, when ▼ showing in fourth line
	Moves cursor 1 space


3.3 Symbols Used

3.3 Symbols Used

In the following sections, the symbols and typographical conventions described below are used to describe the software menus and navigation.

Symbols and conventions used in the following sections

Symbol	Meaning
Within descriptions of procedures	
	Menu title
	Parent (<i>Setup</i>) and current Menu (<i>Analog outputs</i>)
	As an example, the menu for Output1 is displayed; the menus for outputs 2 to 4 are identical
	Display Note! <i>Menus or lines on a grey background are optional or context-dependent, and are not always displayed</i>
	Access levels: Access level 1 (<i>user</i>)
	Access level 2 (<i>expert</i>)
	Access level 3 (<i>administrator</i>)
	Access level 4 (<i>service level</i>)

Convention	Meaning
Within descriptions	
<i>(Menu title)</i>  6.2.2, page 6-12	For a detailed description of this <i>Menü</i> , see section 6.2.2 on page 6-12
CONTROL - ZOOM..	Navigate from the main menu via the CONTROL menu to the ZOOM.. menu
„Valves“	Parameter name
Never, 1 min	Selectable values
0 ... 2000	Range of values

3.4 Software

3.4 Software

The analyzer software displays measurement results and status messages, allows parameters to be set and edited and allows maintenance functions (e.g. calibration) to be carried out.

To make it possible to perform all these functions on a 4x20 display, the software is organised hierarchically: measurement

Function	Description
Displaying TEXT	Simple text (not selectable with cursor)
Editing VARIABLES	<p>A variable description ends with a colon and the line can be made up of up to 3 elements:</p> <ol style="list-style-type: none"> 1. description 2. value: number or text 3. unit (optional) <p><i>Examples:</i></p> <p style="padding-left: 20px;">Span gas: 2000 ppm Tol.Check: Off</p> <p>Variables without a colon cannot be edited.</p>

3.4.1 Navigating and Editing

Selecting a line

Lines are selected using the **↑↓** (UP/DOWN) keys.

The cursor is displayed over the first character of the selected line. It is moved down with the DOWN key and up with the UP key.

If the cursor is in the first line, pressing the **↑** key will move it to the last line.

display is on the topmost level, while menus and submenus are below (see X-STREAM X2 series instruction manual).

The following methods are used to distinguish between various functions, e.g. executing commands:

Function	Description
Executing COMMANDS	<p>A command line text ends in a colon; when this line is selected and ENTER pressed, a command is executed, e.g. a calibration procedure.</p> <p><i>Example:</i></p> <p style="padding-left: 40px;">Start calibration !</p>
Selecting a MENU	<p>A menu line text ends in two dots; when this line is selected and ENTER pressed, a submenu is opened.</p> <p><i>Example:</i></p> <p style="padding-left: 40px;">Setup..</p>

If the cursor is in the last line, pressing the **↓** key will move it to the first line.

An action in the selected line is initiated by pressing the **↵** key, i.e. opening a new menu, starting a procedure or entering edit mode.

3.4 Software

If a selected parameter has been changed, the “function check” status is set, with the following consequences:

- the middle LED lights
- the NAMUR relay is activated.

The status can be reset by acknowledging it in the “Acknowledgements” menu.

A “function check” message set off by editing a parameter is **automatically** reset upon returning to the measurement display.

Browsing

Some menus have more than four entries, and these cannot all be displayed at once. In these menus, an indicator in the last (▼) or first (▲) line indicates the direction the menu continues in.

To show the following page, the cursor is placed in the line with the indicator and the UP or DOWN key pressed. Alternatively, the LEFT or RIGHT key can be used, irrespective of where the cursor is located.

```
Line 1
Line 2..
Line 3
▼Line 4
```

```
▲Line 1
Line 2..
Line 3
▼Line 4
```

```
▲Line 1
Line 2..
Line 3
Line 4
```

Menu continues downwards..

Menu continues upwards and downwards..

Menu continues upwards.

Editing

Editing mode enables the setting of a parameter. It is initiated by pressing the \leftarrow key.

The cursor is now placed over the last character of the current value. Pressing the \uparrow \downarrow keys change the selected character; if it is a list of possible values, the entire value is changed.

The \leftarrow and \rightarrow keys are used to select a specific character for editing.

Which characters are available depends on the position of the cursor:

- It is not possible to select the minus sign or decimal point as the last character.
- It is not possible to select the decimal point in integer values.

- For decimal numbers, the decimal point can be placed anywhere within certain limits.

There are two ways to leave editing mode:

\leftarrow key: the value is verified (e.g. min/max). If the value is possible, it is saved and the new value displayed; if not, an error message is displayed.



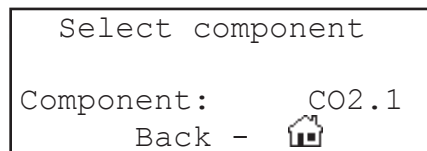
key: Cancel: all settings and changes are reset to their former values.

3.4 Software

Component selection menu

A single channel analyzer has only one measurement channel (component): editing any parameter will only effect this one channel.

A multi-channel analyzer requires that a channel must be selected before its parameters can be changed. When this selection is necessary, a menu is automatically displayed; it is not displayed on single-channel units.



3.4.2 Access Levels

Access levels can be used to prevent changes to parameters by unauthorised personnel. The X-STREAM menu system supports **four prioritized** access levels which can be activated and deactivated separately, and should be supplied with their own access codes.

Level four has the highest priority and is used for factory settings — only qualified EMERSON service personnel have access to this level.

Level three allows access to system admin parameters, e.g. for data capture and processing systems.

Level two covers the expert settings, e.g. basic settings for calibration.

Level one is the user level and includes parameters which should be set by trained personnel.

Any menus not assigned to one of these levels are not editable or are of minor relevance. In this chapter, the descriptions of the individual menus also indicate which level the

menus are in. These assignments cannot be changed.

Access codes for levels 1 to 3 can be defined, activated and deactivated by the client. The analyzer is delivered with the following settings:

Level	Access code	Status
100000001		Off
200000002		Off
300000003		Off

It is recommended to set new access codes if they are to be activated.

Note!

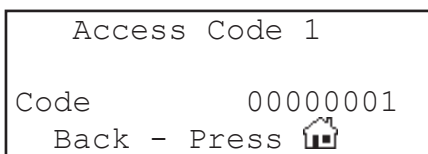
*If a lower level is **locked** (i.e. its code activated), all higher levels will also be **locked**.*

*If a higher level is **unlocked** (i.e. its code deactivated), all lower levels will also be automatically **unlocked**.*

3.4 Software

Entering access codes

If an access code is required for a menu, the following message is displayed:

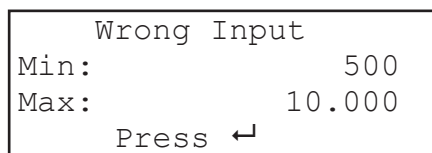


Use


- the UP/DOWN keys to change the currently selected digit,
 - the LEFT/RIGHT keys to select a different digit,
 - the ENTER key to submit the code
- or
- the MEASURE key to leave edit mode and return to the previous display.

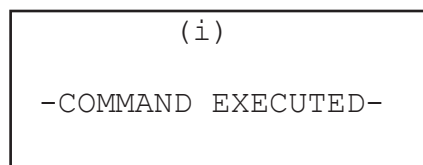
3.4.3 Special Messages

Depending on the last action performed by the user, one of the following messages may be displayed to assist or inform the user (the two confirmation messages are displayed only for a few seconds):

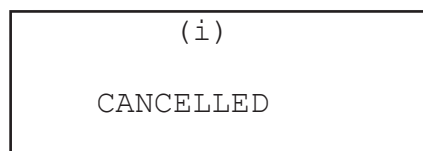


Information on incorrect entry:

The value entered by the user is outside valid limits. The display indicates what limits apply. Pressing  returns the display to the previous screen to allow a valid setting to be entered.



Confirmation of execution of command:
Confirms that a procedure (e.g. calibration) has been started.



Confirmation of cancellation:
Confirms that a procedure (e.g. calibration) has been aborted.

X-STREAM X2

3.5 Powering Up

3.5 Powering Up

3.5.1 Boot Sequence

When the unit is powered up, a series of internal tests is automatically performed. During this time the front panel keys are disabled,

while the time remaining for the boot sequence counts down in the display.

3.5.2 Measurement Display

The measurement display is shown

- automatically on completion of the boot sequence
- when the MEASURE key is pressed
- automatically after a set period of time of inactivity (i.e. with no keys being pressed).

The information displayed in the four lines of the measurement display can be determined by the operator:

- Sample gas components, measuring results and measuring units for each channel
- additional measurements, e.g. pressure, gas flow, temperature
- nothing (empty line)

The factory settings are as follows:

- Line 1: measured value of channel 1
- Line 2: measured value of channel 2
- Line 3: measured value of channel 3
- Line 4: measured value of channel 4

Note!

If less than four channels are installed in the unit, only the values of the available channels will be shown.

Line 4 is also used to display plain text status information (errors, maintenance requests, function checks or off-spec performance).

If such messages are active, line 4 alternates between the messages and the parameter selected for line 4.

Active messages are stored in an internal buffer. If there is more than one message in the buffer, the display will cycle through them.

Each message is not just shown in the display as text, but also indicated by the appropriate LED on the front panel and the activation of the appropriate NAMUR relay (if a relay has been assigned to that NAMUR function; see X-STREAM X2 series instruction manual).

Note!

There are also functions, that do activate a relay or LED, but are not shown on the display (e.g. concentration alarms). In such cases, check the status menu for more information.

CO2.1	135.1	ppm
O2.2	201952	ppm
CO.3	58.8	ppm
H2.4	1.5	%

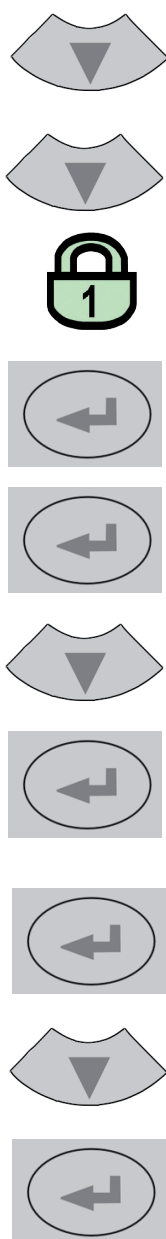
MEASUREMENT DISPLAY

3.6 Selecting the Language

3.6 Selecting the Language

If the analyzer is operational and it becomes clear that the incorrect language has been set, which is unintelligible to the operator, the

following sequence of keypresses (starting at the measurement display) can be used to set the language.



If the system has been set up accordingly, the code for access level 1 must be entered at this point to enable access to the following menu.

Note!

The factory setting for this unit is “no code required”. For ease of operation, it is recommended to use the factory settings for access codes while setting up the unit for the first time. In the following sections, therefore, no more reference will be made to any need for entering a code.

Note!

The fourth press of the ENTER key in this sequence access the “Language” parameter line.

The DOWN key changes the language. Pressing ENTER will set this language and the display is updated accordingly.

If the selected language is not the intended one, the previous three steps can be repeated until the intended language is set.

3.7 Checking the Settings

3.7 Checking the Settings

The following sections are structured so that the user can work through them one by one after powering up the unit. After completing

these steps, the unit will be configured to the user's needs and functioning correctly.



Setup..

Display..



Language..

Language

Language: EN

Starting with the measurement display, pressing any key except the MEASURE key will access the MAIN MENU; from here, the following steps are to be followed:

(If the display is showing anything other than the measurement display, pressing the MEASURE key will return to the measurement display).

Note!

If you are unfamiliar with the language set: page 3-13 shows the sequence to be used to set a different language.

If the system has been set up accordingly, the code for access level 1 must be entered at this point to enable access to the following menu.

Note!

The factory setting for this unit is “no code required”. For ease of operation, it is recommended to use the factory settings for access codes while setting up the unit for the first time. In the following sections, therefore, no more reference will be made to any need for entering a code.

Set the preferred language for the software; each analyzer shipped with 3 out of below list of available languages.

Currently available (may be extended by future software versions.):

EN: English, **FR:** French, **DE:** German, **IT:** Italian, **ES:** Spanish, **PT:** Portuguese

3.7 Checking the Settings

3.7.1 Installed Options



```
▲InstalledOptions..  
Communication..  
Alarms..  
▼Save-Load..
```

```
Valves:      Internal  
COM-Interf:  Yes  
Pump:        Yes  
▼Flow monitor:  Yes
```

Page 1

```
▲DigitalIO:      1  
Pressure:      Internal  
Analog outputs  4  
More..
```

Page 2

```
Protocol:      MODB RTU  
MODB Mode:     32Bit  
ID number:     2  
▼Interface:    RS485/2w
```

```
▲Baud rate:     19200  
Parity:         No
```

All X-STREAM gas analyzers can be fitted with a variety of optional components: follow these steps to see which options are installed on your analyzer.

Press the LEFT key several times to return to the SETUP menu.

The cursor is now in the “In/Outputs” line over an arrowhead. Press the DOWN key to display the next menu page and open the INSTALLED OPTIONS submenu.

This menu is in two columns and indicates which of the possible optional components are installed in the unit. The values displayed on your unit may differ from those illustrated here.

Do not edit any entries in these menus without special knowledge.



Incorrect entries may result in incorrect results or impair the performance of the unit.

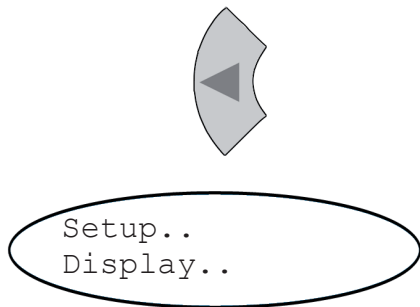
This initial access to this menu is intended to gain information on the configuration of the unit.

In the two pages of the COMMUNICATION menu, you can verify the parameters of the serial interface, and if necessary select the protocol to be used for data transfer.

Press the LEFT key twice to return to the SETUP menu.

3.7 Checking the Settings

3.7.2 Configuring the Display



Press the LEFT key to return to the display setup menu.

Check the settings for the measurement display, temperature and pressure units, and for menu access: use the DOWN and ETER keys to access the submenus.

If a setting is not in accordance with your requirements, access that menu and adjust the parameter.

Select the value to be displayed in each line of the measurement display. The following options are available:

▲Line 1:	Comp-1
Line 2:	Comp-2
Line 3:	Comp-3
▼Line 4:	Comp-4

- Comp-1 ... Comp-4,**
- Temp-1 ... Temp-4,**
- Press-1 ... Press-4,**
- Flow-1 ... Flow-4**
- Blank (nothing)**

Page 2

Note!

