**Instruction Manual**
HASXMDE-IM-EX
03/2012

# Gas Analyzer

## X-STREAM X2 Series

## Flameproof Variation
## For Use in Zone 1 and Division 2 Hazardous Areas

## Instruction Manual Addendum


ROSEMOUNT® Analytical

EMERSON™ Process Management

www.EmersonProcess.com

# 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.

6th edition 03/2012

**Original Instruction Manual for the purpose of the European Directive 94/9/EC.**

**Rosemount Analytical**
**Process Gas Analyzer Center of Excellence**
**Emerson Process Management GmbH & Co. OHG**
Industriestrasse 1
D-63594 Hasselroth
Deutschland
T +49 (0) 6055 884-0
F +49 (0) 6055 884-209
www.emersonprocess.de

Zert. Reg. Nr. 254969 QM08

EMERSON
Process Management

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# PREAMBLE

**This instruction manual provides information about installing, operating and maintaining/ servicing X-STREAM X2 series gas analyzers in hazardous (classified) areas and shall be read in conjunction with the basic analyzer instruction manual only!**

**This instruction manual covers several X-STREAM X2FD series analyzer variations and therefore may describe configurations and/or options not part of your specific analyzer.**

# DEFINITIONS

**The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout this publication.**

**WARNING**

**HIGHLIGHTS AN OPERATION OR MAINTENANCE PROCEDURE, PRACTICE, CONDITION, STATEMENT, ETC.**

**If not strictly observed, could result in injury, death, or long-term health hazards of personnel.**

**CAUTION**

**HIGHLIGHTS AN OPERATION OR MAINTENANCE PROCEDURE, PRACTICE, CONDITION, STATEMENT, ETC.**

**If not strictly observed, could result in damage to or destruction of equipment, or loss of effectiveness.**

**NOTE**

*Highlights an essential operating procedure, condition or statement.*

# TERMS USED IN THIS MANUAL

**ATEX**

Directive 94/9/EC, commonly called the ATEX („Atmosphères Explosibles“) directive, dealing with equipment intended to be used in potentially explosive atmospheres.

This directive is valid for equipment to be sold into and/or installed and operated in the European Union (EU).

**Division 2**

Where ignitable concentrations of flammable gases are not likely to exist under normal operating conditions (similiar to Zone 2).

**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.

**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.

**Zone 1**

Where ignitable concentrations of flammable gases can exist some of the time under normal operating conditions.

(A guideline value [not part of a standard ] is 10 to 1.000 hours per year.)

**Zone 2**

Where ignitable concentrations of flammable gases are not likely to exist under normal operating conditions.

(A guideline value [not part of a standard ] is less than 10 hours per year.)

## Symbols used on and inside the unit

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!

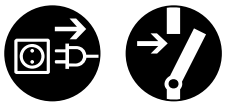
**Strictly observe the given warnings, instructions and information to minimize hazards!**

| This symbol at the instrument ... | ... means |
|---|---|
|  | **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! |
|  | **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. |
|  | **more detailled information available:** see instruction manual before proceeding! |
|  | **more detailled information available:** see instruction manual before proceeding! |

## 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.<br>This symbol may also indicate information important for achieving accurate measurements. |

# SAFETY INSTRUCTIONS

## Intended Use Statement

X-STREAM X2 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.

Using X-STREAM X2 analyzers as safety devices is prohibited where redundancy and/or SIL classification or equivalent is needed.

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.

## Special Conditions for Safe Use

- Only specified screws M16x45 ISO 4762 A2-70 as specified in the maintenance section of this manual shall be used (spare part # 42716945).
- The flame joints correspond to the drawing No. 4.271-7112/1 and do not comply with the dimensions mentioned into the Tab. 1 and Tab. 2 of EN 60079-1 ed.2.
- The gas path for the sample gas shall be equipped with additional appropriate flame arrestors in case of gas pressure above 1100 hPa to 1500 hPa.
- Appropriate certified cable glands shall be used in accordance with IEC/EN 60079-14.
- Vapor recovery application:
  Pressure of gases not to exceed 1100 hPa.
  Concentrations of gases must be below 25 % LEL.
- Depending on the particular application all approbriate safety instructions mentioned in this instruction manual on hand must be considered!
- Take special care of formation of flammable gas at the outlet of breathing and/or purging devices, if the sample gas concentration is above 25% LEL! If need be, such outlets have to end in a safe area!

## 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.

## Additional Literature

**This manual covers aspects specific for using flameproof X-STREAM X2FD gas analyzers in hazardous (classified) areas, only.**

**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 instruction manuals are available and/or referenced within this manual at hand:

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

HASICx-IM-H Infallible Containment

The original manufacturer's cable gland or conduit instruction manual, depending on what is used.

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

**SAVE ALL INSTRUCTIONS FOR FUTURE USE!**

## WARNING

**POSSIBLE EXPLOSION HAZARD**

**Do not open instrument when energized.**

**Ensure that external circuitry is disconnected or de-energized before opening the instrument.**

**Ensure that all gas connections are made as labeled and are leak free. Improper gas connections could result in explosion and death.**

## WARNING

**EXPLOSION HAZARD BY MODIFICATION**

**Any addition, substitution, or replacement of components installed on or in this device, must be certified to meet the hazardous area classification that the device was certified to prior to any such component addition, substitution, or replacement. In addition, the installation of such device or devices must meet the requirements specified and defined by the hazardous area classification of the unmodified device.**

**Any modifications to the device not meeting these requirements, will void the product certification(s).**

**Contact Emerson Process Management's customer service center for return authorization.**

## WARNING

**EXPLOSION HAZARD**

**The X-STREAM X2FD analyzer may utilize not only sample gas but one or more pressurized carrier gases and/or calibration gases.**

**If an external flowmeter is required for flow control, legislative requirements and instructions for installation in hazardous (classified) areas must be considered.**

## WARNING

**ELECTRICAL SHOCK HAZARD**

**Installation and connecting mains and signal cables are subject to qualified personnel only taking into account all applicable standards and legislative requirements!**

**Failure to follow may cause warranty invalidation, property damage and/or personal injury or death! Connecting mains and signal cables to internal srew terminals requires working at open housing near life parts!**

**Installation of this instrument is subject to qualified personnel only, familiar with the resulting potential risks!**

**The gas analyzers do not provide a mains power switch and are operable when connected to power.**

**The gas analyzers do not provide a mains switch! A mains switch or circuit breaker (to comply with IEC 60947-1 /-3) has to be provided in the building installation. This switch has to be installed near by analyzer, must be easily operator accessible and has to be assigned as disconnector for the analyzer.**

## WARNING

**EXPLOSION and ELECTRICAL SHOCK HAZARD**

**These instruments provide a protective earth terminal. To prevent electrical shock and explosion hazards, the instrument must be connected to a protective earth.**

**Therefore the instrument has to be connected to mains by using a three wire mains cable with earth conductor!**

**Any interruption of the earth connector inside or outside the instrument or disconnecting the earth terminal may cause potential electrical shock hazard!**

**Intended interruption of protective earth connections is not permitted!**

## WARNING

**EXPLOSION HAZARD BY HOT COMPONENTS**

**Temperatures inside an analyzer for VAPOR RECOVERY applications exceed the analyzer‘s temperature classification for hazardous areas!**

**Special conditions apply to handling and operating this analyzer, consider the safety instructions at the beginning of this manual!**

## CAUTION

**HEAVY INSTRUMENT**

**The analyzer model X-STREAM X2FD, to which this manual relates, intended to be wall mounted and/or outdoor installed, weighs up to approx. 63 kg (139 lbs), depending on included options!**

**Use two people 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 units!**

**Take care the wall or stand the unit is intended to be installed at is solid and stable to hold the units!**

## CAUTION

**HIGH TEMPERATURES**

**While working at internal components hot surfaces may be accessible, even after the instrument has been disconnected from power!**

## HOW TO STAY IN COMPLIANCE WITH THE EUROPEAN DIRECTIVE 94/9/EC ("ATEX") WHEN PERFORMING GAS ANALYSIS WITHIN A FLAMEPROOF ENCLOSURE.

**Special conditions apply to using a flameproof enclosure analyzer under the scope of the "European Directive for Equipment used in Explosive Atmosphere" (Directive 94/9/EC; ATEX). To stay compliant to the directive consider the following clarification sheet released by the European ATEX Notified Body Group (see next page):**

| $E_xNB$ | Co-ordination of Notified Bodies Electrical Equipment for use in potentially explosive atmospheres on Council Directive 94/9/EEC | EOTC/00/007<br>Issued: February 10, 2000<br>CS/99/06/069 |
|---|---|---|

## European ATEX Notified Bodies Group

## Interpretation/Clarification Sheet N° 99/06/069/CS Edition 1.0

*Original in English*

**Status :** Step* 5.2.1■ question ExNB/98(EECS)002 Date : 20/04/98
Step* 5.2.3■ proposal **Proposer :** DMT Date : 05/06/98
Step* 5.2.4■ **Received for publication** Date : 15-16/06/99

*Step refers to ExNB Rules

■ authorised **Chairman : M. BRÉNON**
**Date of application : 16/06/99** **Signature :**

**SUBJECT :** **EN 50018 : 1994** **Gas analysis performed within a flameproof enclosure**

***Question :*** ***What restrictions are necessary on the contents of the gas system/process line in order to validate the use of « Flameproof Enlcosure » as the protection concept.***

**Answer :**

**1** Oxygen shall be present in the process line only as a constituent of an inert/oxygen gas mixture of which the oxygen represents no more than that normally present in air.

**2** The gas mixture in process line shall not be within the explosive limits continuously, for long periods or frequently.

If the gas mixture is above UEL in normal service, gas leakage into the main enclosure due to failure of the gas containment shall not remain undetected for long periods.

If the gas mixture is above UEL in normal service and if the gas measuring system contains potential ignition sources (e.g. heated wires) in the process line, the line shall be purged with process gas before the measuring system is activated and the measuring system shall be de-activated before shut down of the process.