X-STREAM currently supports only one pressure sensor. Values Press-1 to Press-4 thus refer to the same sensor .

▲Component..
Temperature..
Pressure..
Gasflow..

The measurement units for the displayed values can be changed in the submenus on page 3.

Page 3

For example, here are the options for the display of temperature values:

Temperature	
Unit:	°C
DecimalPlaces:	1
Temp-1	63.7 °C

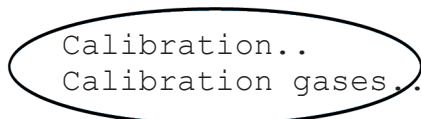
Set temperature unit
 Options available: **°C, °F**

Set number of decimal places for temperature display: **0 to 4**

Current temperature; here: sensor 1.

3.7 Checking the Settings

3.7.3 Calibration Setup



Once the display settings have been checked, press the LEFT key to return to the SETUP menu, then open the CALIBRATION menu where e.g. the calibration gas concentrations can be entered..

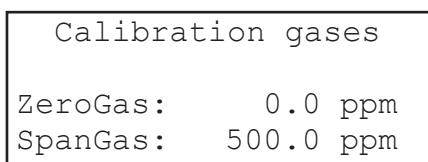
Note!

For more detailed information about the calibration procedure, see  Chapter 4.



Multi-channel unit:

Select the component to be set in the gas component selection menu.



In the CALIBRATION GASES menu, the values for zero and span gas should be entered: these values should be taken from the gas supplier's certification. Values must be correctly set for results to be accurate.

In multi-channel units, the values for each channel must be entered separately.



Press the LEFT key to return to the CALIBRATION menu, and check the entry for "Tol. Check". The "Tol. Check" (tolerance check) option is set to inactive (**Off**) by default.

When the tolerance check is active (**10 %**), the analyzer checks during calibration whether the values set for zero and span gas conform to the concentration of the gas currently being supplied. If the concentration varies by more than 10% of the range from the value set, the calibration is aborted.

3.7 Checking the Settings

```
Calibration gases..  
Tol.Check:      Aus  
Hold on Cal:    Yes  
▼Purge time:    12 s
```

Page 1

Note!

The line "Purge time" and the second menu page are only displayed if the "Valves" parameter in the *INSTALLED OPTIONS* menu is not set to **none**.

```
▲Valve assignment..  
Interval time..  
  

```


Page 2

This prevents calibration from being performed when the incorrect gas is supplied (e.g. span gas calibration using zero gas), which would result in an incorrectly configured unit.

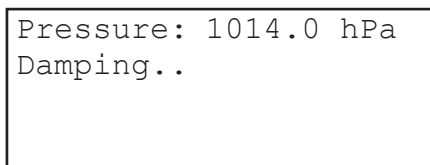
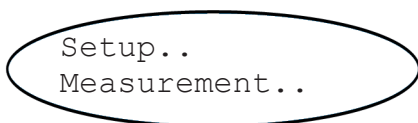
"Hold on Cal": Specifies behaviour of analog outputs and concentration limits alarms during calibrations (follow measured value or not)..

"Purge time": When gas flow is controlled by internal or external valves, these allow the appropriate calibration gas to flow into the unit as soon as the calibration procedure is started. Due to the limited gas flow and the distance between valves and measuring cell, some time is required before the measuring cell is filled with the calibration gas: this is the purge time, which is to be entered here. If the calibration is started earlier, the gas lines will still contain other components and the calibration will be inaccurate.

"Valve assignment": This line is to assign internal and/or external valves the function of either zero or span gas valve. Instruments with internal valves are already factory setup.

If any of these parameters need to be changed,  X-STREAM X2 instruction manual for more information.

3.7 Checking the Settings



Press the LEFT key to return to the SETUP menu and from there open the MEASUREMENT MENU.

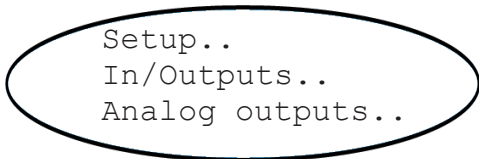
The first line allows the user to enter the current air pressure manually when no pressure sensor is installed, or to read the current pressure if a sensor is installed (INSTALLER INSTALLED OPTIONS menu). The measurement unit is set in the DISPLAY SETUP menu.

If no pressure sensor is installed, enter the current air pressure here and adjust it when significant changes take place: this improves the accuracy of the instrument.

Signal damping (set in the DAMPING menu) allows the smoothing of the measuring signal, but also affects the reaction time of outputs and display. The factory setting is 0 seconds, and any value between 0 and 28 seconds can be set. In multi-channel units, the value for each channel must be entered separately.

3.7 Checking the Settings

3.7.4 Setting the Analog Outputs



Press the LEFT key to return to the SETUP menu, and then open the IN/OUTPUTS menu. and from there the ANALOG OUTPUTS menu.

Page 1 shows settings which are relevant for all available analog outputs:

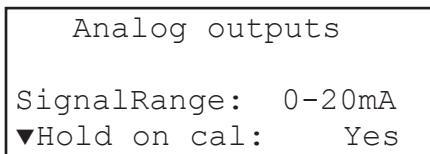
The “SignalRange” parameter sets the signal range for the analog outputs. This entry also allows the analog outputs to be set according to the NAMUR NE43 recommendations:

The **0–20 mA** operational mode generates a 20 mA signal when the concentration is measured at the upper limit of the signal range. A 0 mA signal is generated when the sample gas concentration is at 0 (dead zero).

However, a severed cable would also result in a signal of 0, and so an external data capture system would not be able to recognise such a failure, instead registering a gas concentration of 0.

The usual method to detect a severed cable is to use an offset current: when the concentration reaches the lower limit of the range, an analog signal of 4 mA is sent. This allows the detection of a severed cable.

This (life zero) mode is activated by setting the “SignalRange” parameter to **4–20 mA**.



Page 1

3.7 Checking the Settings

Operational modes conforming to NAMUR 43 recommendations (NE 43)

The modes described so far do not generate any signal which would allow the detection of a failure in the measurement system. In such a case, the behaviour of the output signal is undefined: either the last value is held, or a random value is sent. System failures cannot then be detected by an external data capture system.

NE43 includes recommendations for such cases, but also for the configuration of analog outputs to detect other measurement states. X-STREAM analyzers incorporate these recommendations as follows:

Setting the "SignalRange" parameter to a value other than **0–20 mA** or **4–20 mA** defines specific analog output signal levels for

system failures. Since these values are not sent during normal operation, a data capture system is able to distinguish between the following situations:

- valid measured value (signal within range as per Table 5-1)
- signal out of range (signal slowly rises or falls towards the limits given in table 5-1, and holds that value until the concentration returns to within the measuring range).
- failure (signal out of range as per table 5-1, but not 0)
- severed cable (no signal (0 mA)),

Table 3-1 shows an overview of all available operational modes.

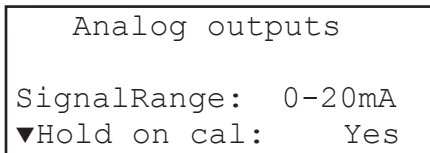
"Signal-Range"	Operation Mode	Failure Signal Level acc. NE 43	Output signal, if				
			Measured value is valid	Measured value is below lower range limit	Measured value is above upper range limit	An internal failure occurred	Cable is broken
0-20 mA	Dead-Zero	-	0 ... 20 mA	< -19 mA	> 21.7 mA	undefined	0 mA
4-20 mA	Live-Zero	-	4 ... 20 mA	< -19 mA	> 21.7 mA	undefined	0 mA
0-20 mAL	similar Dead-Zero	below	0 ... 20 mA	-0.2 mA* (-1.8 ... -0.01 mA)**	20.5 mA* (20.01 ... 21.5 mA)**	-2 mA	0 mA
4-20 mAL	similar Live-Zero	below	4 ... 20 mA	3.8 mA* (2.2 ... 3.9 mA)**	20.5 mA* (20.01 ... 21.5 mA)**	2 mA	0 mA
0-20 mAH	similar Dead-Zero	above	0 ... 20 mA	-0.2 mA* (-1.8 ... -0.01 mA)**	20.5 mA* (20.01 ... 21.5 mA)**	> 21.7 mA	0 mA
4-20 mAH	similar Live-Zero	above	4 ... 20 mA	3.8 mA* (2.2 ... 3.9 mA)**	20.5 mA* (20.01 ... 21.5 mA)**	> 21.7 mA	0 mA

Note!

The application of values marked * or ** depends on the setting of "SignalRange" (see next page).

Tab. 3-1: Analog output signals: settings and operational modes

3.7 Checking the Settings



Page 1

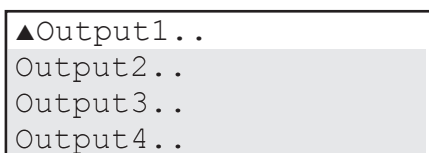
The behaviour of the outputs during calibration can also be set on page 1 of the ANALOG OUTPUTS menu (“Hold on cal” parameter): When the parameter is set to **Yes**, the following occurs during calibration:

- the analog outputs are “frozen”; i.e., the output signals remain constant, irrespective of the actual measured concentrations;
- concentration alarms, which may otherwise be set off by the concentrations of the calibration gases, are suppressed.

When **No** is set, the analog output signal always corresponds to the actual measured value during calibration; this may mean that alarms are triggered when limits are exceeded.

Note!

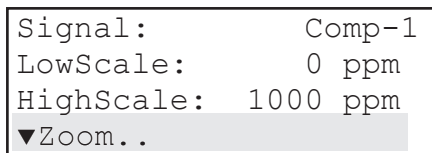
This behaviour may be undesirable if for example the unit is connected to a data capture system.



Page 2

The submenus on page 2 allow further analog output parameters to be set. The number of lines displayed will depend on the number of available analogue outputs. All these submenus are identical:

3.7 Checking the Settings

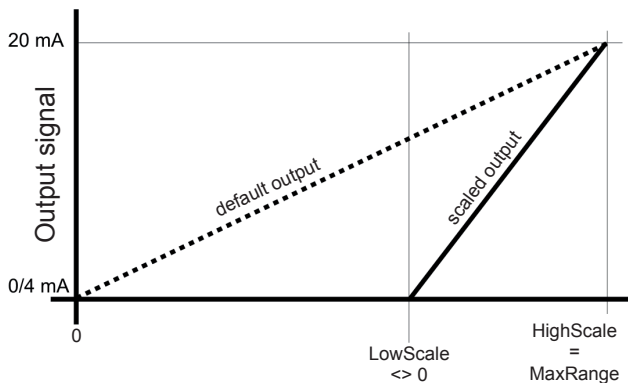
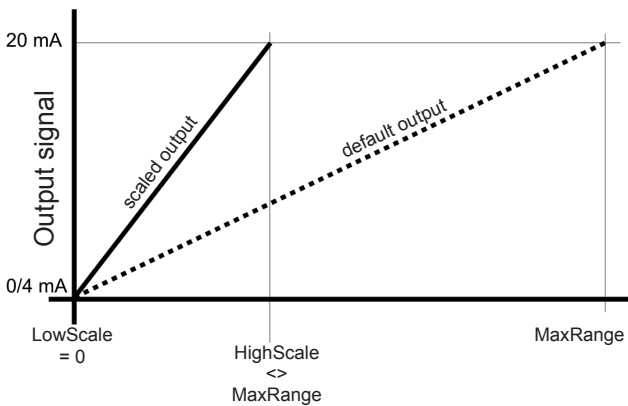


The “Signal” parameter defines the value to be sent to the selected output. The following options (partly dependent on the number of measuring channels and sensors installed) are available:

Value	Description
None	The analog signal is deactivated
0/4 mA	Either a 0 mA or 4 mA signal is generated, for example to be used to test the processing in a subsequent system. The actual type of generated signal is setup in the previous menu in the “SignalRange” line (see previous page).
20 mA	A 20 mA signal is generated, with which, for example, the processing of a signal can be tested.
Comp-1, Comp-2, Comp-3, Comp-4	Gas component of channel 1 to 4
Temp-1, Temp-2, Temp-3, Temp-4	Measured value from temperature sensor
Press-1, Press-2, Press-3, Press-4	Measured value from pressure sensor
Flow-1, Flow-2, Flow-3, Flow-4	Measured value from flow sensor
Zoom-C1, Zoom-C2, Zoom-C3, Zoom-C4	A “zoomed” signal is sent from the selected measuring channel (C1 to C4). If one of these options is selected, the “Zoom..” line appears in the menu (see above), which allows a zoom to be set.


3.7 Checking the Settings

```
Signal:      Comp-1
LowScale:   0 ppm
HighScale:  1000 ppm
▼Zoom..
```



The “LowScale” and “HighScale” parameters allow a concentration value to be set to correspond to the lower (0 or 4 mA) or upper signal value (20 mA). The limits for these parameters are given by the "MinRange" and "MaxRange" parameters, specifying the physical measuring ranges of each instrument. Concentrations outside the range defined by "LowScale" and "HighScale" are not supported by an analog output.

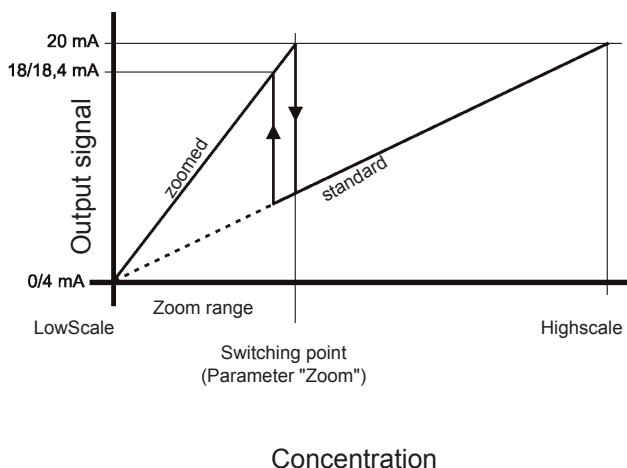
Note!
Scaling may affect the analog outputs accuracy!

Carefully read the information, given on  page 3-27 before scaling analog outputs!

The last line on this menu allows the zoom function of the analog output to be set when that output has been assigned the **Zoom** signal.


This function allows a part of the signal range, specified by “LowScale” and “HighScale”, to be “magnified” on the analog output. Unlike the scaling function, here the output is switched automatically, the moment the switching point concentration is reached.

3.7 Checking the Settings



This allows to increase the resolution (concentration/mA) for a selected range of the entire measuring range.

Note!
Zooming may affect the analog outputs accuracy!

Carefully read the information, given at  page 3-27 before scaling analog outputs!

X-STREAM analyzers support the zooming of analog outputs with the following options:
 The zoom function can be activated in different ways; this is set in the “Switching” line:

- **Manual:** The operator must activate the zoom function manually, with either
 - the “Status” parameter in the last line of this menu
 or
 - a parameter in the CONTROL - ZOOM.. menu
- **Auto:** The analog output is switched depending on the measured concentration.
- **Inputs:** This requires setting a digital input. If an external signal is present at that input, the analog output is switched.

```
Switching:      Manual
Zoom:           50 %
Position:       LowScale
Status:         Off
```

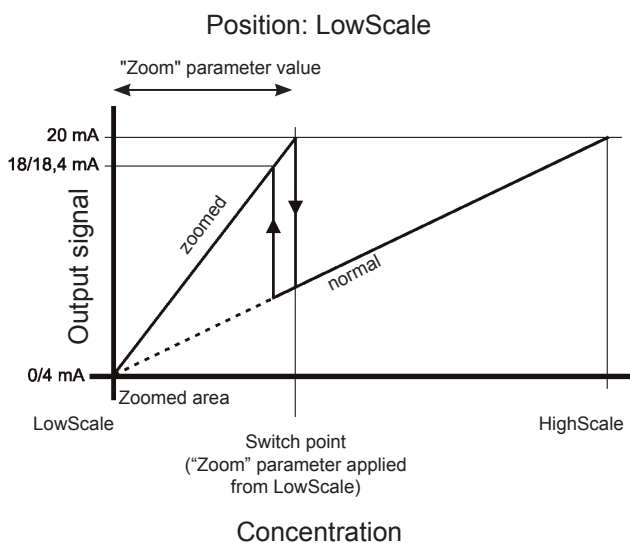
In the second line of the menu the zoomed area can be set to between 1 and 99 % of the range previously set in the “LowScale” and “HighScale” functions.

3.7 Checking the Settings

Note!

For both figures given below, the "Zoom" parameter is set to the same value (here: about 37%), but, depending on parameter "Position", is once applied from the LowScale end, and once from the HighScale end!

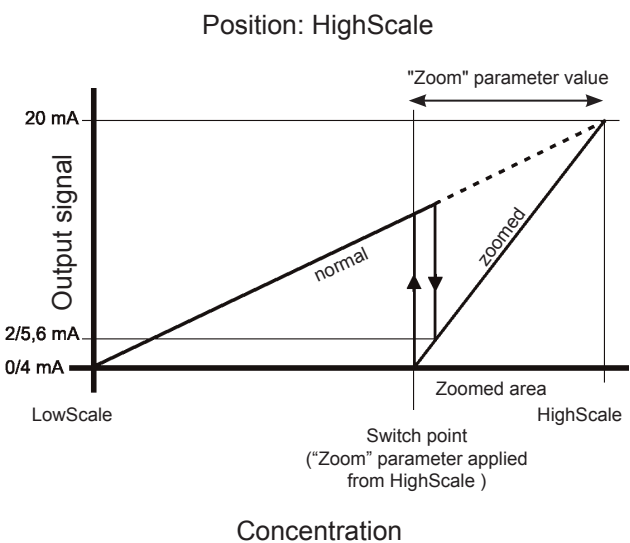
Additionally, the "Position" parameter allows the X-STREAM analyzer to zoom either the lower or the higher end of the range.



If the parameter is set to **LowScale**, the zoomed area is at the lower end of the measurement range.

When switching is set to **automatic**, a hysteresis of 10% of the output signal range is applied to the switch point:

Output signal range	Switch point in mA, measured in zoomed area	
	rising concentration	falling concentration
0 ... 20 mA	20 mA	18 mA
4 ... 20 mA	20 mA	18.4 mA



If the parameter is set to **HighScale**, the zoomed area is at the upper end of the measurement range.

When switching is set to **automatic**, a hysteresis of 10% of the output signal range is applied to the switch point:

Output signal range	Switch point in mA, measured in zoomed area	
	rising concentration	falling concentration
0 ... 20 mA	2 mA	0 mA
4 ... 20 mA	5,6 mA	4 mA

3.7 Checking the Settings

3.7.4.1 References to the accuracy of the analog outputs

Scaling or zooming relates to the analog outputs only and does not affect front panel display nor serial (Modbus) interface output of measuring results!

X-STREAM analyzers are shipped with pre-defined physical measuring ranges, as listed e.g. in the INFO-RANGES.. menu (parameters „MinRange“ and „MaxRange“):

All measurement specifications like repeatability, drift, etc. are related to these physical measuring ranges only! Scaling or zooming cannot improve analog output specifications to values better than specified by the physical measuring ranges!



Furthermore the tables apply only to analog output scaling meeting the form „0 ... MinRange“ to „0... MaxRange“ (means always **0** as "LowScale" value)!

If "LowScale" is set to a value other than **0**, specifications are not longer applicable to **analog outputs!** The same applies to the zoom parameter "Position" (👉 previous page), if set to **HighScale!**

Example

Analyzer data:
 MinRange: 500 ppm
 MaxRange: 5000 ppm

	Low Scale	High Scale	Statement
Scaling settings, where tables are applicable	0	500	<i>Parameter "LowScale" is 0 and "HighScale" within the limits of "MinRange" and "MaxRange"</i>
	0	1000	
	0	2375	
	0	5000	
Scaling settings, where tables are NOT applicable	100	500	<i>Parameter "LowScale" different 0</i>
	500	1000	
	375	2500	
	4000	5000	
	0	300	<i>Parameter "HighScale" lower than "MinRange"</i>
	0	5100	<i>Parameter "HighScale" higher than "MinRange"</i>

Tab. 3-2: Analog outputs - Scaling (examples)

3.7 Checking the Settings

3.7.5 Setting Concentration Alarms

Note!

If concentration alarms are not being used, go straight to page 3-34.



Press the LEFT key until the SETUP menu is displayed, then select “Alarms” and open the submenu. If you are using a multi-channel analyzer, select the channel to be modified.

Level1:	100 ppm
Function:	Low
Level2:	500 ppm
Function:	High

Two concentration limits can be set for each channel. Valid settings for limit levels depend on the measuring range and the value of the “SpanRange” parameter (👉 next page):

An error message is displayed if an invalid setting is input.

Should the measured concentration go beyond one of the limits, a message is displayed in the fourth line of the measurement display and the corresponding digital output is activated if programmed to do so.

3.7 Checking the Settings

The "SpanRange" parameter is displayed in the INFO - RANGE menu and is always given as the percentage of the upper range limit of the selected channel.

The "SpanRange" parameter is preset and cannot be modified by the operator. It is used for various functions:

Firstly, this parameter determines the **maximum possible value of the span gas**:

A SpanRange of e.g. 220 % means that the greatest permitted value of the span gas for the selected channel is 220 % of the maximum measuring range.

Example 1:

The oxygen measuring range is 10 %. If the SpanRange is set to 220 %, the maximum permissible span gas concentration is 22 %, enabling to use ambient air (21 % O₂) as a span gas.

Furthermore, the "SpanRange" parameter determines the **range for concentration limits**. 100 percentage points are subtracted from the value of this parameter: The result determines by how much above or below the measuring range limits may be set.

Example 2:

*Range upper limit: 1000 ppm,
 SpanRange: 100 %.*

This means that the span gas range coincides with the measuring range. Limits may not lie outside this range: only limits between 0 ppm and 1000 ppm are admissible.

Example 3:

*Range upper limit: 1000 ppm,
 SpanRange: 110 %.*

This means that the span gas range exceeds the upper measuring range limit by 10 %. The lower limit may therefore be 10 % below the lower range limit: limits of between -100 ppm and +1100 ppm are admissible.

Example 4:

*Range upper limit: 1000 ppm,
 SpanRange: 220 %.*

This means that the span gas range exceeds the measuring range by 120 % in both directions (220 % - 100 % = 120 %): the limits may be set between -1200 ppm (-120 % of 1000 ppm) and +2200 ppm (+220 % of 1000 ppm).

	Range: 0 ... 1000 ppm				
	Parameter "Span range"	Span range exceeds measuring range by		Permissible concentration limits	
		relative value	absolute value	lower limit	upper limit
Example 2 (see text)	100 %	0 %	0 ppm	0 ppm	1000 ppm
Example 3 (see text)	110 %	10 %	100 ppm	-100 ppm	1100 ppm
Example 4 (see text)	220 %	120 %	1200 ppm	-1200 ppm	2200 ppm

Tab. 3-3: Influence of "SpanRange" parameter on concentration alarm limits

3.7 Checking the Settings

The function of each limit can be set in the “Function” parameter:

Low: An alarm is triggered if the measured value drops below the set limit.

The alarm relay is activated.

High: An alarm is triggered if the measured value exceeds the set limit.

The alarm relay is activated.

Off: The alarm function is deactivated and the corresponding relay is not activated (remains dead).

The “Function” parameter also supports the “Failsafe” operational mode:

Failsafe (FS) means that the alarm relay is activated during **normal operation**. This is the reverse of the usual function in which a relay is activated when an alarm is triggered.

In FS mode, if an alarm is triggered, the relay is switched off. In this way, an alarm is also triggered if, for example, the analyzer loses power. Cable breaks can also be detected in this way. Options are:

Low FS: An alarm is triggered if the measured value drops below the set limit.

The alarm relay is deactivated.

High FS: An alarm is triggered if the measured value exceeds the set limit.

The alarm relay is deactivated.

Off FS: The alarm function is deactivated and the corresponding relay is activated.

Various different behaviours can be programmed using combinations of operational modes and limit settings:

- **Window mode:** An alarm is triggered, if the concentration drops below or exceeds the limits of a concentration window, .

- **High pre-alarm and main alarm:** A pre-alarm and a main alarm are set for rising concentrations.
- **Low pre-alarm and main alarm:** A pre-alarm and a main alarm are set for falling concentrations.

For more detailed information on alarm settings, please see the following instructions and illustrations.

Note!

Off FS is preset by default unless otherwise specified on time of order.

3.7 Checking the Settings

• **Defining a window**

If a window between an upper and a lower limit is defined, an alarm is issued when the concentration exceeds the upper level (area D) or drops below the lower limit (area B).

Only one alarm can be active per channel at any one time.

Standard mode:

An alarm results in the assigned relay being activated.

Settings:

- Level 1 > Level 2
- Level 1-Function: High
- Level 2-Function: Low

Failsafe mode:

An alarm results in the assigned relay being deactivated.

Settings:

- Level 1 > Level 2
- Level 1-Function: High FS
- Level 2-Function: Low FS

If an alarm is active, a corresponding message is displayed in line 4 of the measurement display.

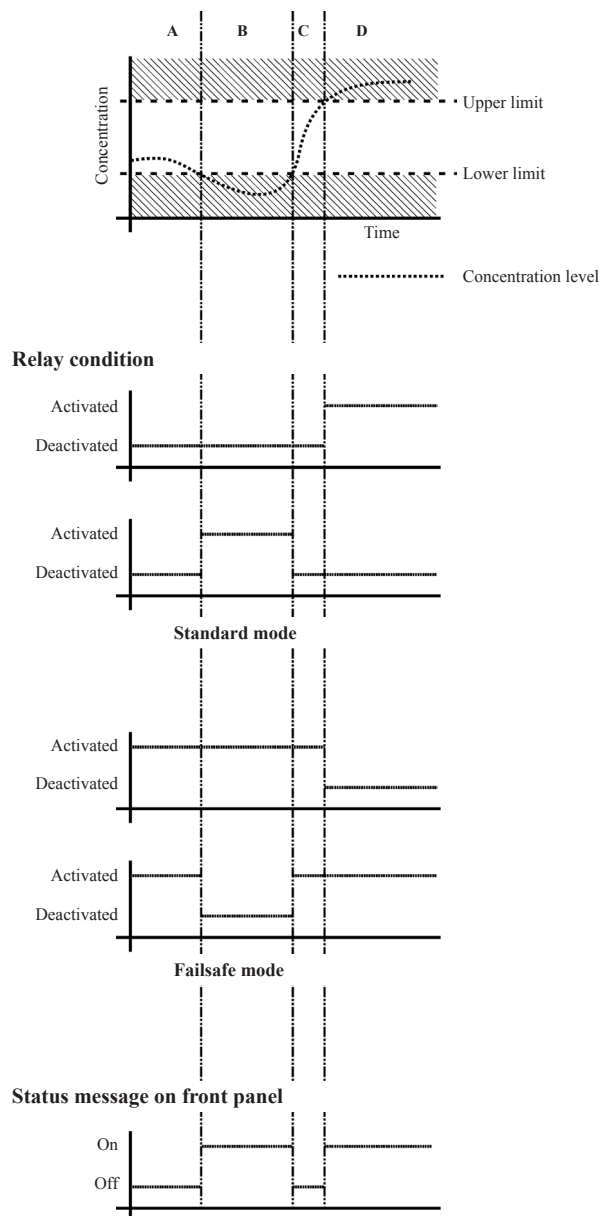


Fig. 3-3: Limits defining a window for valid concentrations

3.7 Checking the Settings

Defining high pre-alarm and main alarm

If two upper limits are set with one limit higher than the other, a pre-alarm is triggered when the measured concentration exceeds the first limit (area B). If no corrective measures are taken and the concentration exceeds the second limit (area C), a main alarm is triggered.

Up to two alarms may be active per channel at any one time.

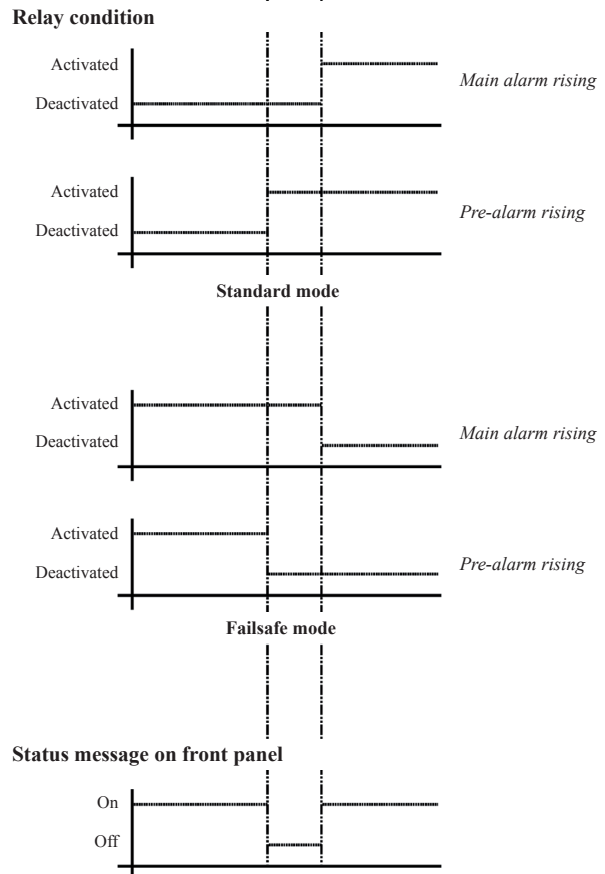
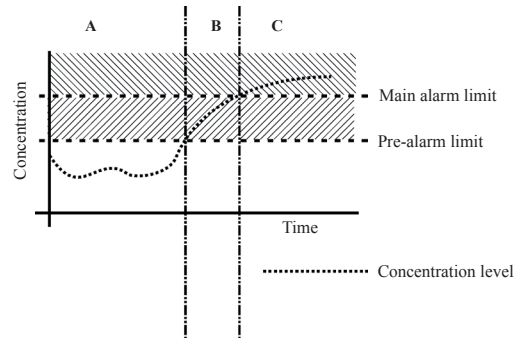


Fig. 3-4: High pre-alarm and main alarm

Standard mode:

An alarm results in the assigned relay being activated.