**3** If the pressure in the process line in normal operation is higher than 1.1 bar, the following applies :

**3.1** The gas mixture shall not be within the explosive limits in normal operation. This can be realized e.g. by purging the line with process gas or with inert gas before the measuring system is actived.

**3.2** Even in case of total leakage of the gas containment, the pressure in the main enclosure shall not be higher than 1.1 bar.

**3.3** The process line shall not contain potential sources of ignition and, taking into account the maximum pressure in service, the breathing devices shall be tested with respectively precompressed mixtures.

This ExNB Interpretation/Clarification Sheet has the sole purpose of clarifying the application of the EN Standards and/or of the requirements of Directive 94/9/EC and related documents. It does not in any way change the content of the standards and/or of the requirements. It remains valid until an official answer is received from the European Commission or the relevant standardization bodies.

ExNB03/S87/Autres

# Chapter 1
# Technical Description



## 1.1 Overview

The new X-STREAM X2FD gas analyzer is designed to be used in hazardous areas. Its flameproof enclosure can be installed at Zone 1 and Division 2 locations without the need of any additional protective measures, e.g. purge gas supply.

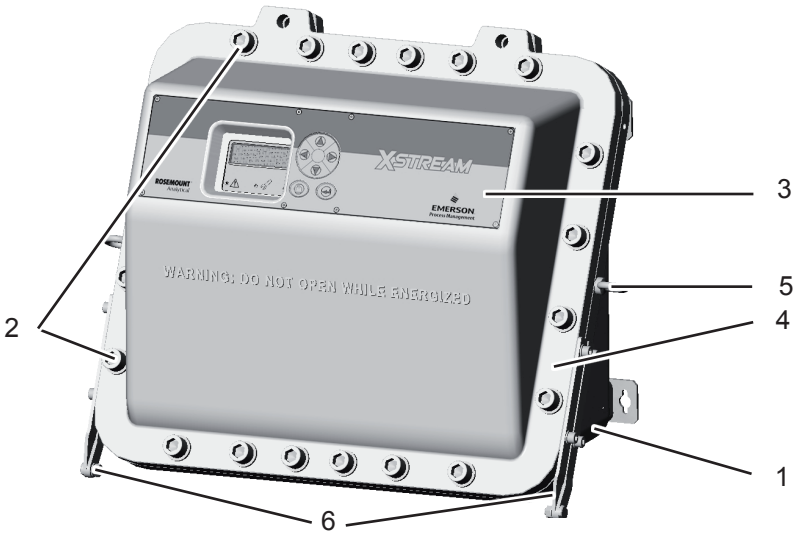
## 1.2 Design Features

Packaged into a cast aluminum enclosure, the X-STREAM X2FD gas analyzer provides all the measurement options available for general purpose instruments, but for installation at locations, where explosive gas atmosphere might be present frequently (Zone 1) or occasionally (Zone 2, Division 2).

The basic concept used to protect the surrounding atmosphere from being ignited if an internal failure results in high temperatures, flames or even an explosion, is to keep the explosion inside the enclosure and quench all flames possibly passing through the flange.

To provide adequate explosion protection the X-STREAM X2FD analyzer features:

- a cast aluminum enclosure, designed to
  - withstand an internal explosion,
  - quench flames resulting from an internal explosion (thus preventing a surrounding explosive atmoshere from being ignited).
- flame arrestors avoiding flame transmission from the gas paths into the surrounding atmosphere.
- approved cable glands (option: conduits), protecting the cable inlets and outlets.




1: Enclosure base
2: Screws
3: Enclosure cover
4: Flange
5: Eyebolts for lifting
6: Hinges

*Fig. 1-1: Frontal View*

## 1.3 Protective Measures in Detail

The cast aluminum enclosure consists of two parts: base and cover, connected by hinges.

The area where the two parts are in contact is designed to work as a flange, quenching flames entering the small path between them. When operated, the analyzer enclosure has to be closed and secured by 20 screws evenly arranged all over the flange. The only openings penetrating the enclosure are threads, to be used for gas and cable in- and outlets:

Depending on the measurement application the instrument provides up to 8 gas in- and outlets, each protected by an approved flame arrestor. These arrestors are installed into threads at the bottom side of the enclosure base. Two fitting sizes are available for external connection of gas pipes with 3,18 mm (1/8“) or 6,35 mm (1/4“) outer diameter (OD). Optionally a clamping ring for 6 mm OD may be used, replacing the 6,35 mm version.

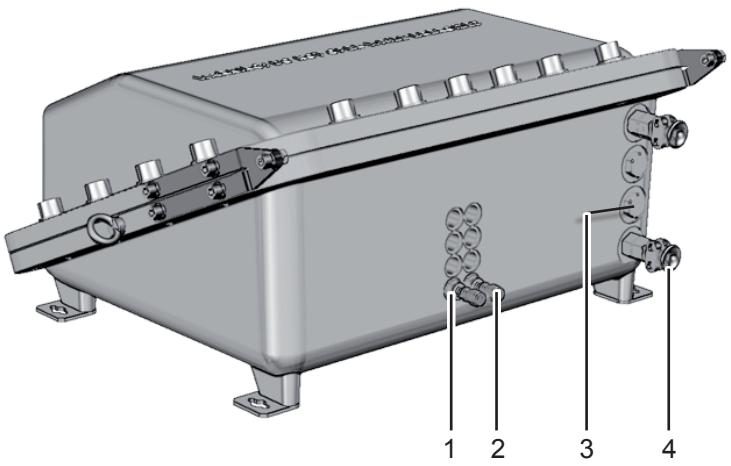
Cables are fed into the enclosure utilizing up to 4 cable glands, located at the enclosure`s bottom right side.

For installation in North America cable glands are replaced by a combination of conduits and metric-to-NPT thread adapters.

All threads provide a flame path of a length ensuring that possibly entering flames are quenched before reaching the external atmosphere.

Unused threads must be closed with plugs when the instrument is operated to ensure explosion protection.

***Note!***
*See the X-STREAM X2 series instruction manual for more information about common X-STREAM X2 series gas analyzers features and special features of the X-STREAM X2FD.*




1: Plugged when not used
2: Gas fitting (part of flame arrestor)
3: Plug
4: Cable gland (or conduits)

*Fig. 1-2: Bottom view*

## 1.4 High Pressure Option / Purge Option

Normally flameproof housings are permitted to operate under atmospheric conditions only, that is within an ambient pressure range between 800 and 1100 hPa.

For analyzers this pressure range also applies to the gas pressure within the containment system. While the lower limit is not critical, the higher is, because it lowers the permitted sample gas (and calibration gases) pressures by 400 hPa, compared to general purpose analyzers. This results in higher requirements for the sample handling system, as it has to safely reduce the process gas pressure to the permitted range.

Another aspect to take care for when operating flameproof analyzers is the option of applying a purge gas to the enclosure when measuring low concentrations of gases, being constituent of the ambient air: The ambient air inside the analyzer enclosure cross interferese with the sample gas and influences the measuring results. By purging the housing with a gas free of the measured component, this can be avoided, but could increase the pressure inside the analyzer and so would violate the atmospheric pressure condition.

X-STREAM X2FD analyzers have been subjected to additional tests to support both situations:

- higher sample and calibration gas pressures

as well as

- purging the housing with a gas for best measuring results at low concentrations.

To permit this, special additional conditions must be taken into account:

**Higher sample and calibration gas pressures**

Higher gas pressure is specified to be within the range of 1100 hPa to 1500 hPa. The maximum permitted flow is 1,5 l/min, depending on the installed measurement system lower limits may apply.

The gas paths need additionally to be protected by suitable inline flame arrestors, designed and approved for the applied higher gas pressure and for the area of installation. These flame arrestors need to be installed outside the analyzer and in addition to the flame arrestors provided by the analyzer.

***Note!***

*The external inline flame arrestors are not subject of the analyzer certification and may be provided by the customer, or optionally by EMERSON PROCESS MANAGEMENT.*

A separate analyzer flame arrestor has to be installed, operating as a breathing device and thus limiting the increase of pressure in the enclosure in case of internal leakage.

**Purging the housing with clean gas when measuring low concentrations**

The maximum permitted gas flow is 2 l/min. The gas must be supplied via a separate flame arrestor. Another flame arrestor must be installed, operating as a breathing device and so limiting the increase of pressure in the enclosure.

**WARNING**

**EXPLOSION HAZARD**

**When making use of any of above mentioned options, take care of the special conditions for safe use given on the next page!**

## 1.5 Explosion Protection Compliances

This product is available in two different variations, separately certified by agencies for the use in hazardous (classified) areas:

The one version, to be equipped with cable glands, is certified by Fyzikálně technický zkušební ústav, s.p (FTZÚ), an European Notified Body under the Directive 94/9/EC („ATEX“) and conforms to the provisions of EN 60079-0 and EN 60079-1. See appendix for a copy of the EC type examination certificate.

The second variation, to be equipped with metric-to-NPT adapters and conduits (these components are not part of the instrument certification), is certified by the Canadian Standards Association, an „OSHA Nationally Recognized Testing Laboratory“ (NRTL), for Canada and USA and conforms to the provisions of CAN/CSA-E60079-0:02 (R2006), CAN/CSA-E60079-1:02 (R2006), ANSI/ISA-12.00.01-2002 (IEC 60079-0 Mod), ANSI/ISA-12.22.01-2002 (IEC 60079-1 Mod). Furthermore, these X-STREAM X2FD analyzers are certified for use in Class I, Division 2, Group BCD T3 areas.

See appendix for a copy of the CSA Certificate of Compliance.

IECEx certification enables worldwide approvals with minimized need of testing.