Settings:

- Level 1 > Level 2
- Level 1-Function: High
- Level 2-Function: High

Failsafe mode:

An alarm results in the assigned relay being deactivated.

Settings:

- Level 1 > Level 2
- Level 1-Function: High FS
- Level 2-Function: High FS

If an alarm is active, a corresponding message is displayed in line 4 of the measurement display.

3.7 Checking the Settings

• **Defining low pre-alarm and main alarm**

If two lower limits are set with one limit lower than the other, a pre-alarm is triggered when the measured concentration falls below the first limit (area B). If no corrective measures are taken and the concentration falls below the second level (area C), a main alarm is triggered.

Up to two alarms may be active per channel at any one time.

Standard mode:

An alarm results in the assigned relay being activated.

Settings:

- Level 1 > Level 2
- Level 1-Function: Low
- Level 2-Function: Low

Failsafe mode:

An alarm results in the assigned relay being deactivated.

Settings:

- Level 1 > Level 2
- Level 1-Function: Low FS
- Level 2-Function: Low FS

If an alarm is active, a corresponding message is displayed in line 4 of the measurement display.

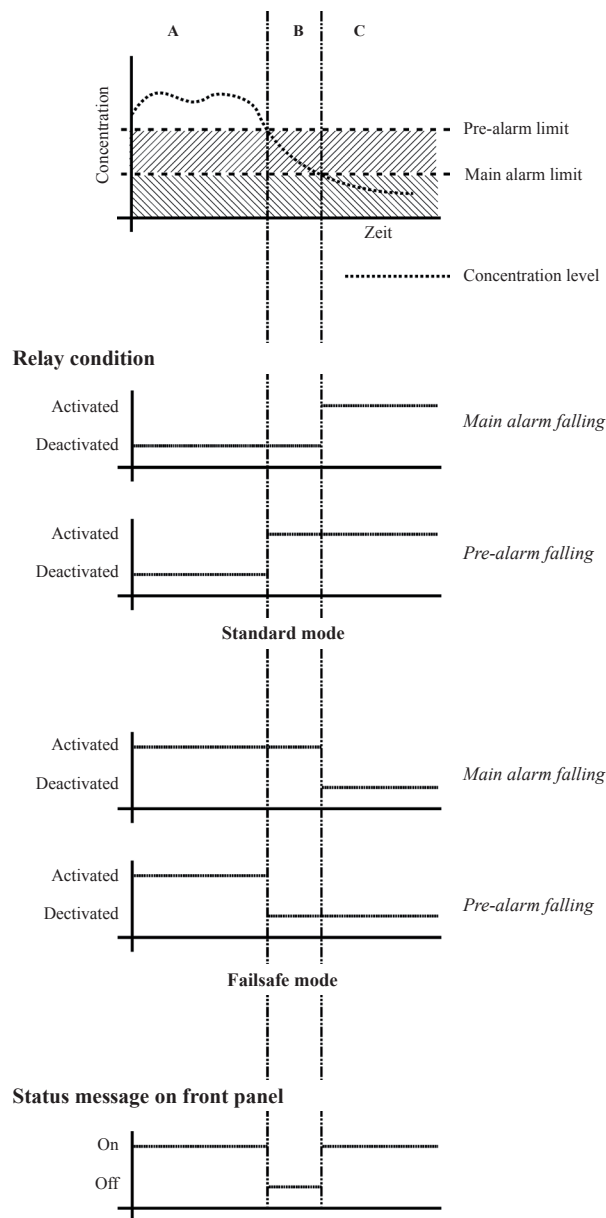


Fig. 3-5: Low pre-alarm and main alarm

3.7 Checking the Settings

3.7.6 Backing Up the Settings

The most important parameters have now been checked and the unit's settings adjusted to your needs.

A backup copy of these configuration data can now be made and saved.

Press the LEFT key until the SETUP menu is displayed, and from there open the SAVE-LOAD menu.



```
▲Installed options..  
Communication..  
Alarms..  
Save-Load..
```

Page 2

```
Save-Load  
CfgData > SvcPort!  
SvcPort > CfgData..  
▼Verify!
```

Page 1



```
▲  
FactData > CfgData..  
CfgData > UserData..  
UserData > CfgData..
```

Page 2

```
CfgData>UserData  
Are you sure?  
No!  
Yes!
```

Press the DOWN key to reach page 2.

Now select the "CfgData > UserData" line and press ENTER.

A new window comes up to confirm the action: Select the line **Yes!** and press the ENTER key: Another windows shows the current status.

3.7 Checking the Settings

```
Copying data
- PLEASE WAIT -
Procedure      X:E000
```

```
(i)
-COMMAND EXECUTED-
```



The unit is now saving a copy of the current configuration data (the so-called **CfgData** dataset) in a special area of memory labelled **UserData**. This dataset can be used to reset the unit later if, for example, later incorrect settings render the unit unusable.


If, during the analyzer startup up, the **Cfg-Data** checksum is found to be incorrect, the **UserData** dataset is loaded, to ensure the instrument remains usable.


Further changes to the configuration will only be stored in the **CfgData** dataset until manually saved to **UserData**.

Upon completion of the saving process a confirmation message will be displayed.


You have now completed checking the analyzer setup: Press the MEASURE key to return to the measurement display.


We recommend to perform at least a zero calibration, after startup of the instrument, to ensure proper measuring results.

 Chapter 4 for information on how to perform a manual calibration.


If your instrument features a valve block,  X-STREAM X2 instruction manual for a comprehensive description of calibration procedures.

Chapter 4 Maintenance

For information on how to carry out a leak test,  Chapter 3.

For further information about maintenance procedures  maintenance chapter of the X-STREAM X2 instruction manual.

4.1 Perform a Calibration

The following steps describe, how to perform a manual calibration. If your instrument features a valve block,  X-STREAM X2 instruction manual for a comprehensive description of calibration procedures.

Note!

To achieve best and proper measuring results, it is recommended to perform zero and span calibrations on a regular weekly basis. Also, a span calibration must always be preceded by a zero calibration!

Zero calibration

To perform a zero calibration supply either nitrogen (N₂) or another suitable zero gas [conditioned ambient air or industrial air (NOT for oxygen measurement!)] to the gas path. The concentration of the component of interest is specified as set point and during zero calibration, the actual value is assigned this concentration

Span calibration

Supply span gases with concentrations of 80 % to 110 % of the upper measuring range limit to the gas path. (*Using lower concentrations may decrease accuracy when measuring above the span gas concentration*) The concentration of the component of interest is specified as set point, and during span calibration the actual value is assigned this concentration!

Note!

If the oxygen concentration is known, ambient air may be used for an oxygen channel span calibration.

4.1 Perform a Calibration

CAUTION

OPERATION AT LOW TEMPERATURES



When operating an instrument at temperatures below 0 °C (32 °F), do NOT apply gas nor operate an internal pump before the warmup time has elapsed! Violation may result in condensation inside the gas paths or damaged pump diaphragm!



Do NOT calibrate the TRACE OXYGEN sensor (tO₂) without prior reading the instructions!

Together with each sensor an installation manual is shipped, also giving comprehensive calibration information.


Read these information prior intending to activate calibration procedures!



Do NOT calibrate the TRACE MOISTURE sensor (tH₂O)!

The sensor is completely calibrated with all calibration data stored in its flash memory and does not require recalibration:


If the sensor is included into a calibration procedure, it might end up with a wrong calibration and unusable sensor. Therefore the analyzer's trace moisture measurement channel is configured to be excluded from autocalibration procedures, by default calibrating all channels. **This exclusion is done by factory setup and cannot be changed.**

For proper measurement results we recommend to exchange the sensor regularly after 12 months of operation. For instructions on how to exchange,  X-STREAM X2 instruction manual



Before performing any actions, make sure the required calibration gas is applied and flowing!

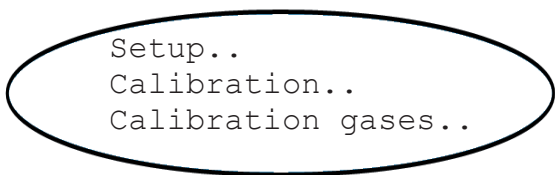
Supply all calibration gases with the same flow and pressure as the sample gas (recommended: approx. 1 l/min), and utilizing the correct gas fitting.

Ensure the warm-up time after switching on has elapsed! Warm-up time depends on installed measuring system and configuration,  measurement specifications in section 1.7!

4.1 Perform a Calibration

4.1.1 Preparing Calibrations

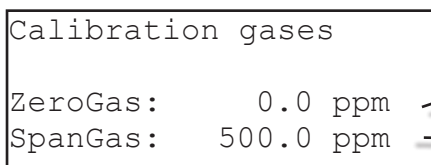
Before starting calibrations it is required to tell the instrument the calibration gas concentrations.



Starting from the measurement screen press the DOWN key to open the MAIN MENU, enter the SETUP-CALIBRATION.. menu and directly enter the CALIBRATION GASES.. menu.



Multi-channel unit:
 Select the channel to be calibrated in the SELECT COMPONENT menu.



Enter the concentration value for the zero gas to be used during zero calibration.

Enter the concentration value for the span gas to be used during span calibration.

Note!
 The units for the calibration gases are taken from the related entry in the display setup menu.

Multi-channel unit:
 Press the ← key to enter the SELECT COMPONENT menu to change the settings for a different channel.



When done, press the ← key to return to the CALIBRATION menu.

4.1 Perform a Calibration

```

Calibration gases...
Tol.Check:           Off
Hold on cal:         On
▼Purge time:         15 s
  
```

Example:

Measuring range: 0 ... 50 %
 Zero gas: 0 %
 Span gas: 50 %

Situation:

Due to a fault zero gas is supplied to carry out a span calibration, instead of span gas.

Tolerance check disabled (Off):

The analyzer calibrates the span with the wrong gas resulting in an analyzer out of tune.

Tolerance check enabled (10%; AutoOff):

Starting a span calibration with zero gas connected instead of span gas, the analyzer gives an error message and stops calibrating because the measured (expected span gas) value differs more than 10 % from the upper measuring range limit.

```

Calibration gases...
Tol.Check:           Off
Hold on cal:         On
▼Purge time:         15 s
  
```

By default the option "Tol.Check" (tolerance check) is disabled (**Off**).

So tolerance check helps avoiding calibrating with a wrong gas applied (e.g. starting a span calibration while zero gas is flowing) resulting in an instrument out of tune (see example to the left side).

With tolerance check enabled (**10%**) during calibration the analyzer checks that the entered (setpoint) values for zero gas and span gas are reasonable compared to the currently flowing calibration gas. If this gas concentration differs more than 10 % of measuring range from zero gas (during zero calibration) or span gas setup (during span calibration), calibration is aborted and a maintenance request alarm is set (LED and optional relay output). Resetting the alarm requires to perform a valid calibration or to confirm it within the CONTROL - ACKNOWLEDGEMENTS.. screen.

The 3rd option (**AutoOff**) has the same functionality as **10%** except that the maintenance request is reset after 2-3 minutes.

There are still situations when tolerance check must be disabled, e.g. when calibrating after changing the span gas concentration. In this cases select **Off**.

Note!

The last line ("purge time") shows up only if the valve option is other than none (see INSTALLED OPTIONS menu) and is used for advanced, remote and unattended calibrations only..

4.1 Perform a Calibration

4.1.2 Manual Calibration

Control..

```
Zero calibration..  
Span calibration..  
Adv.Calibration..  
▼Apply gas..
```

Starting from the measurement screen press the DOWN key to open the MAIN MENU and enter the CONTROL.. menu.

To start a zero calibration select the first line:

4.1.2.1 Manual Zero Calibration

Component ?

Multi-channel unit:
Select the channel to be calibrated in the SELECT COMPONENT menu.

Before selecting any further line make sure the required calibration gas is applied and flowing!

Supply all calibration gases with the same flow as the sample gas (recommended approx. 1 l/min), pressureless and utilizing the right gas fitting while calibrating, the analyzer compares the set values for zero or span gas with the actual value.



**Ensure the warm-up time after switching on has elapsed!
Warm-up time is 15 to 50 minutes depending on installed measuring system and configuration!**

The first line gives you the choice to cancel the procedure now.

Select the second line to **start the calibration.**

Line 3 shows the calibration gas setup (here: required zero gas concentration is 0.000 ppm), while line 4 shows the currently measured gas concentration.

```
CANCEL calibration!  
START calibration!  
ZeroGas      0.000 ppm  
▼CO2.1      0.200 ppm
```

4.1 Perform a Calibration

```
Gasflow      ZeroGas
CO2.1       0.500 ppm
Procedure    Zeroing
Time        10 s
```

After having started the calibration, watch the screen for information about the status:

The first lines shows the gas (channel) to be calibrated as well as the currently measured concentration (after zero calibration this value should be set to "0").

The line "Procedure" shows what's currently happening (**Zeroing** = calibration ongoing; **Purging** = waiting for measuring system to be filled with currently flowing gas; **None** = calibration finished), while the last line shows the remaining time till end of calibration (countdown starting from 40 seconds).

When finished press the LEFT key two times to return to **either**

the SELECT COMPONENT menu (multi channel analyzer only), select another channel to perform the steps described above to zero calibrate this channel, too,

or

the CONTROL.. menu, which allows you to start a span calibration. The procedure and screens look similiar to those of a zero calibration:

Select SPAN CALIBRATION...

Multi-channel unit:

Select the channel to be calibrated in the SELECT COMPONENT menu.



Before selecting any further line make sure the required calibration gas is applied and flowing!

The first line gives you the choice to immediately cancel the procedure.

Select the second line to **start the calibration**.

Line 3 shows the calibration gas setup (here: required span gas concentration is 20 ppm), while line 4 shows the currently measured gas concentration.

4.1.2.2 Manual Span Calibration



```
CANCEL calibration!
START calibration!
SpanGas      20.000 ppm
▼CO2.1      16.200 ppm
```

4.1 Perform a Calibration

Gasflow	SpanGas
CO2.1	20.000 ppm
Procedure	Spanning
Time	10 s

After having started the calibration watch the screen for status information:

The display shows the currently flowing gas, the gas (channel) to be calibrated as well as the currently measured concentration (after span calibration it should be set to the expected value) and a countdown for the current procedure:

The line "Procedure" shows what's currently happening (**Spanning** = calibration ongoing; **Purging** = waiting for measuring system to be filled with currently flowing gas; **None** = calibration finished), while the last line shows the remaining time till end of calibration (countdown starting from 40 seconds).

When finished, either press the LEFT key two times to return to the SELECT COMPONENT menu (multi channel analyzer only), select another channel and perform the steps described above to zero calibrate this channel, too, or the HOME key to return to the measurement screen to finish with manual calibration procedures.

4 Maintenance

Chapter 5 Dismounting and Disposal

5.1 Dismounting and Diposal of the Analyzer

WARNING

HAZARDS FROM DISMOUNTING



Dismounting instruments installed in hazardous area requires special documents to be issued and instructions to be followed! Do not dismount such instruments without written permit!



Failure to follow may result in explosion!



Gas lines may contain unhealthy or toxic gases, depending on the application, the instrument has been used for! Take care to purge such gas lines prior to disconnection, to remove all unhealthy or toxic components.

Failure to follow may result in personal injury or death!

WARNING

ELECTRICAL SHOCK HAZARD WHEN DISMOUNTING



Dismounting instruments installed in hazardous area requires special documents to be issued and instructions to be followed! Do not dismount such instruments without written permit!



Failure to follow may result in explosion!



Gas lines may contain unhealthy or toxic gases, depending on the application, the instrument has been used for! Take care to purge such gas lines prior to disconnection, to remove all unhealthy or toxic components.

CAUTION

HEAVY INSTRUMENT



Field housings, intended for outside and wall mounted use, weigh between 26 kg (57 lb) and 63 kg (139 lb), depending on version and options installed.

Two people and/or lifting equipment is required to lift and carry these units.

5 Dismounting & Disposal

When the instrument has reached the end of its useful life, do not throw it in a trash can!



This instrument has been made of materials to be recycled by waste disposal contractors specialised in this field. Let the instrument and the packing material duly disposed of in environmentally sound manner. Ensure the equipment is free of dangerous and harmful substances (decontaminated).


Take care of all local regulations for waste treatment.

Advice concerning the disposal of chemicals

This instrument may contain electrochemical sensors, e. g. for measuring O₂. For these sensors applies:

- Don't dispose of together with household carbage.
- At the end of useful life, the instrument and the sensors must be disposed of in compliance with the waste regulations, see instructions below.

When the instrument has reached the end of its useful life,

- purge all gas lines with inert gas
- ensure all gas lines are pressureless
- disconnect all gas lines
- switch off power and signal lines
- disconnect and remove all electrical connections
- for wall mounted instruments, support the instrument before loosening the fixing screws.
- properly fill out the Declaration of Decontamination ( X-STREAM X2 Instruction Manual)
- hand over the dismantled instrument together with the Declaration of Decontamination to a waste disposal contractor. This contractor then has to disassemble the instrument, recycle and dispose of in compliance with all applicable waste treatment regulations.