The following certification markings apply to the products:

**European Union (EU, ATEX)**
Category 2, Zone 1:
Ex d IIB+$H_2$ T4 Gb

**EC ATEX Type Examination Certificate:**
FTZU 08 ATEX 0028 X.

**IECEx**

Ex d IIB+$H_2$ T4 Gb

CE 0035 Ex II 2 G
FTZU 08 ATEX 0028X
IECEx FTZU 08.0004X
Ex d IIB+$H_2$ T4 Gb
-30 °C ≤ $T_{amb}$ ≤ +50 °C
IP 66 Type 4X

Conforms to the provisions of the „Equipment intended for use in Potentially Explosive Atmospheres (ATEX)“ Directive 94/9/EC, EMC Directive 2004/108/EC and CE Directive 93/68/EEC.

**USA**
Class I, Zone 1, AEx d IIB+$H_2$ T3
Class I, Division 2, Group BCD T3

**Canada**
Class I, Zone 1, Ex d IIB+$H_2$ T3
Certificate of Compliance 1714037X

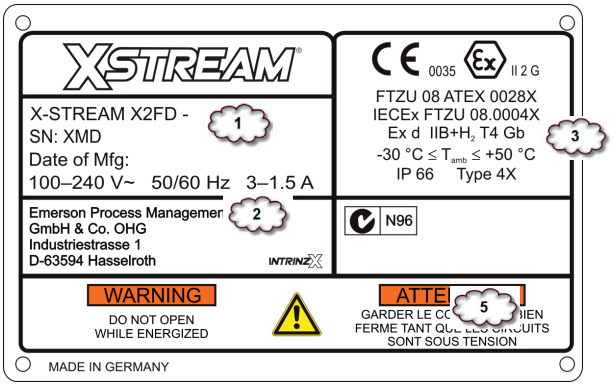
C SP US
1714037X
Class I Zone 1
AEx d IIB+$H_2$ T3
Ex d IIB+$H_2$ T3
Class I, Division 2
Groups BCD T3
-30 °C ≤ $T_{amb}$ ≤ +50 °C
IP 66 Type 4X
Explosionproof seal at enclosure or within 2” of enclosure
Joint anti-déflagrant à la clôture ou à moins de 2” de la clôture

## 1.5 Compliances

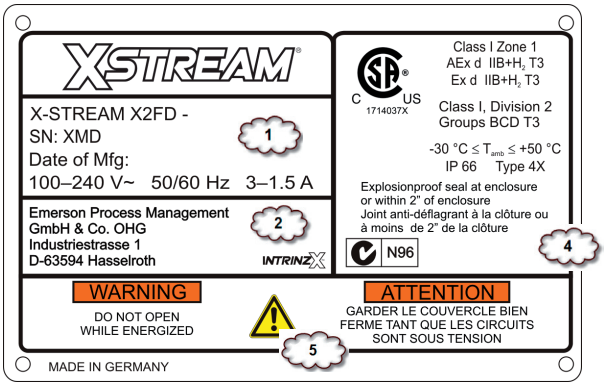
### 1.5.1 Special conditions for safe use

- Only specified screws M16x45 ISO 4762 A2-70 as specified in the maintenance section of this manual shall be used (spare part # 42716945).
- The flame joints correspond to the drawing No. 4.271-7112/1 and do not comply with the dimensions mentioned into the Tab. 1 and Tab. 2 of EN 60079-1 ed.2.
- The gas path for the sample gas shall be equipped with additional appropriate flame arrestors in case of gas pressure above 1100 hPa to 1500 hPa.
- Appropriate certified cable glands shall be used in accordance with IEC/EN 60079-14.
- Vapor Recovery application:
  Pressure of gases not to exceed 1100 hPa. Concentrations of gases must be below 25 % LEL.
- Depending on the particular application all approbriate safety instructions mentioned in this instruction manual on hand must be considered!
- Take special care of formation of flammable gas at the outlet of breathing and/or purging devices, if the sample gas concentration is above 25% LEL! If need be, such outlets have to end in a safe area!

## 1.6 Nameplate Label




ATEX version




CSA-C/US version

| Area | Description | Area | Description |
|---|---|---|---|
| 1 | The analyzer´s electrical data, manufacturing data and serial number | 2 | Manufacturer address |

| | | 3 IECEx / EU (ATEX) | 4 North America (CSA) |
|---|---|---|---|
| | **Certification Data** | | |
| | **Area classification** | ***II*** other than mines<br>***2*** Category **2** Equipm. (Zone 1)<br>***G*** for explosive **G**as atmosphere | ***Class I*** Flammable gases, vapors or liquids<br>***Zone 1*** Zone 1 areas |
| | **Protection concepts** | ***Ex*** Explosion protected<br>***d*** flameproof<br>***IIB+$H_2$*** Group **II**, Gas Group **B** plus **Hydrogen**<br>***T4*** Temperature Class (135 °C)<br>***Gb*** Equipment Protection Level<br>***$T_{amb}$*** Ambient Temperature Range<br>***IP66***, ***Type 4X*** Enclosure Rating (outdoor use) | ***AEx*** Explosion protected (US)<br>***Ex*** Explosion protected (CAN)<br>***d*** flameproof<br>***IIB+$H_2$*** Group **II**, Gas Group **B** plus **Hydrogen**<br>***T3*** Temperature Class (200 °C)<br>***$T_{amb}$*** Ambient Temperature Range<br>***IP66***, ***Type 4X*** Enclosure Rating (outdoor use) |
| | **Additional Division Marking, if applicable** | -- | ***Class I*** Flammable gases, vapors or liquids<br>***Division 2*** Division 2 areas<br>***Groups BCD*** all Gases, except Acetylene<br>***T3*** Temperature Class (200 °C) |
| | **Certificate numbers** | IECEx FTZU 08.0004X<br>FTZU 08 ATEX 0028 X | 1714037X |
| | **Other** | CE mark, number of Notified Body for Quality assessment | Instruction note where to install the explosion proof seal |
| 5 | Additional warning: Do not open the instrument while energized. Consult manual! | | |

*Fig. 1-3: Nameplate Label Details (exemplary)*

## 1.7 Technical Data

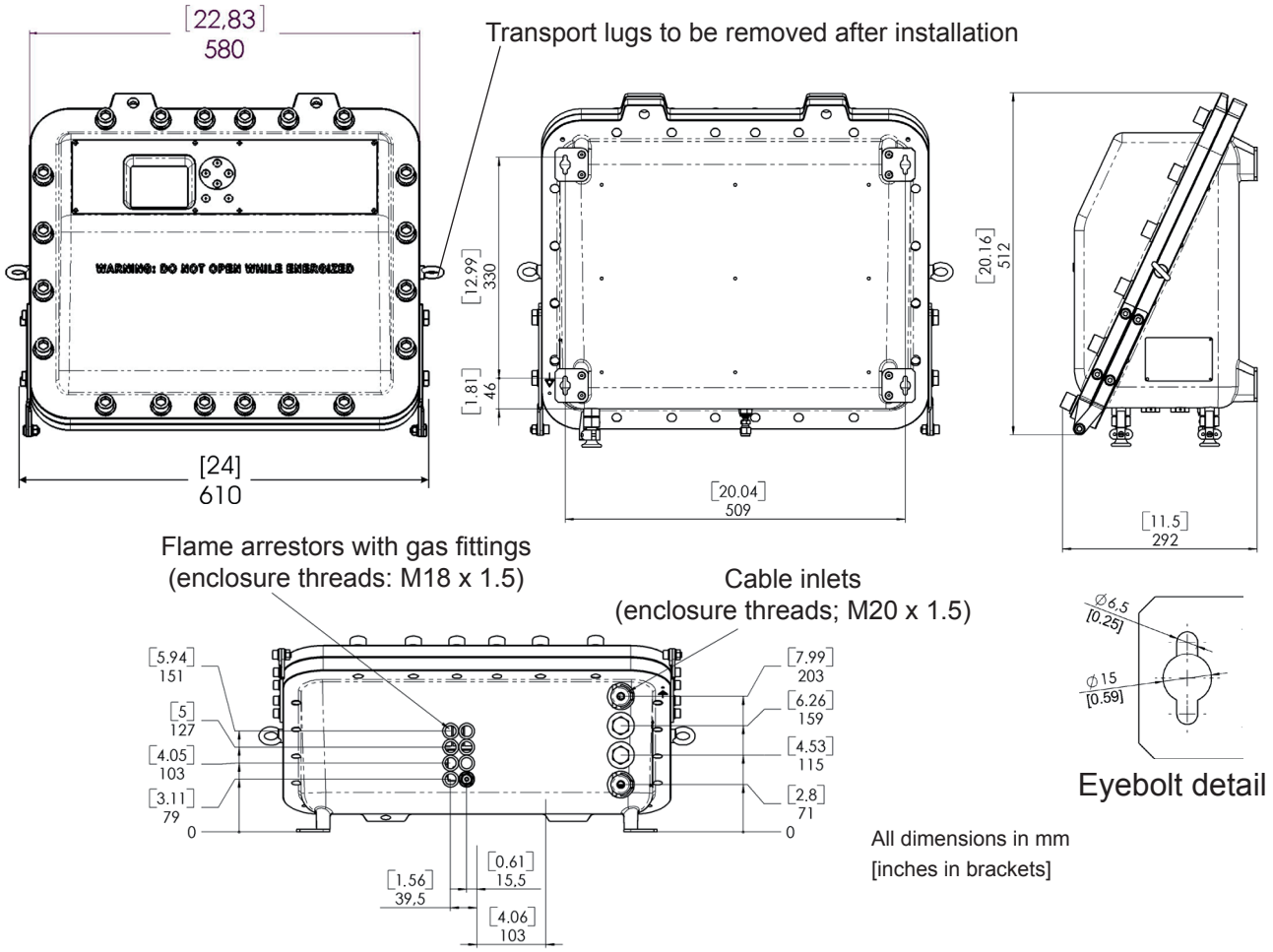



*Fig. 1-4: Dimensions*

### *Housing*

| | |
|---|---|
| Permissible operating ambient temperature range | -30 °C to +50 °C (-22 F to +122 F) |
| Permissible storing ambient temperature range | -30 °C to +70 °C (-22 F to +158 F) |
| Weight: | approx. up to 63 kg (139 lbs)<br>(depending on analyzer configuration) |
| Protection class: | IP 66 (EN 60529) / Type 4X for outdoor installation (if applicable, see nameplate label !)<br>Analyzer must not be exposed to direct sun light |
| Gas fittings: | quantity: max. 8<br>specification: flame arrestors with fittings<br>connections: 6/4 mm or ¼“, stainless steel |

## 1.7 Technical Data

### *Site of installation*

| | |
|---|---|
| Humidity (non condensing) | < 90 % r. h. at +20 °C (68 F)<br>< 70 % r. h. at +40 °C (104 F) |
| Pollution degree | 2 |
| Installation category | I I |
| Altitude | 0 to 6560 ft (2000 m) above sea level |
| Sourrounding atmosphere | Analyzers must not be operated in corrosive atmosphere. |

### *General Purpose Compliances*

| | | |
|---|---|---|
| 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 |
| | other | NAMUR |

### *Power supply*

| | |
|---|---|
| Rated input voltage | 100 - 240 V~ 50/60 Hz, wide range input<br>Power supply voltage fluctuations are not to exceed +/- 10 % of the nominal supply voltage! |
| Input voltage range | 85 - 264 V~, 47 - 63 Hz |
| Nominal input current | |
| standard | 1.3 - 0.7 A max. |
| with temperature control | 3 - 1.5 A max. |

## 1.7 Technical Data



### *Interfaces, signal inputs / outputs*

| | |
|---|---|
| **up to 4 analog outputs channel**<br>(Standard: 1 analog output per channel) | 4 (0) - 20 mA ($R_B \leq 500\ \Omega$)<br>optically isolated from each other and from other electronic components;<br><br>user-configurable activation and deactivation concentration levels; support for NAMUR NE 43 operation modes, configurable via keypad and Modbus |
| **4 relay outputs** | dry contacts,<br>max. load. 30 V; 1 A; 30 W resistive |
| Each output can be configured to one of the following functions: | NAMUR NE 107 status signal<br>“Failure”<br>“Maintenance request”<br>“Out of specification”<br>“Function check”<br>1 of 2 concentration limits per channel,<br>Control signals for<br>external valve V1 ... V8,<br>external sample gas valve<br>external pump<br>Zoom status for analog outputs |

### Optional interfaces for all models

| | |
|---|---|
| **1 Modbus interface** | RS 485 (2 or 4 wire)<br>*optional:*<br>*RS 232*<br>*Ethernet (RJ45 socket)* |

### Digital inputs and outputs

| | |
|---|---|
| **7 or 14 digital outputs** | max. 30 V, internally limited to 2.3 mA<br>HIGH: min. 4 V; LOW: max. 3 V<br>(common GND) |

## 1.7 Technical Data

| | |
|---|---|
| Each input can be configured to one of the following functions: | Open valve V1 ... V8<br>Open sample gas valve<br>Activate sample gas pump<br>Zero calibrate all channels<br>Span calibrate all channels<br>Zero and span calibrate all channels<br>Abort calibration<br>Zoom analog output 1<br>Zoom analog output 2<br>Zoom analog output 3<br>Zoom analog output 4 |
| **9 or 18 additional relay outputs** | dry contacts,<br>max. load. 30 V; 1 A; 30 W resistive |
| Each output can be configured to one of the following functions: | NAMUR NE 107 status signal<br>“Failure”<br>“Maintenance request”<br>“Out of specification”<br>“Function check”<br>1 of 2 concentration limits per channel,<br>Control signals for<br>external valve V1 ... V8,<br>external sample gas valve<br>external pump<br>Zoom status display for analog outputs |

## 1.7 Technical Data



High sample and calibration gas pressures

| | |
|---|---|
| High gas pressure | Above 1100 hPa to max. 1500 hPa (take care of the measurement principles limits!) |
| Maximum flow | 1,5 l/min. |
| Special conditions: | The gas paths need additionally to be protected by suitable inline flame arrestors, designed and approved for the applied higher gas pressure. These inline flame arrestors need to be installed outside the analyzer and in addition to the flame arrestors provided by the analyzer. A separate analyzer flame arrestor has to be installed, operating as a breathing device. |
| Connection of breathing device: | The external output of the breathing device (exhaust) can be open to the ambience of the analyzer, if the measured gas concentration is below 25 % V-V LEL. Otherwise it must end in a safe area. |

Purging the housing with clean gas when e.g. measuring low concentrations

| | |
|---|---|
| Maximum gas flow | 2 l/min. |
| Permitted purge medium: | Inert gas or air. Dry, clean, free of corrosives or components containing solvents, and free of components to be measured.<br>Its temperature must correspond to the ambient temperature of the analyzer, but be at least within the range 20–35 °C (68–95 °F). |
| Special conditions: | The medium must be supplied via a separate flame arrestor. Another flame arrestor must be installed, operating as a breathing device. |
| Connection of breathing device: | The external output of the breathing device (exhaust) can be open to the ambience of the analyzer if inert gas is used as purge medium. If air is used, the output must end in a safe area, if the measured gas concentration is above 25 % V-V LEL. |

**Take care of special conditions for safe use (☞ S-5 or ☞ 1-5 ) !**

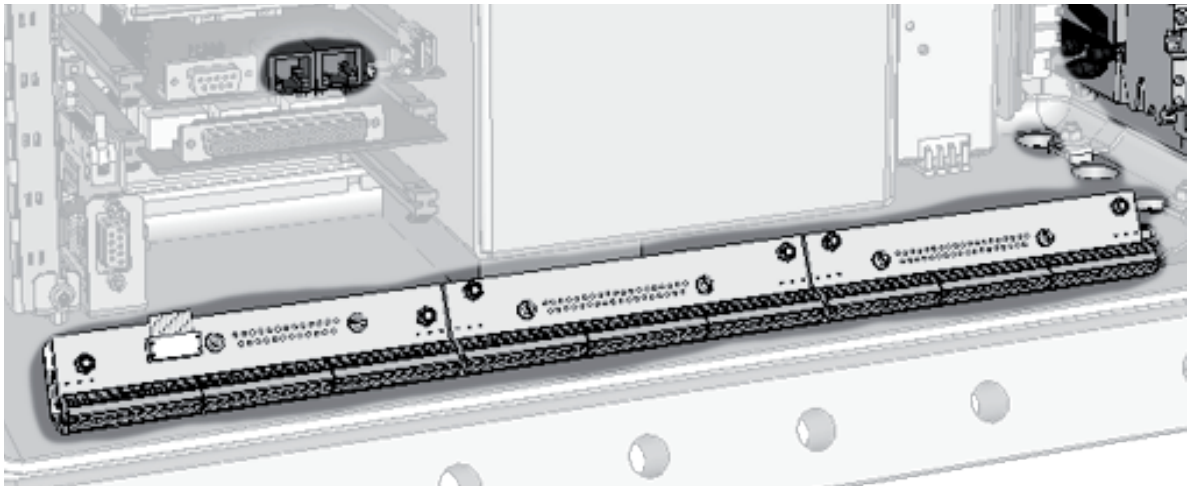
## 1.7 Technical Data

***Signal inputs and outputs***

All signal cables are connected to internal
screw-type terminals (fig. 1-5), except the optional RJ45 ethernet connector.

| | | |
|---|---|---|
| Cable cross-section: | | max. 1.5 mm² (14 AWG),<br>end sleeves not required. |
| Cable entry via | | three IP 68 cable glands or conduits |
| Permissible cable outer diameter: | | see cable gland / conduit specification |
| Available signals: | standard: | Analog signal outputs<br>Relay status signals<br>Modbus interface (RS232; RS 485) |
| | optional: | Digital inputs/outputs<br>Modbus RJ45 ethernet connector |

Detailed terminals configuration ☞ „Chapter 2 Installation“



***Note!***
*Depending on the actual analyzer configuration not all shown terminals may be provided!*

*Fig. 1-5: Signals terminals*

## 1.7 Technical Data



### *Power Connection*

| | |
|---|---|
| Connection via internal screw terminals near cable entries, (fig. 1-6). | |
| Cross section: | max. 4 mm² (10 AWG), end sleeves not required |
| Cable entry via | 1 cable gland, classified IP 68 or suitable conduit with metric-to-NPT adaptor |
| Permissible outer cable diameter for power cord: | see cable gland / conduit specification |

### *Power supply fuses*

| | |
|---|---|
| The power terminals integrate fuse holders. | |
| Fuse ratings: | AC 230 V / T 4 A / 5x20 mm |

1 Power terminals with integrated fuse holders
2 Protective earth terminal (PE)
3 Power cable entry
4 EMI power supply filter