Appendix

This chapter contains

Block diagram



page A-2

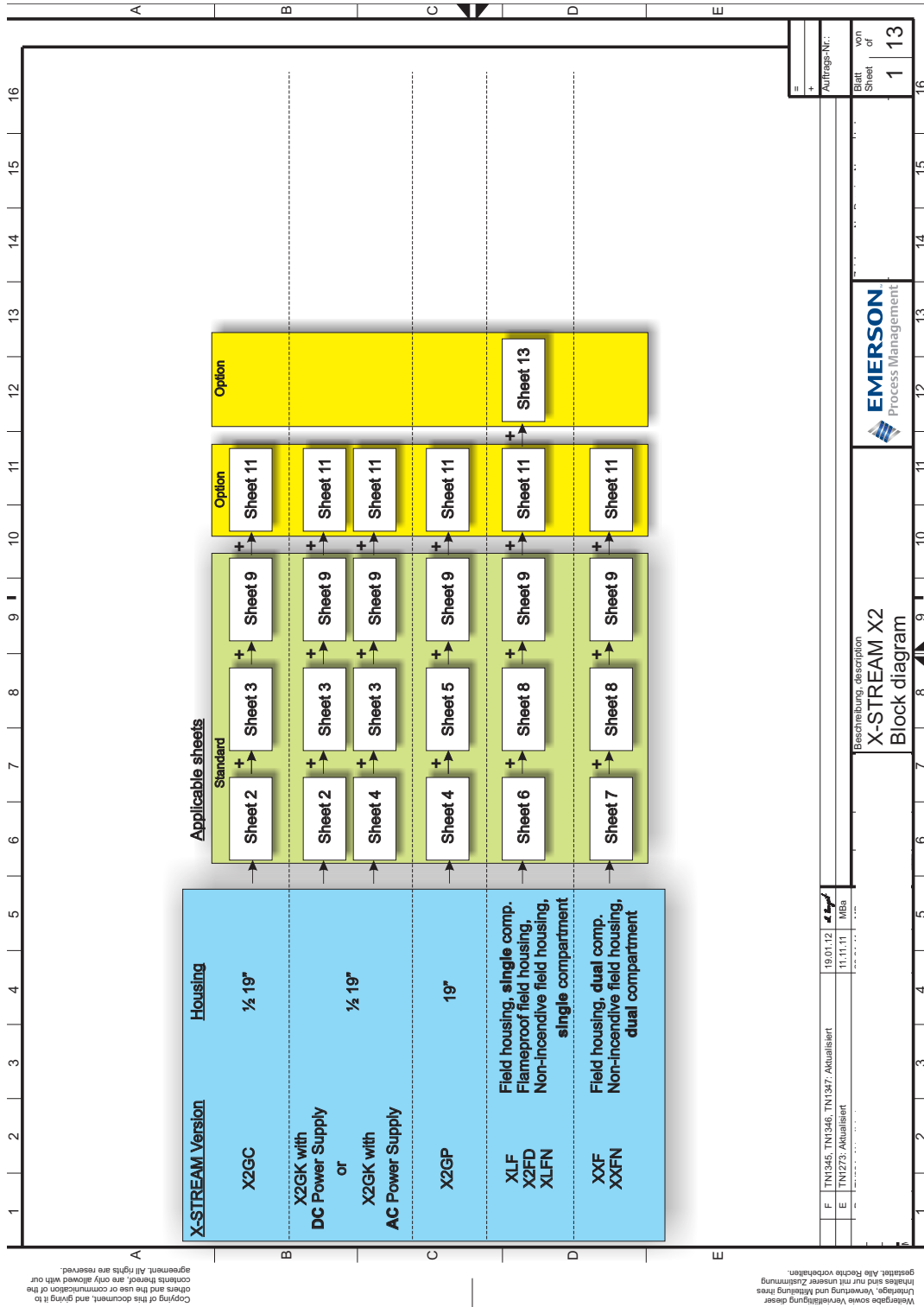
Assignment of Terminals and Sockets



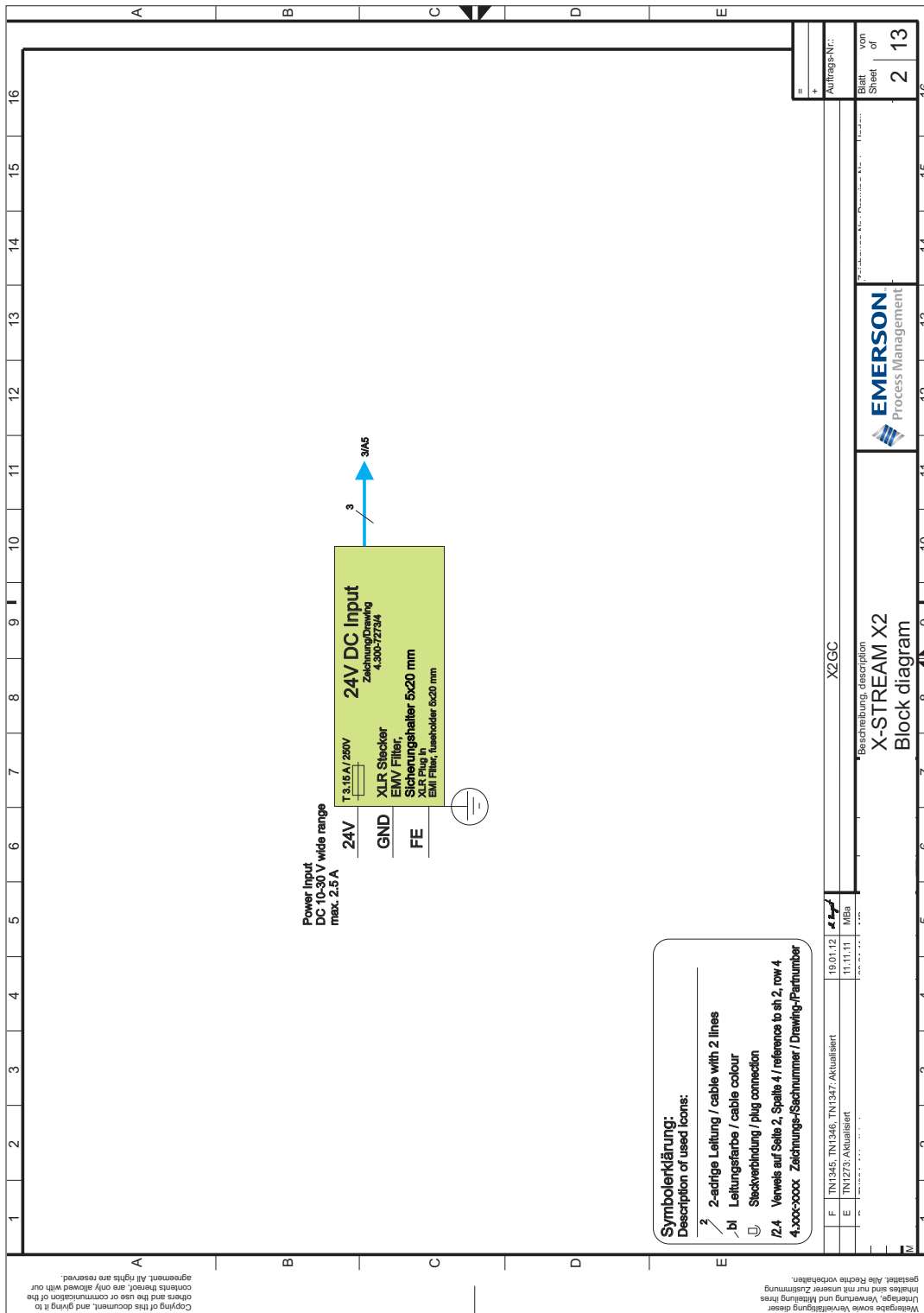
page A-15

A.1 Block Diagram

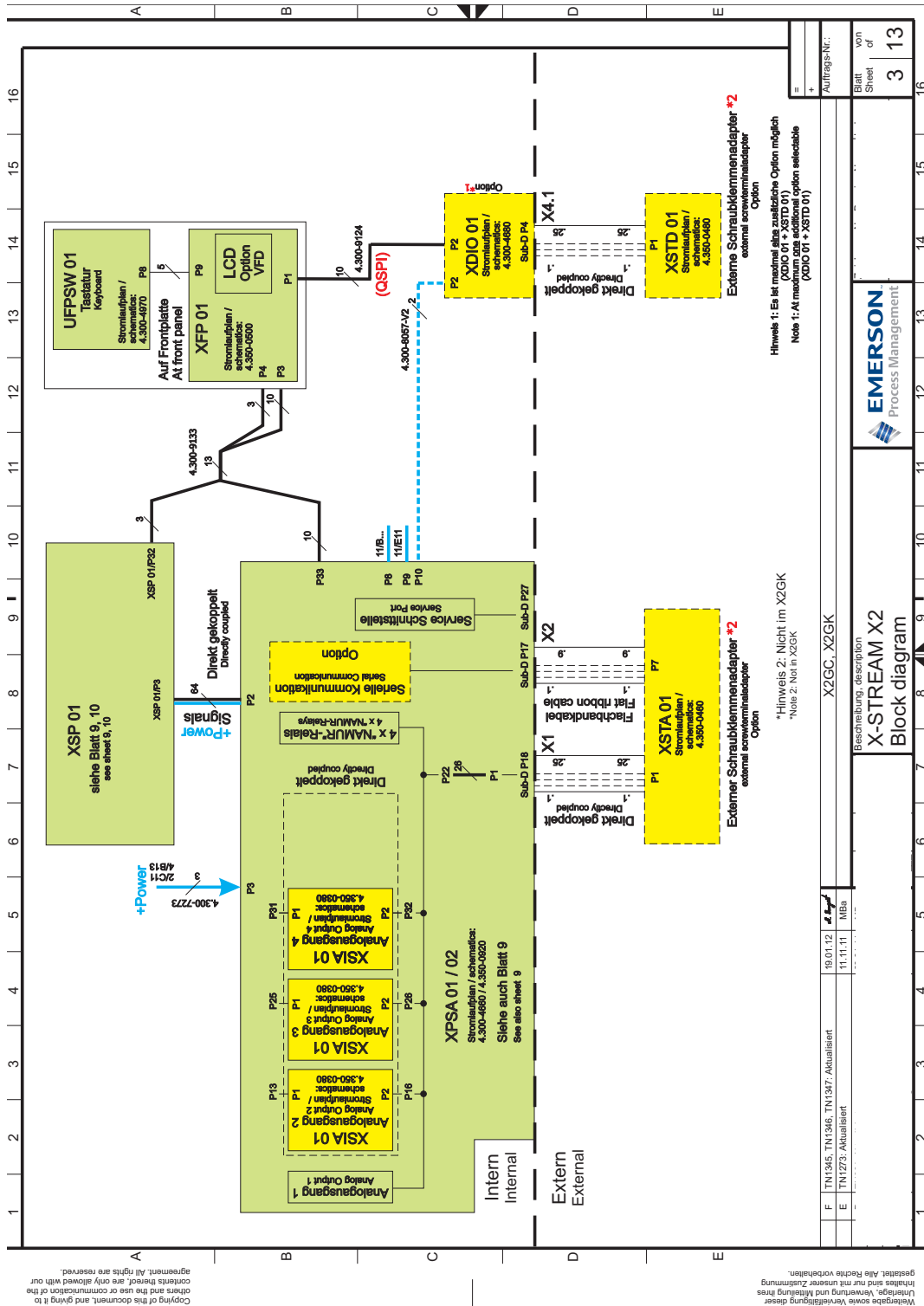
A.1 Block diagram



A.1 Block Diagram



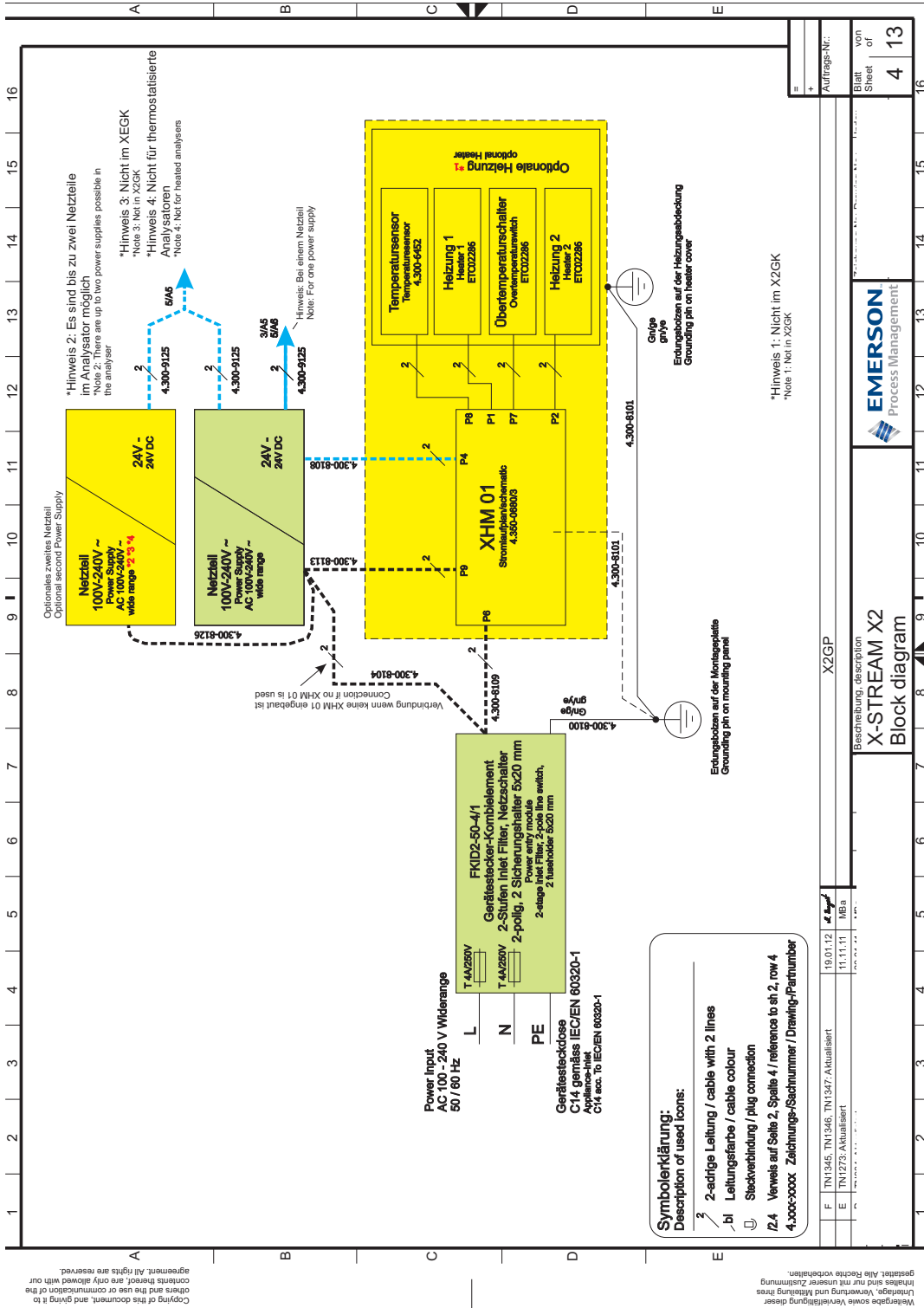
A.1 Block Diagram



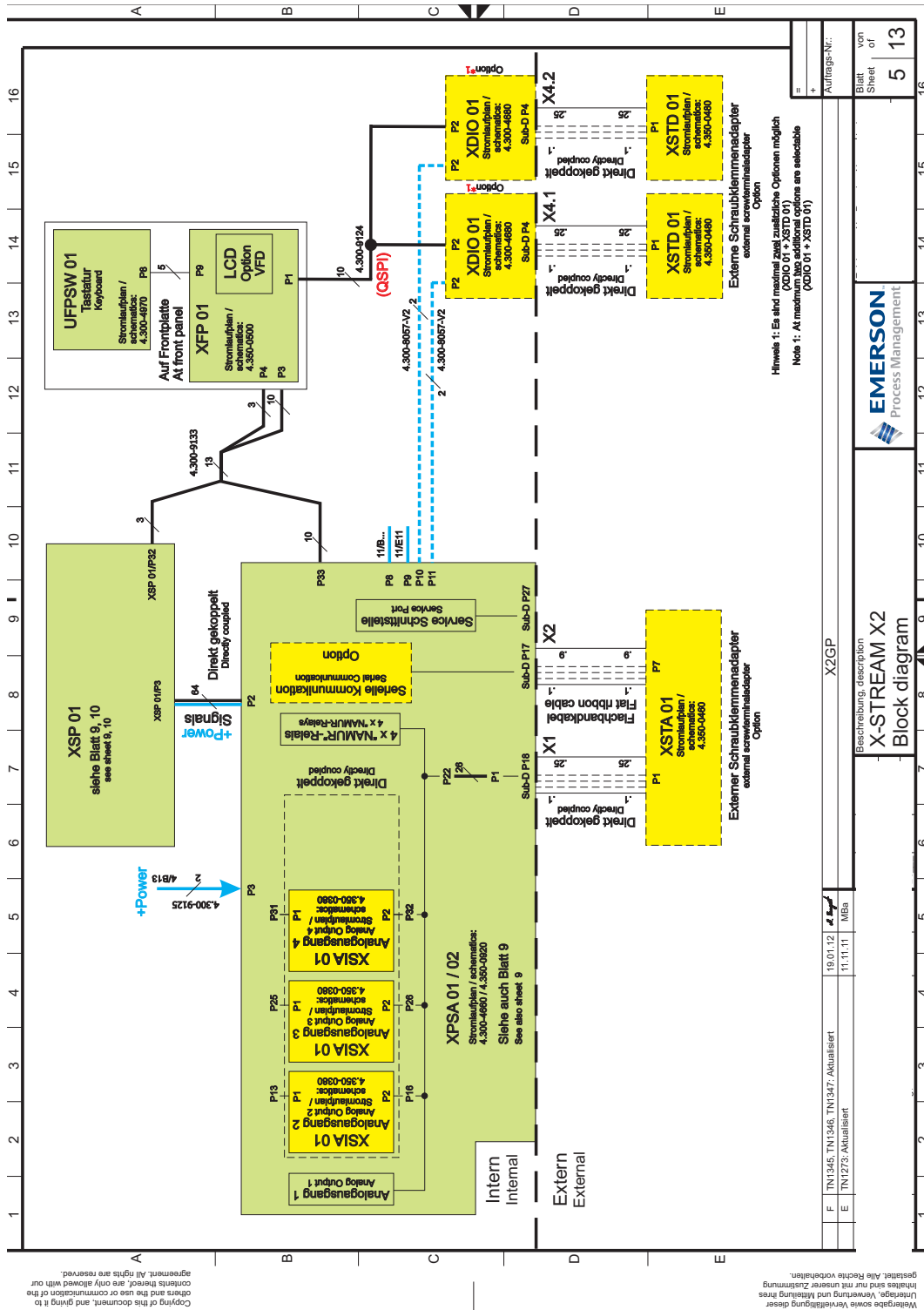
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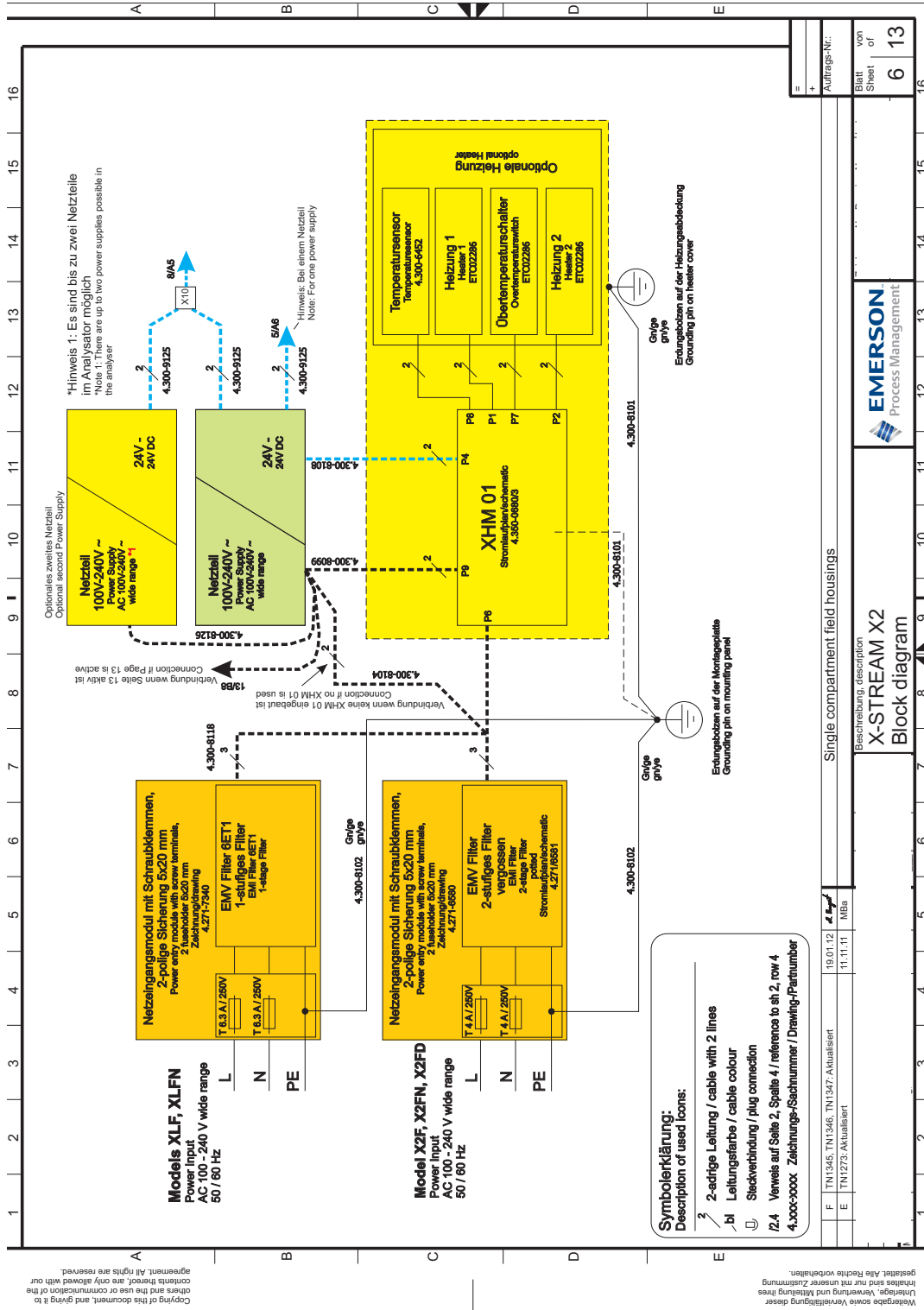
A.1 Block Diagram