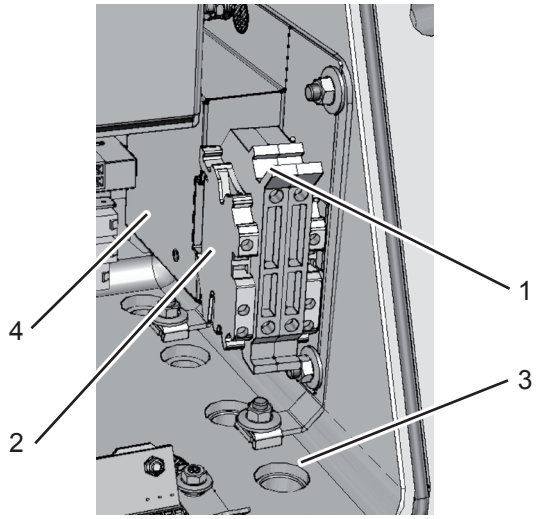



*Fig. 1-6: Power terminals / fuse holders*

## 1.8 Measurements 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] | $CH_3COCH_3$ | UV | | 0–400 ppm | 0–3 % |
| Acetone [1] | $CH_3COCH_3$ | IR | | 0–500 ppm | 0–3 % |
| Acetylene | $C_2H_2$ | 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 | $C_2H_6$ | IR | | 0–1000 ppm | 0–100 % |
| Ethanol [1] | $C_2H_5OH$ | IR | | 0–1000 ppm | 0–10 % |
| Ethylene | $C_2H_4$ | IR | | 0–400 ppm | 0–100 % |
| Helium | He | TCD | | 0–10 % | 0–100 % |
| Hexane [1] | $C_6H_{14}$ | IR | | 0–100 ppm | 0–10 % |
| Hydrogen [4] | $H_2$ | TCD | | 0–1 % | 0–100 % |
| Hydrogen Sulfide | $H_2S$ | UV | | 0–2 % | 0–10 % |
| Hydrogen Sulfide | $H_2S$ | IR | | 0–10 % | 0–100 % |
| Methane | $CH_4$ | IR | | 0–100 ppm | 0–100 % |
| Methanol [1] | $CH_3OH$ | IR | | 0–1000 ppm | 0–10 % |
| n–Butane | $C_4H_{10}$ | 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 | $N_2O$ | 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 | $C_3H_8$ | IR | | 0–1000 ppm | 0–100 % |
| Propylene | $C_3H_6$ | 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] | $C_7H_8$ | UV | | 0–300 ppm | 0–5 % |
| Vinyl chloride | $C_2H_3Cl$ | IR | | 0–1000 ppm | 0–2 % |
| Water vapor [1] | $H_2O$ | IR | | 0–1000 ppm | 0–8 % |
| Water vapor, Trace [1] | $H_2O$ | 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 specs range
[4] Special "refinery" application with 0–1% $H_2$ in $N_2$ available
[5] see Tab. 1-5

*Tab. 1-1: Gas Components and Measuring Ranges, examples*

## 1.8 Measurements Specifications



### Standard Performance Specifications

| | NDIR/UV/VIS | Thermal Conductivity (TCD) |
|---|---|---|
| Detection limit (4 σ) [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 % [12] |
| Maximum gas pressure [8] [9] | ≤ 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 [10] | 0 (-20) to +50 °C (32 (-4) to 122 °F) | 0 (-20) to +50 °C (32 (-4) to 122 °F) |
| Influence of temperature [1] [14] (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] [13] | none / 60 °C (140 °F) [5] | none / 60 °C (140 °F) [11] |
| 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] Special conditions for > 1100 hPa abs. (1.5 psig)
[9] Limited to atmospheric if internal sample pump
[10] Temperatures below 0 °C (-4 °F) with thermostat control only
[11] Thermost. controlled sensor: 75 °C (167 °F)
[12] Flow variation within ± 0.1 l/min
[13] Optional thermostatically controlled box with temperature 60 °C (140 °F)
[14] Temperature variation: ≤ 10 K per hour

*Tab. 1-2: NDIR/UV/VIS, TCD - Standard Measurement Performance Specifications*

| | Trace Moisture ($tH_2O$) |
|---|---|
| Measurement range | -100 to -10 °C dew point (0–3000 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]<br>max. 1500 hPa abs / 7 psig [2] |
| Flow rate | Depending on sequential measurement system, see analyzer specification [1]<br>0.2 to 1.5 l/min |

*Note! 1 psi = 68.95 hPa*

[1] If installed in series to another measurement system, e. g. IR channel
[2] Special conditions for > 1100 hPa abs. (1.5 psig)

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

*Tab. 1-3: Trace Moisture - Standard Measurement Performance Specifications*

## 1.8 Measurements 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 [11] | 0.2–1.5 l/min. | 0.2–1.5 l/min. |
| Influence of gas flow [1] [4] | ≤ 2 % [11] | ≤ 2 % | ≤ 2 % |
| Maximum gas pressure [7] [8] | ≤ 1500 hPa abs. (≤ 7 psig) [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 | ≤ 0.10 % per hPa |
| – With pressure compensation [6] | ≤ 0.01 % per hPa | ≤ 0.01 % per hPa | ≤ 0.01 % per hPa |
| Permissible ambient temperature [9] | 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] [13] (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) [12] | none | none [10] |
| 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] Special conditions for > 1100 hPa abs. (1.5 psig)
[8] Limited to atmospheric if internal sample pump
[9] Temperatures below 0 °C (-4 °F) with thermostat control only
[10] Thermost. controlled sensor: 35 °C (95 °F)
[11] Flow variation within ± 0.1 l/min
[12] Optional thermostatically controlled sensor with temperature 60 °C (140 °F)
[13] Temperature variation: ≤ 10 K per hour
[14] No sudden pressure surge allowed

***Note! Take care of the $tO_2$ sensor's documentation, providing important calibration instructions!***

*Tab. 1-4: 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).*

***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.*

## 1.8 Measurements Specifications

### *Special Performance Specifications for Gas Purity Measurements (ULCO & ULCO$_2$)*

| | **0–10…< 50 ppm CO<br>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] | ≤ 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; special conditions for > 1100 hPa abs. (1.5 psig)

*Tab. 1-5: Special Performance Specifications for Gas Purity Measurements*

## 1.9 Vapor Recovery Application (Simultaneous Measurement of $CH_4$ and Non-$CH_4$)

This application is served by a special configuration of the X-STREAM X2FD flameproof analyzer.

The configuration consists of a dual channel IR measurement, connected to the inlet and outlet of a converter. This converter is installed inside the X-STREAM analyzer and is heated to about 280 °C (536 °F).

**WARNING**

**EXPLOSION HAZARD BY HOT COMPONENTS**

**Temperatures inside an analyzer for VAPOR RECOVERY applications exceed the analyzer's temperature classification for hazardous areas!**

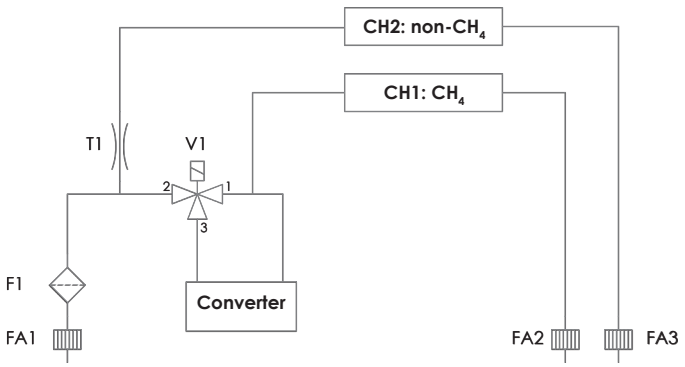
**Special conditions apply to handling this analyzer, consider the safety instructions at the beginning of this manual and the special conditions for safe use (☞ 1-5)**

**Consider the waiting time statement on the front door label before opening!**

### Principle of measurement

The sample gas is taken towards a converter. At it's inlet the gas stream is divided into two: one is directly fed to a non-$CH_4$ measurement. The other is supplied to a solenoid valve, normally forwarding the gas to the converter.

Within the converter, hydrocarbons higher than $CH_4$ are converted into $H_2O$ and $CO_2$. The converter outlet is connected to a second IR measurement system, analyzing the remaing amount of hydrocarbons (mainly $CH_4$) in the sample gas.




FA1: Analyzer's inlet flame arrestor
FA2...3: Analyzer's outlet flame arrestors
F1: Filter
T1: Throttle
V1: Valve

*Fig. 1-7: Vapor Recovery Gas Flow Diagram*

**After switching power on, wait about 50 min. for the converter to reach its operating temperature before applying gases!**

## 1.9 Vapor Recovery Application

### Converter efficiency

The measurement accuracy is highly dependent on the converter efficiency: If this is too low, the converter material needs replacement.

To measure the converter efficiency, one has to compare the measurement values of CH1 with and without having the gas flowing through the converter. This requires activating the valve V1.

☞ 4 Maintenance section of this manual for instructions about when and how to replace the converter material.

# Chapter 2
# Installation

**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

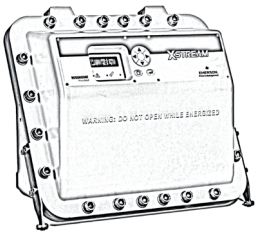
**WARNING**

**HAZARDS FROM MISSING INFORMATION**

**Compare the content of your package with the pictures below.**

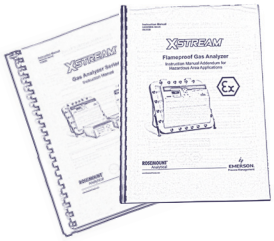
**Call your local sales office if something is missing, and DO NOT continue to install your analyzer, until all parts are at hand!**

Allen key for flange screws



Analyzer

Metric-2-NPT adaptors for CSA approved analyzers (amount meets number of non sealed threads).



USB stick

Instruction manuals:
- This manual addendum
- X-STREAM X2 instruction manual (on USB stick)

*Fig. 2-1: Scope of Supply*

## 2.2 Installing the Analyzer

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Installing and wiring this instrument must comply with all relevant national legislative requirements and regulations.**

**Consider all safety instructions within this on hand manual and all associated analyzer instruction manuals!**

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Installing this instrument requires opening the enclosure and working at the open instrument. This is permitted only when both no hazardous atmosphere is present and the instrument and connected external circuitry are de-energized!**

**Depending on the local regulation, this may require a competent hot work supervisor to issue a hot work permit.**

**CAUTION**

**HEAVY INSTRUMENT**

**The analyzer model X-STREAM X2FD, to which this manual relates, intended to be wall mounted and/or outdoor installed, weighs up to approx. 63 kg (139 lbs), depending on included options!**

**Use two people 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 units!**

**Take care the wall or stand the unit is intended to be installed at is solid and stable to hold the units!**

**WARNING**

**EXPLOSION HAZARD**

**Failure to follow this instruction and operating the analyzer without properly threaded components may result in explosion hazards!**

**WARNING**

**EXPLOSION HAZARD**

**Consider the permitted fastening torques when installing components to the enclosure or closing the cover, as given in this section and on a label at the instrument (☞ 2-6)!**

## 2.2 Installation - Analyzer

Install the analyzer to a stand or a wall by means of 4 eyebolts, provided at the instruments rear side.

It is recommended to install the analyzer in an upright (vertical) position; other orientations may affect the measuring results.

**IMPORTANT NOTE**

**When installing the analyzer take care to have an area of min. 40 mm surrounding the flange free of any solid components not part of the instrument, to ensure proper function of the flange!**

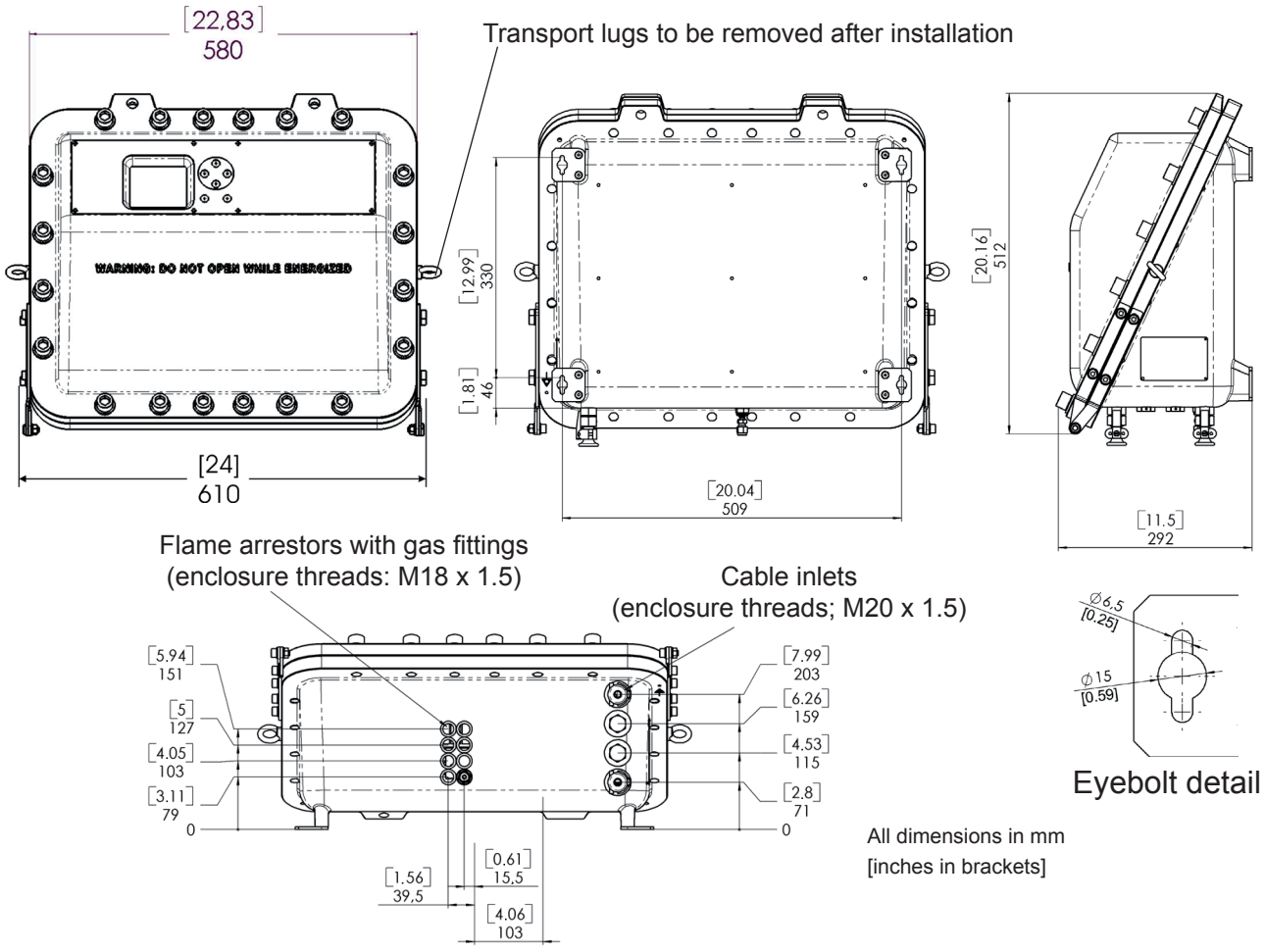



*Fig. 2-2: Dimensions*

## 2.3 Connecting Gas Lines

Gas inlets and outlets are protected by flame arrestors, supporting stainless steel pipes of either 3,18 mm (⅛“) or 6,35 mm (¼“) outer diameter (OD). The ¼“ fitting may optionally be supplied with a clamping ring for 6 mm OD pipes.

The instrument provides up to 8 gas inlets and outlets, depending on the ordered configuration. Unused entries are closed by approved plugs.

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Take care not to damage the threats, this may void the instrument´s safety and cause hazards!**

**Ensure unused entries remain sealed with approved plugs!**



When thightening the fitting, counterhold the flame arrestor with a wrench placed at the hexagon (items 5 of fig. 2-3) next to the cap nut (items 1, 4) to be tightened.

**Always counterhold the flame arrestor while thightening fittings; otherwise the flame arrestor may be damaged!**

**Maximum permitted fastening torque: 40 Nm!**

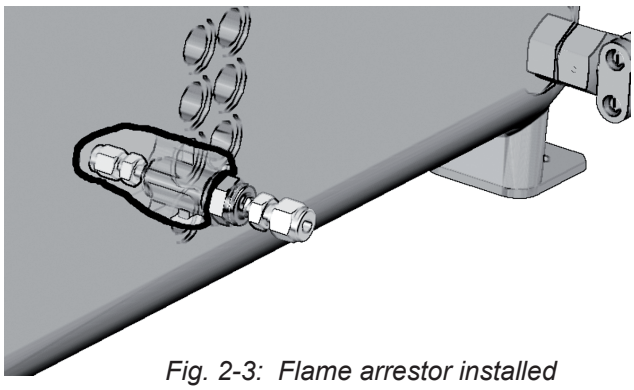
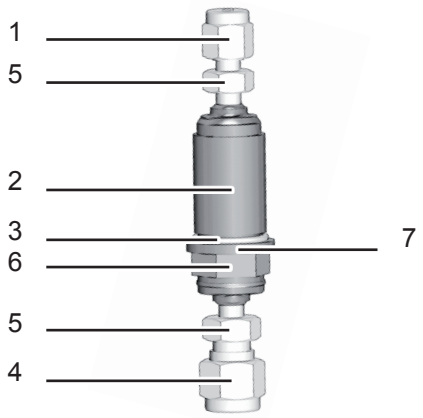


*Fig. 2-3: Flame arrestor installed into instrument enclosure*




1: Gas fitting ⅛“ (inside instrument) *)
2: M18 male threat (inside enclosure wall)
3: O-ring (optional)
4: Gas fitting ¼“ or ⅛“ (outside instrument) *)
5: Hexagon for counter holding while thightening
6: Hexagon for wrench when mounting into a M18 threat
7: O-ring shoulder

*) *FA 01 with ¼“ (outside instrument) and ⅛“ (inside)*
*FA 02 with ¼“ at both ends*
*FA 03 with ⅛“ at both ends*

*Fig. 2-4: Flame arrestor elements, exemplarly considering FA 01*

## 2.3 Installation - Gas Lines

Gas fittings are accessible at the instrument‘s outer bottom side.The number and assignment of gas inlet and outlet fittings depends on the application and is given on a label attached to the analyzer‘s bottom side adjacent to the fittings.

For simple installation we recommend to mark the gas lines according to the marking on the analyzer label. This avoids confusion during re-installation if the analyzer had to be disconnected for whatever reason.

### 2.3.1 Special Conditions

#### 2.3.1.1 Purging the Housing with Clean Gas when e.g. Measuring Low Concentrations

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Risk of internal overpressure under leakage conditions!**

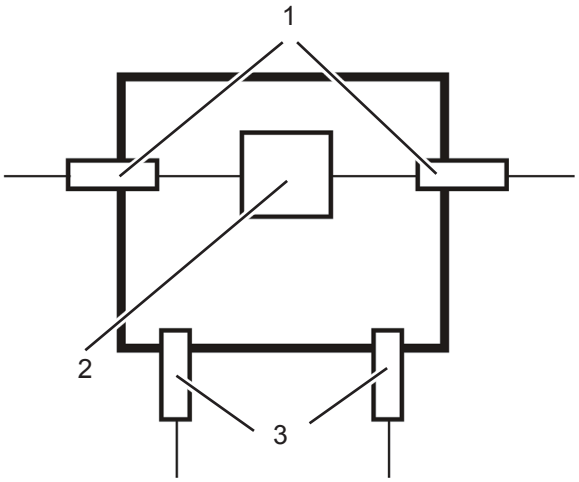
**For the following option, take care to limit the total of purge gas flow and highest flow of sample gas lines into the instrument to max. 2 l/min!**

**Take care of special conditions for safe use, and gas parameter specifications (☞ S-5 and ☞ 1-10) !**

The purge medium must be supplied via a separate flame arrestor (purge gas inlet), installed into the analyzer enclosure. Another flame arrestor must be installed, operating as a breathing device (purge gas outlet).

Connection of breathing device:

The external output of the breathing device (exhaust) can be open to the ambience of the analyzer, if inert gas is used as purge medium. If air is used, the output must end in a safe area, if the measured gas concentration is above 25 % V/V LEL.




1: Flame arrestors for gas path
2: Measuring system
3: Flame arrestors for purge gas in-/outlet

*Fig. 2-5: Exemplary diagram for a single channel unit with purge option*

### 2.3.1.2 High Sample and Calibration Gas Pressures

The gas paths need additionally to be protected by suitable external inline flame arrestors, designed and approved for the installation area and for the applied higher gas pressure (above 1100 hPa to max. 1500 hPa; see gas parameter specification ☞ 1-10). These inline flame arrestors need to be installed outside the analyzer and in addition to the flame arrestors provided by the analyzer.