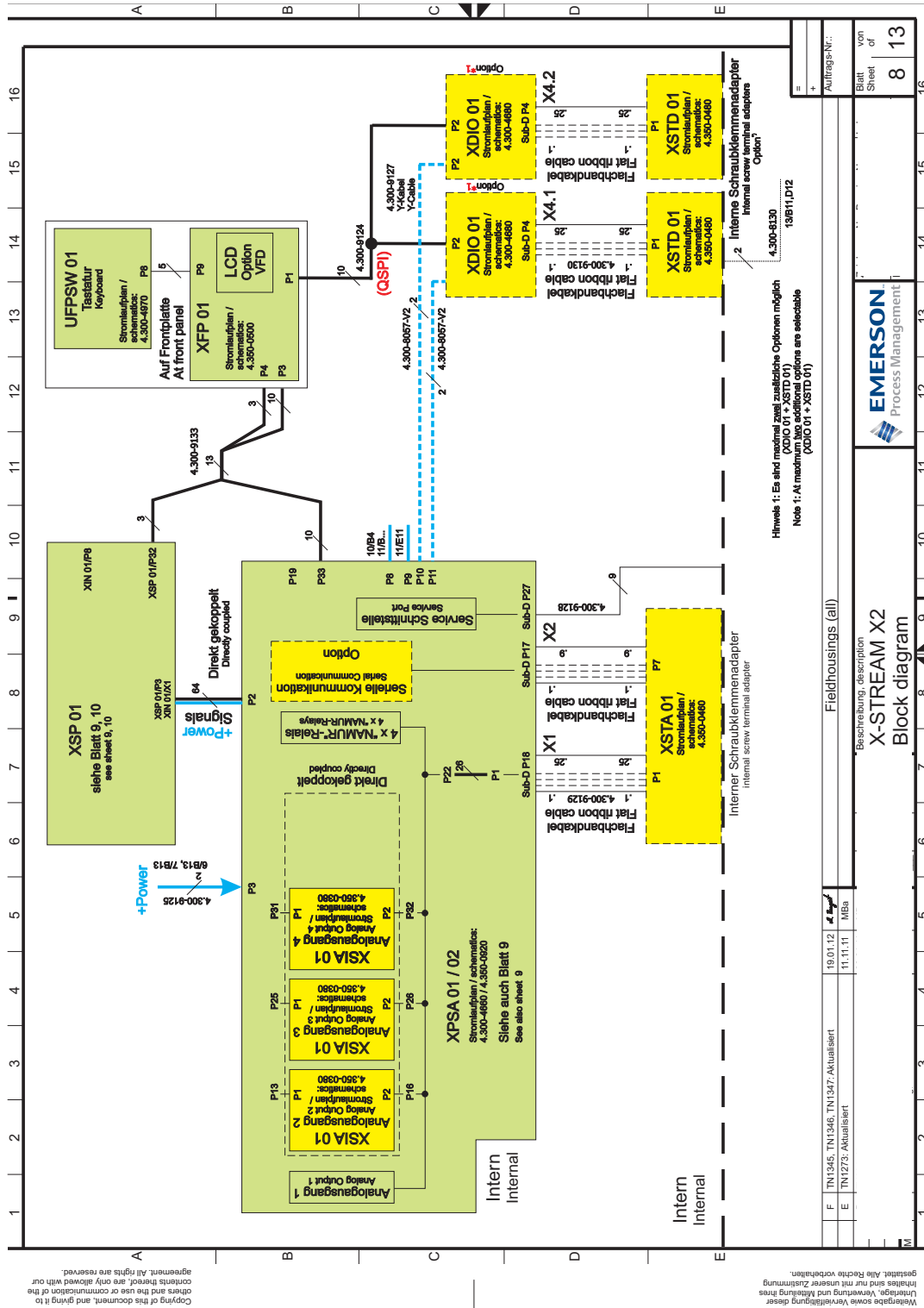
A.1 Block Diagram



A.1 Block Diagram

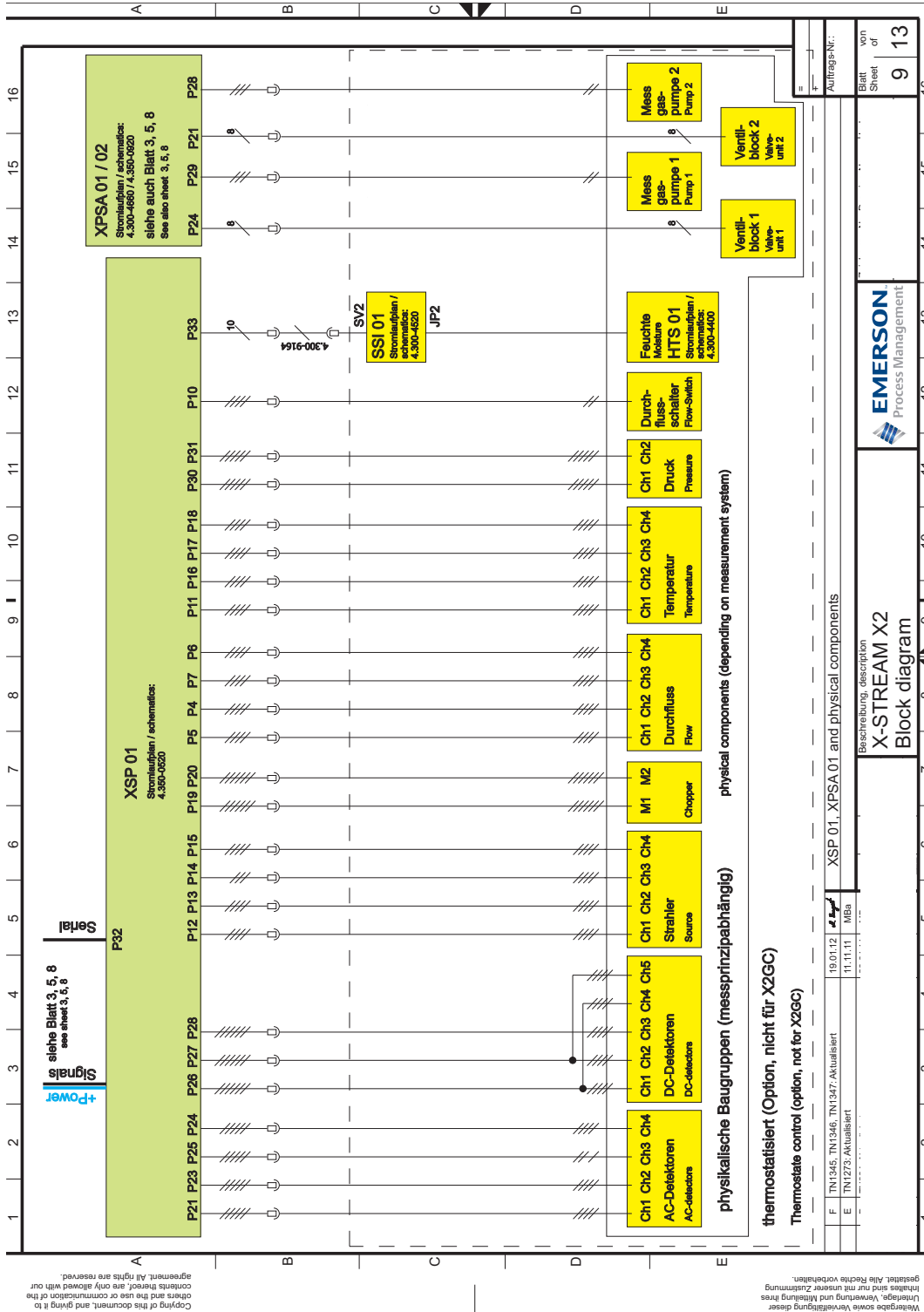


A.1 Block Diagram



F	TN1345, TN1346, TN1347: Aktualisiert	19.01.12	MBa
E	TN1272: Aktualisiert	11.11.11	MBa
Beschreibung, description X-STREAM X2 Block diagram			
Fieldhousings (all)			
EMERSON Process Management			
Auftrags-Nr.:		Blatt von 8 13	

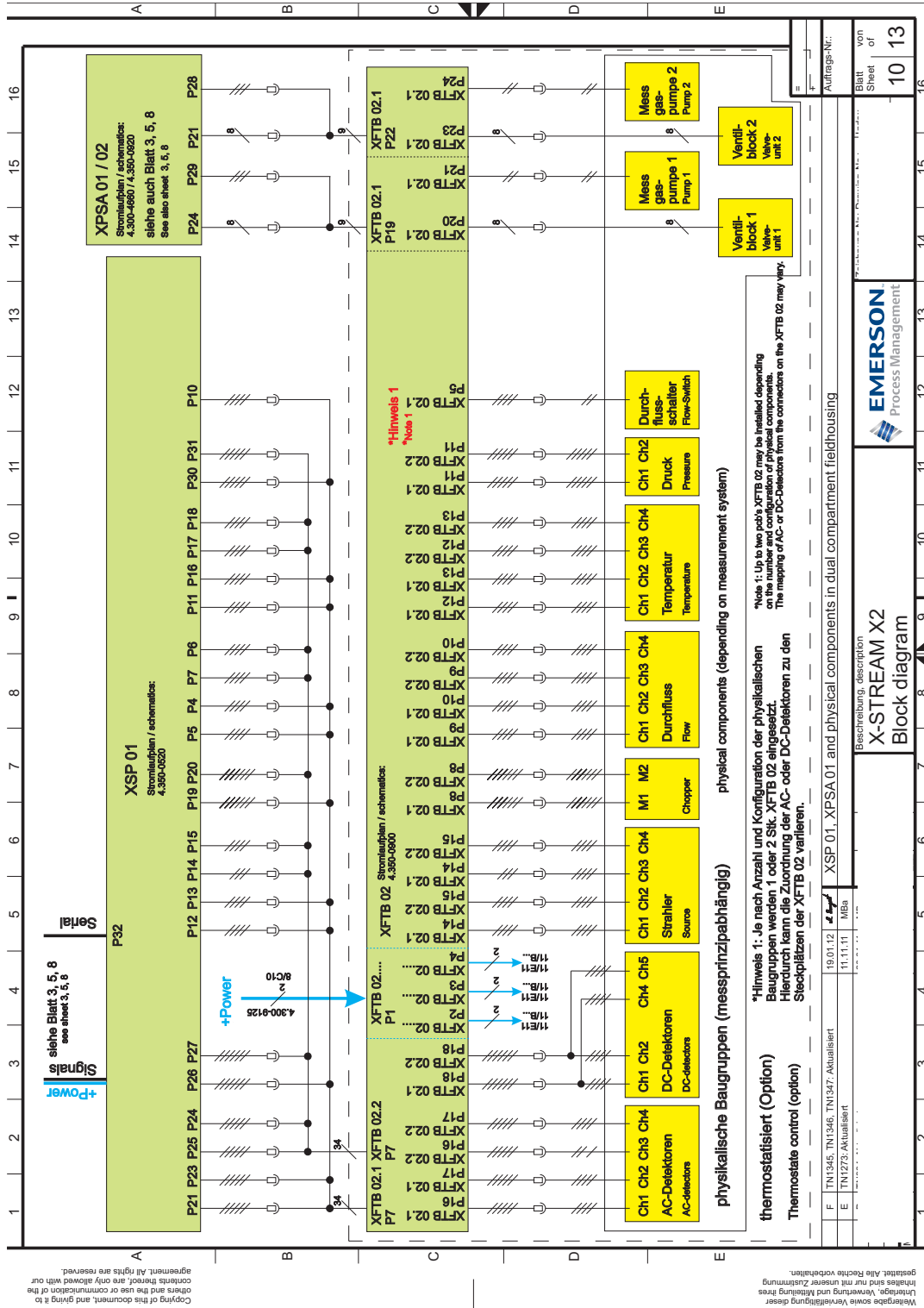
A.1 Block Diagram



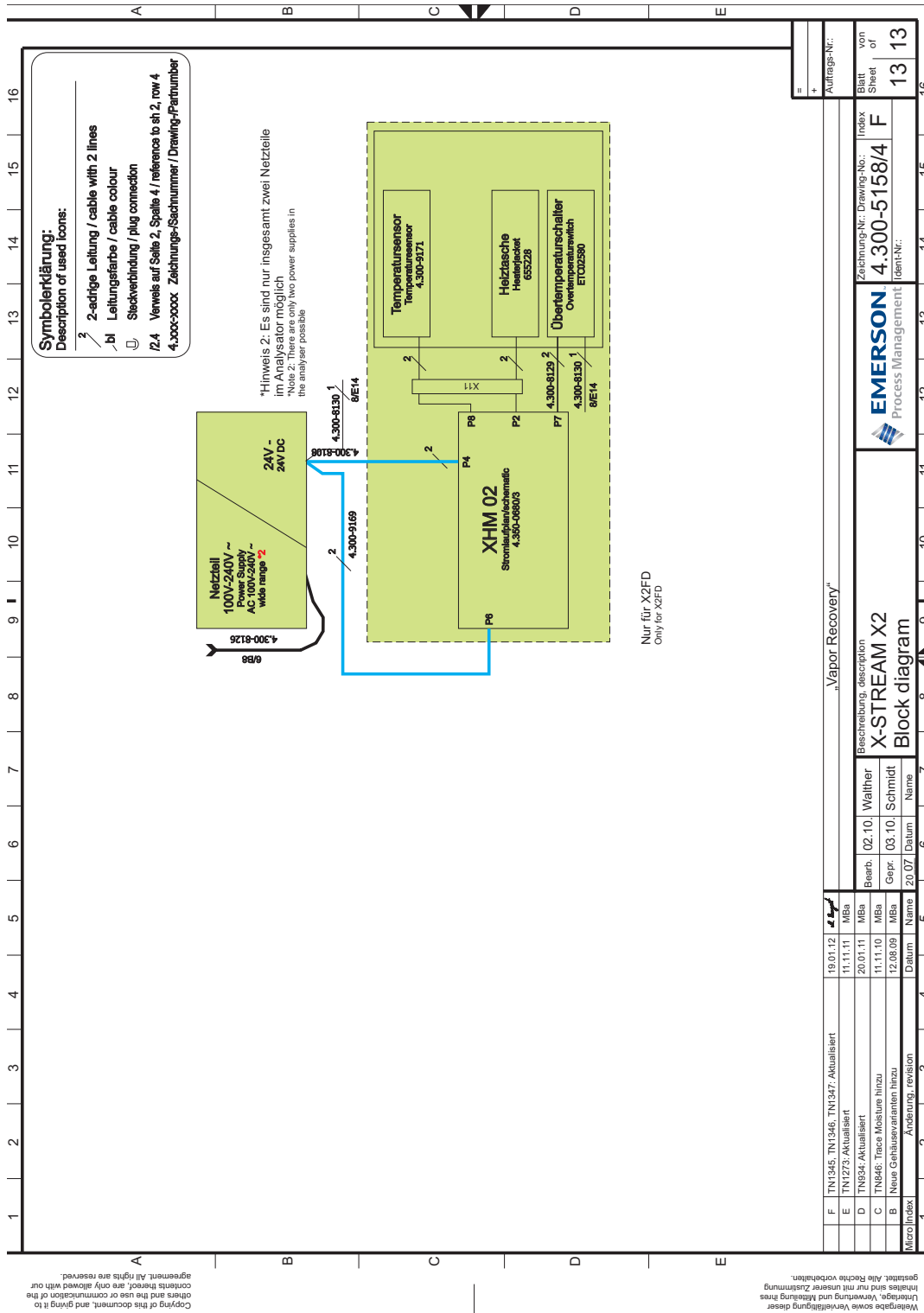
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A.1 Block Diagram