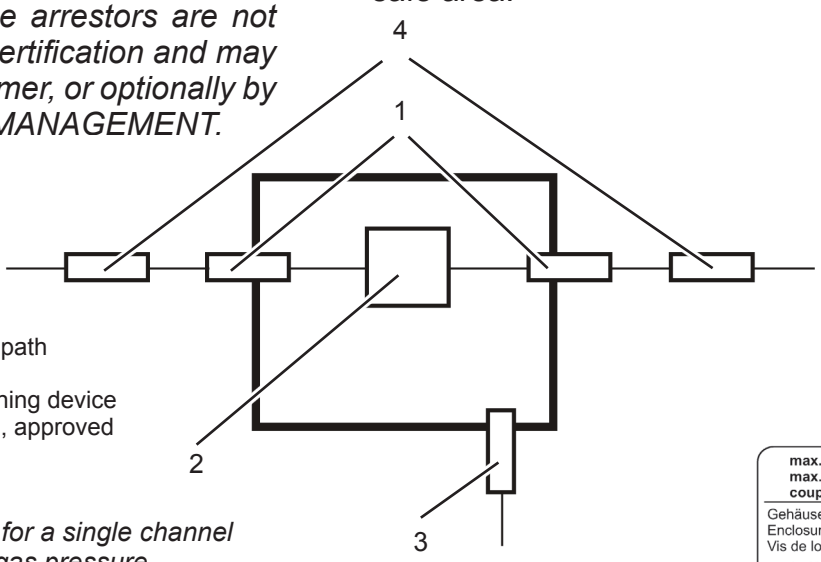
***Note!***

*The external inline flame arrestors are not subject of the analyzer certification and may be provided by the customer, or optionally by EMERSON PROCESS MANAGEMENT.*

A separate analyzer flame arrestor has to be installed, operating as a breathing device, limiting the internal pressure rise in case of gas path leakage.

Connection of breathing device:

The external output of the breathing device (exhaust) may be open to the ambience of the analyzer, if the measured gas concentration is below 25 % V/V LEL. Otherwise it must end in a safe area.




1: Flame arrestors for gas path
2: Measuring system
3: Flame arrestor as breathing device
4: External flame arrestors, approved for higher pressure

*Fig. 2-6: Exemplary diagram for a single channel instrument for high gas pressure*

### 2.3.1.3 Fastening Torques for Enclosure Components

Consider the permitted fastening torques, when installing components to the enclosure, as given on a label at the instrument!

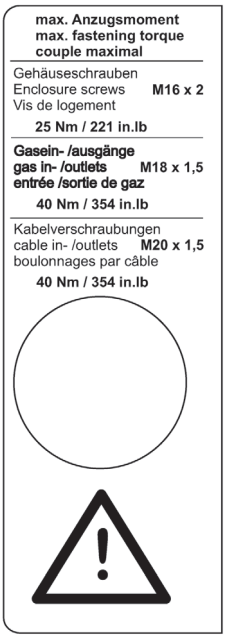



*Fig. 2-7: Label with fastening torques, installed at the instrument*

### 2.3.2 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 be**

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

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.

**Hints for selected gases**

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

---

***Case purge option***

The purge medium (e.g. to minimize $CO_2$ interference or for enhanced safety when 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 safety reasons, consider section 2.3.1 when making use of this option!

***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 ≥ 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!**

## 2.4 Electrical Installation

**WARNING**

**ELECTRICAL SHOCK HAZARD**

**Installation and connecting power and signal cables are subject to qualified personnel only, taking into account all applicable standards and legislative requirements!**

**Failure to follow may cause warranty invalidation, property damage and/or personal injury or death!**

**Installation of these instruments is subject to qualified personnel only, familiar with the resulting potential risks! Instruments providing screw terminals for electrical connections may require working near live part!**

**X-STREAM X2FD gas analyzers do not provide a power switch!**

**A power switch or circuit breaker (complying with IEC 60947-1/-3) has to be provided in the building installation. This switch has to be installed near by analyzer, must be easily operator accessible and has to be assigned as disconnector for the analyzer.**

**Disconnect instruments with screw terminals from power when working at power terminals (pull power plug or operate power switch/ circuit breaker in building installation)!**

**The analyzers provide a protective earth terminal. To prevent electrical shock hazards the instruments must be connected to a protective earth. Therefore the instruments must be connected to power by using a three wire power cable with earth conductor!**

**Any interruption of the earth connector inside or outside the instrument or disconnecting the earth terminal may cause potential electrical shock hazzard!**

**The analyzers do not provide a power switch and are operable when connected to power.**

## 2.4 Installation - Electrical

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Do not open instrument when energized.**

**Ensure that external circuitry is disconnected or de-energized before opening the instrument.**

**All cables (power and signal) must end (be connected) in either a safe (non-hazardous) area or in a protecting enclosure (e.g. Ex e junction box)!**

**CAUTION**

**SELECT THE CORRECT TYPE OF CABLE ENTRY**

**Before starting to install the analyzer, verify what type of cable entry is required at your site of installation:**

**X-STREAM X2FD gas analyzers may be equipped with cable glands (regulated e.g. for installations covered by ATEX) or may be installed with conduits (e.g. in North-America).**

**WARNING**

**INSTALLATION USING CONDUITS**

**X-STREAM X2FD analyzers provide metric threads for installing cable entries. Installing conduits requires using metric-to-NPT adaptors!**

**To stay compliant with the North-American certification use only flameproof certified adaptors, e.g. the following type:**

**Redapt AD-U series, stainless steel with captive o-ring seals, size male M20 x 1.5 to female 3/4-NPT or 1/2-NPT.**

**Select a type of conduit according the local code, suitable for above mentioned adaptors and the site of installation.**

**During installation follow the instructions provided by the manufacturer of the conduits!**

**Unused entries must be provided with flameproof plugs!**

## 2.4 Installation - Electrical

**WARNING**

**INSTALLATION USING CABLE GLANDS**

**X-STREAM Flameproof analyzers are shipped without certified cable glands.**

**Cable glands have to be selected while preparing the installation according all applicable standards, e. g. EN 60079-14 or IEC 60079-14.**

**Use only cables as specified in the cable glands installation instruction, and carefully follow the original manufacturer‘s installation instructions, accompanying the cable glands!**



The next page shows

- the English installation instructions for type AD-U adapters, reprinted with the permission of
  Redapt Ltd

***Note!***

*See the documentation delivered together with your analyzer for an original version of the cable gland or adapter installation instructions, whatever is applicable !*

Type AD-U adapter installation instructions

## Installation Guide

1. All Redapt products should be installed in accordance with all relevant Installation Standards and Codes of Practice.
2. BS EN 60079-14: 1997. Electrical Installations in hazardous areas (other than mines)
3. Installation of Redapt products should only be carried out by an engineer trained in cable gland installation.
4. Under no circumstances should installation be carried out under live conditions.
5. The installer should ensure that no damage occurs to any thread or form of seal during installation. Where component is plated care should be taken to prevent damage or chipping.
6. Threaded Entries – Components can be installed directly into threaded entries and the recommended torque applied.
7. Clearance Holes – Clearance holes should be 0.5 mm to 1mm larger than the major diameter of the male thread. Components installed in clearance holes should be secured with an appropriate sized locknut to recommended torque.
8. Maintaining IP 54 Rating – In order to maintain such an IP rating the installer should ensure that parallel threads engage to 6 full threads and tapered thread to 5 full threads.
9. Maintaining IP 66-67-68 Rating – In order to maintain the IP Rating of a component, the above thread engagement must be attained. The surface of the enclosure should also be clean and free from dust or moisture before assembly. In order to maintain IP 66-67-68 the installer must ensure that either the sealing washer is in the correct position or that the 'O' Ring seal is seated in the groove provided. A non-hardening thread sealant may be used to provide protection.
10. If a serrated washer is used it should not be installed in such a way that it may impair any IP Rating.
11. Recommended Installation Torque – In order to maintain the integrity of the enclosure it is important that an installation torque as detailed below be applied.

## Installation Torque

Redapt adaptors and reducers should be installed to the recommended torque values detailed in the following table. Torque values apply to non-metric thread equivalents.

| Male Thread Size | Metallic Components (Nm) | GF Nylon Components (Nm) |
|---|---|---|
| M16 & M20 and Equivalents | 32.5 | 7 |
| M25 and Equivalents | 47.5 | 10 |
| M32 and Equivalents | 55.0 | 10 |
| M40 and Equivalents | 65.0 | 15 |
| M50 and Equivalents | 80.0 | 25 |
| M63 and Equivalents | 95.0 | 30 |
| M75 and Equivalents | 110.0 | 45 |
| M80 Threads and Above | Major Dia. x 2 (i.e. for M80 – 160 Nm) | - |

## Routine Checking and Maintenance

1. All Redapt products should be checked during routine maintenance of the enclosure.

## 2.4 Installation - Electrical

ATEX approved analyzers provide 4 cable entries (M20 x 1.5) and are shipped with a set of 4 plugs.

Owner of such analyzers are responsible to provide suitable cable glands according all applicable standards (e. g. IEC/EN 60079-14).

See maintenance section of this manual for recommended cable glands.

Unused entries during installation have to be provided with plugs!

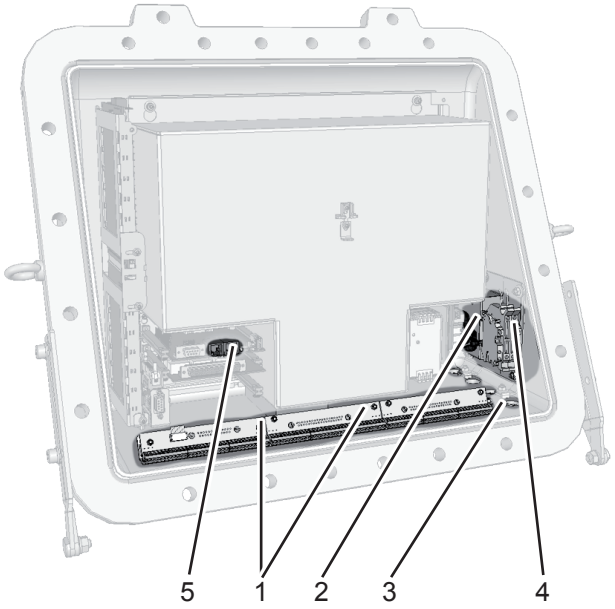
Installation under CSA certification requires the use of approved conduits and suitable metric-to-NPT adaptors. .