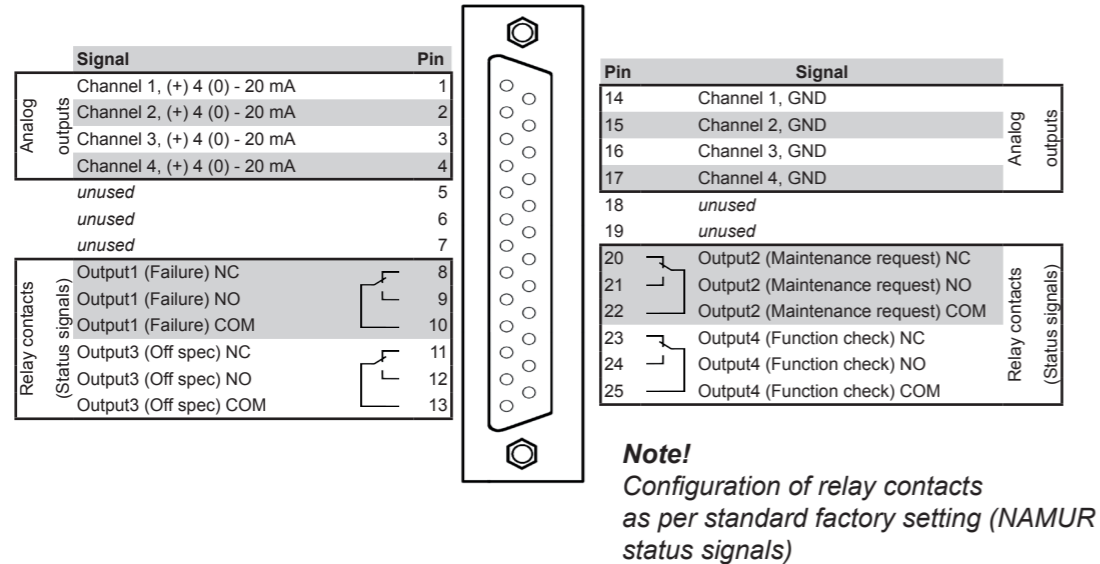
A.1 Block Diagram



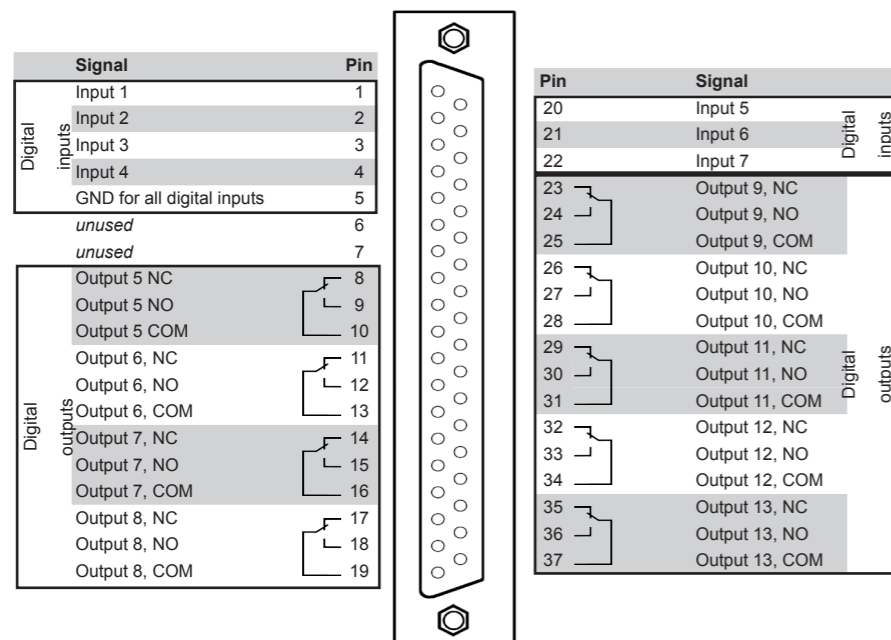
A.2 Assignment of Terminals and Sockets

A.2 Assignment Of Terminals And Sockets

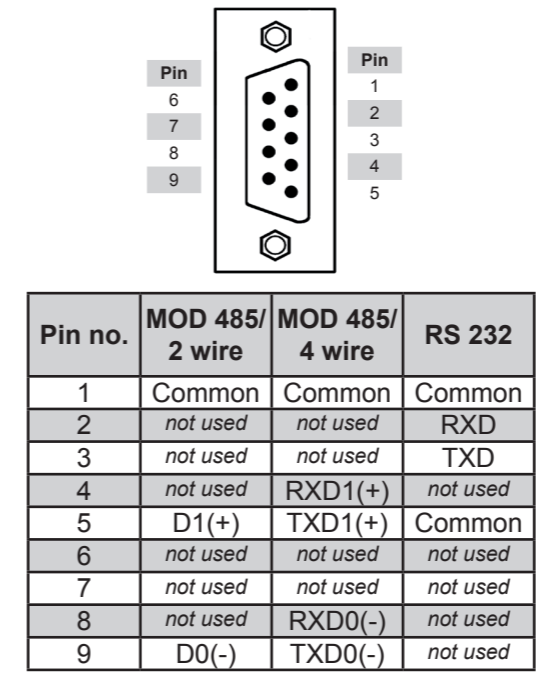
A.2.1 Tabletop & Rack Mount Analyzers



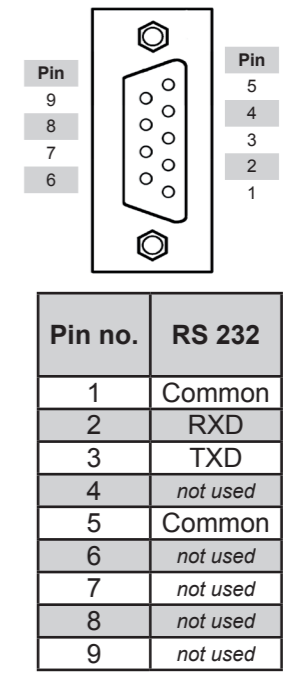
Socket X1 - Analog outputs, relay outputs 1...4
(Assignment of screw terminals adaptor: see XSTA on next page)



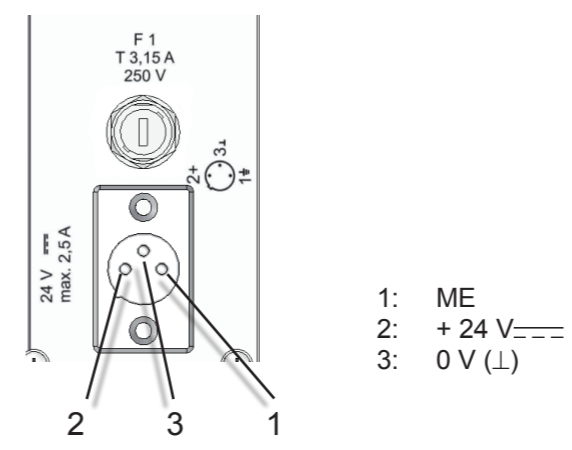
Socket X4 - Digital I/O
(Assignment of screw terminals adaptor: see XSTD on next page)



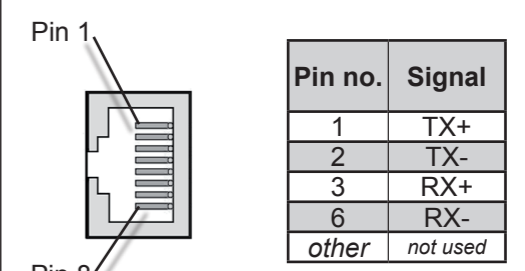
Connector X2 - IOIOI - Serial Modbus interface
(Assignment of screw terminals adaptor: see XSTA on next page)



Service Port Socket - Serial RS 232 interface



DC 24 V Input (1/2 19 in analyzer)

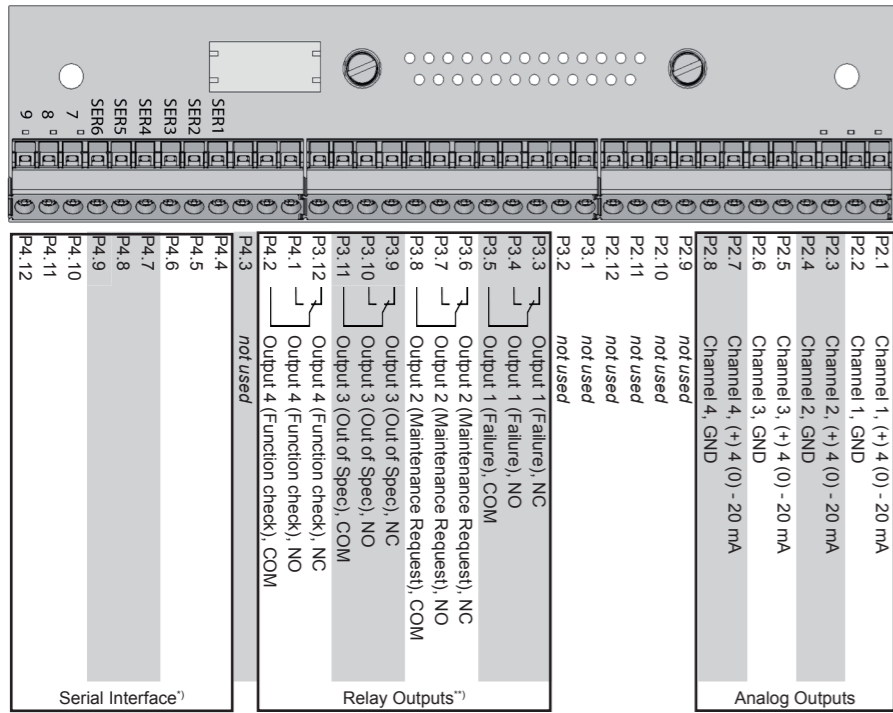


Ethernet connector for Modbus

A.2 Assignment of Terminals and Socket

A.2.2 Field Housings

XSTA: Standard strip with standard and optional signals



*) See table below

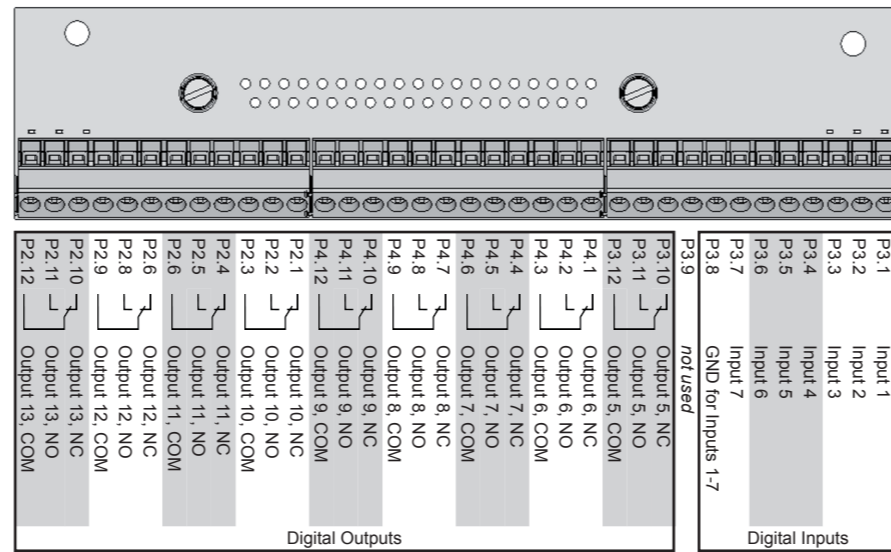
**) Configuration of relay output terminals as per standard factory setting (NAMUR status signals)

Assignment of serial interface terminals

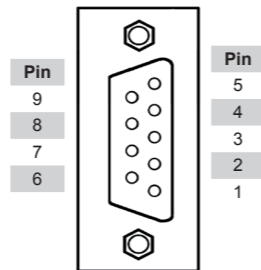
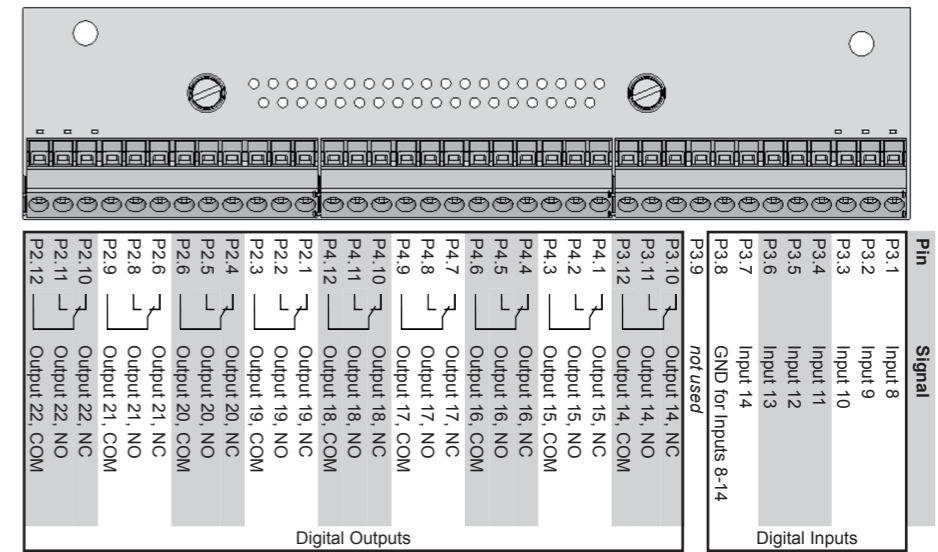
Terminal	MOD 485/ 2 wire	MOD 485/ 4 wire	RS 232
P4.4	SER1	Common	Common
P4.5	SER2	not used	RXD
P4.6	SER3	not used	TXD
P4.7	SER4	not used	RXD1(+)
P4.8	SER5	D1(+)	TXD1(+)
P4.9	SER6	not used	not used
P4.10	7	not used	not used
P4.11	8	not used	RXD0(-)
P4.12	9	D0(-)	TXD0(-)

Signal Terminals Strips

XSTD: First optional strip with optional 7 Dig Inputs and 9 Dig Outputs

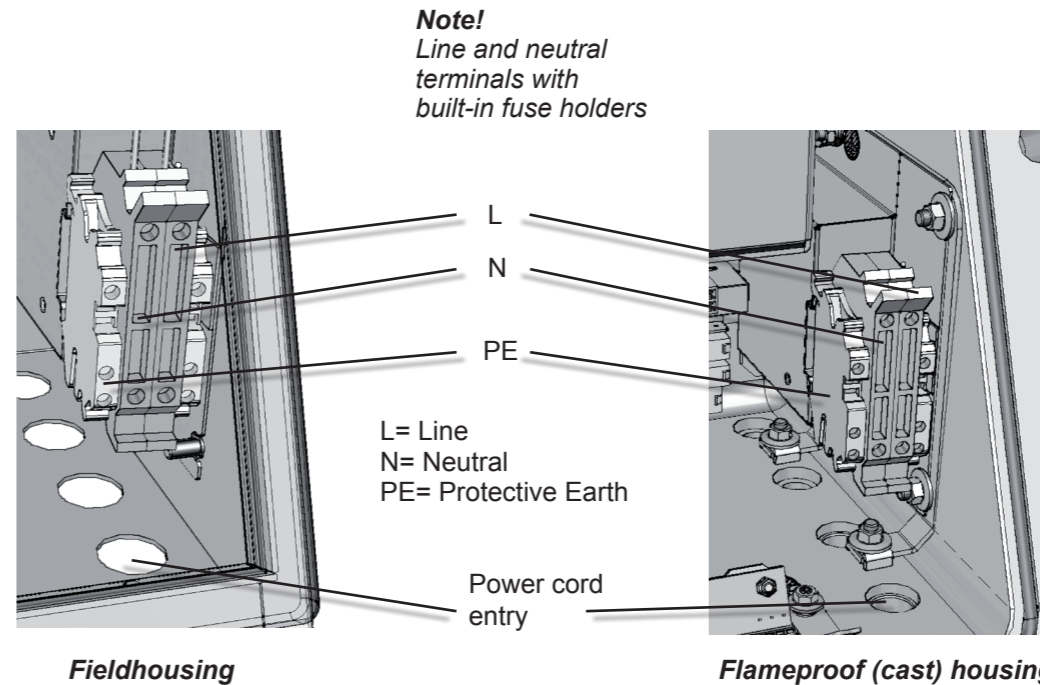


XSTD: Second optional strip with another set of optional 7 Dig Inputs and 9 Dig Outputs

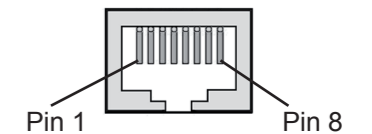


Pin no.	RS 232
1	Common
2	RXD
3	TXD
4	not used
5	Common
6	not used
7	not used
8	not used
9	not used

Service Port Connector - Serial RS 232 interface



Power terminals



Pin no.	Signal
1	TX+
2	TX-
3	RX+
6	RX-
other	not used

Ethernet connector for Modbus

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