Both plugs and cable entries must be installed properly and fixed by applying the prescribed torque.

The instrument provides internal screw terminals for connecting power and signal cables. This requires opening the instrument during installation:

- Unsrew the 20 screws located on the enclosure flange.
- Flap down the cover part to gain access to the analyzer inside.

Inside the enclosure, keep all cables as short as possible to prevent from interferences.




1 Terminals for signal cables
2 Power EMI filter
3 4 cable entries for power and signal cables
4 Power terminals with integrated fuses
5 Ethernet connector (option)

*Fig. 2-8: Allocation of terminals*

## 2.4 Installation - Electrical

### *Installation with conduits*

Ensure all required parts are available:

Adaptors, suitable conduits, compound and plugs for not used entries (see accessory kit).

Install the required number of adaptors into the related cable entries:The 3 rear entries are reserved for signal cables, the first one is for the power cord.

**Tightening torque:**
**max. 354 in.lb / 40 Nm!**

Ensure the explosionproof seal is placed at the analyzer enclosure or within 2“ from enclosure.

All cables need to be fed properly through conduits when entering the instrument and connected to the terminals ( ☞ warning notes, page 2-8).

To seal the cable entries proceed according to the installation instruction given in the related conduits manufacturer documentation.

**Keep the original manufacturer‘s documentation available for future reference!**

Seal unused entries utilizing the flameproof certified plugs.

### *Installation with cable glands*

Ensure all required parts are available:

Cable glands and plugs for not used entries.

Verify the provided cable gland is designed for your type of cable (e. g. armoured, non-; diameter), see marking on the cable gland.

Install the required number of cable glands according the manufacturers instruction into the related cable entry:The 3 rear entries are reserved for signal cables, the first one is for the power cord.

**Tightening torque:**
**max. 354 in.lb / 40 Nm!**

All cables need to be fed properly through the cable glands when entering the instrument and connected to the terminals ( ☞ warning notes, page 2-8).

To seal the cable entries proceed according to the installation instruction given in the related cable glands manufacturer documentation.

**Keep the original manufacturer‘s documentation available for future reference!**

Seal unused entries utilizing the flameproof certified plugs.

### *Preparation of signal cables*

All signal cables are to be connected via screw terminals, except the optional ethernet connector, located inside the analyzer.

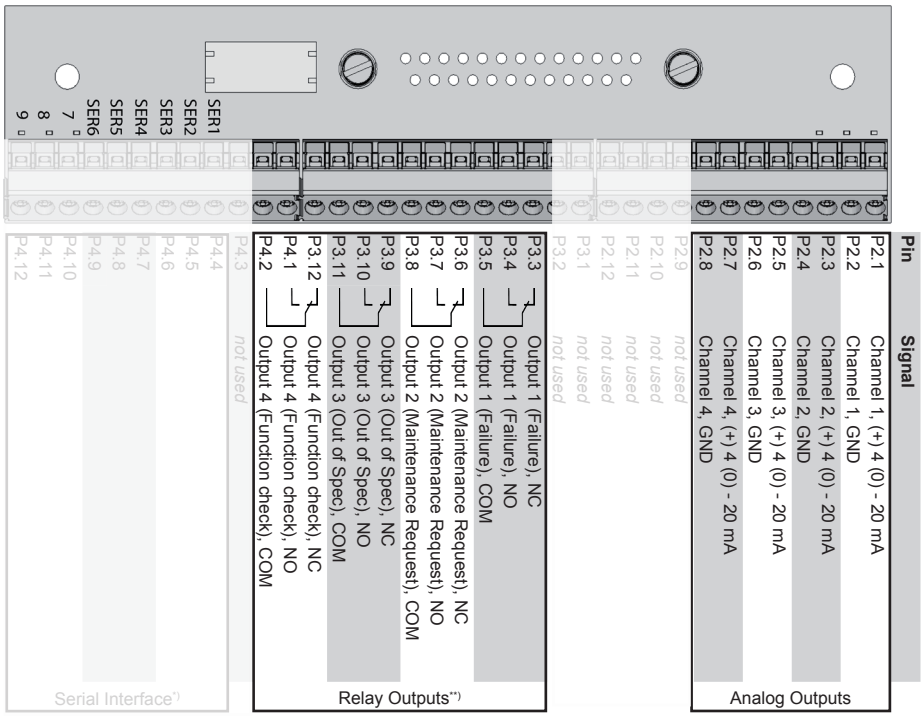
| | |
|---|---|
| Supported wire cross sections: | 0,14 to 1,5 $mm^2$ (26 to 15 AWG) , no need to use wire end sleeves |
| Cable skinning length: | 5 mm (0.2 inch) |
| Screw thread: | M 2 |
| Tightening torque, min: | 0,25 Nm (2.3 in.lb) |

*Analog Outputs*
*Relay Outputs 1 - 4*

Terminals for analog signals and relais outputs 1 - 4 are located at the leftmost terminal module (terminal block X1; fig. 2-5).

| | |
|---|---|
| Analog outputs specification: | 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!***
*Take care of the special installation instructions in section 4.5 of the X-STREAM gas analyzer series manual!*




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

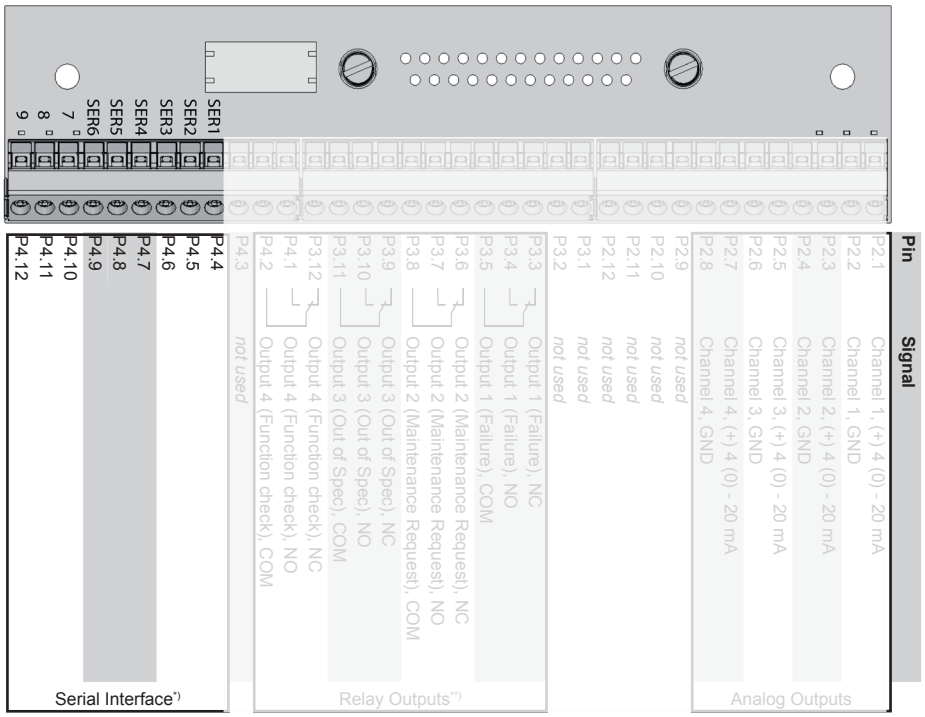
*Fig. 2-9: Terminals block X1 - analog signals and relay outputs 1-4*

## 2.4 Installation - Electrical

*Modbus Interface*

Specification and interface control:
☞ Analyzer instruction manual, chapter 9

The 9 terminals on the left (28 - 36) of the strip next to the power connections carry the Modbus interface signals.




*) See table below

Assignment of serial interface terminals

| Terminal | MOD 485/ 2 wire | MOD 485/ 4 wire | RS 232 |
|---|---|---|---|
| P4.4 | Common | Common | Common |
| P4.5 | *not used* | *not used* | RXD |
| P4.6 | *not used* | *not used* | TXD |
| P4.7 | *not used* | RXD1 | *not used* |
| P4.8 | D1 | TXD1 | Common |
| P4.9 | *not used* | *not used* | *not used* |
| P4.10 | *not used* | *not used* | *not used* |
| P4.11 | *not used* | RXD0 | *not used* |
| P4.12 | D0 | TXD0 | *not used* |

*Fig. 2-10: Terminals block X1 - Modbus interface*

***Note!***
*Take care of the special installation instructions in section 4.5 of the X-STREAM gas analyzer series instruction manual!*

***Note 2!***

*X-STREAM analyzers are to be considered a DTE (Data Terminal Equipment).*

*Optional Modbus RJ45 connection*

If fitted, the optional RJ45 connection is located on an electronics board in the card cage section of the unit (fig. 2-4.

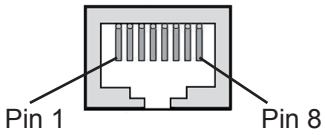
To install this connection, a cable must be fed through the cable entry **without** a connector.

The connector can be wired on when the free end has been fed into the instrument:

We recommend the VARIOSUB RJ45 QUICK-ON connector (PHOENIX CONTACT), which is supplied with the unit and requires no special tools. Wiring instructions can be found in the separate manual supplied with the connector.

***Note!***
*Take care that the Modbus terminals (☞ 2-16) are still installed but not connected!*






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

*Fig. 2-11: Modbus Interface - Ethernet connector*

## 2.4 Installation - Electrical

*Digital inputs*

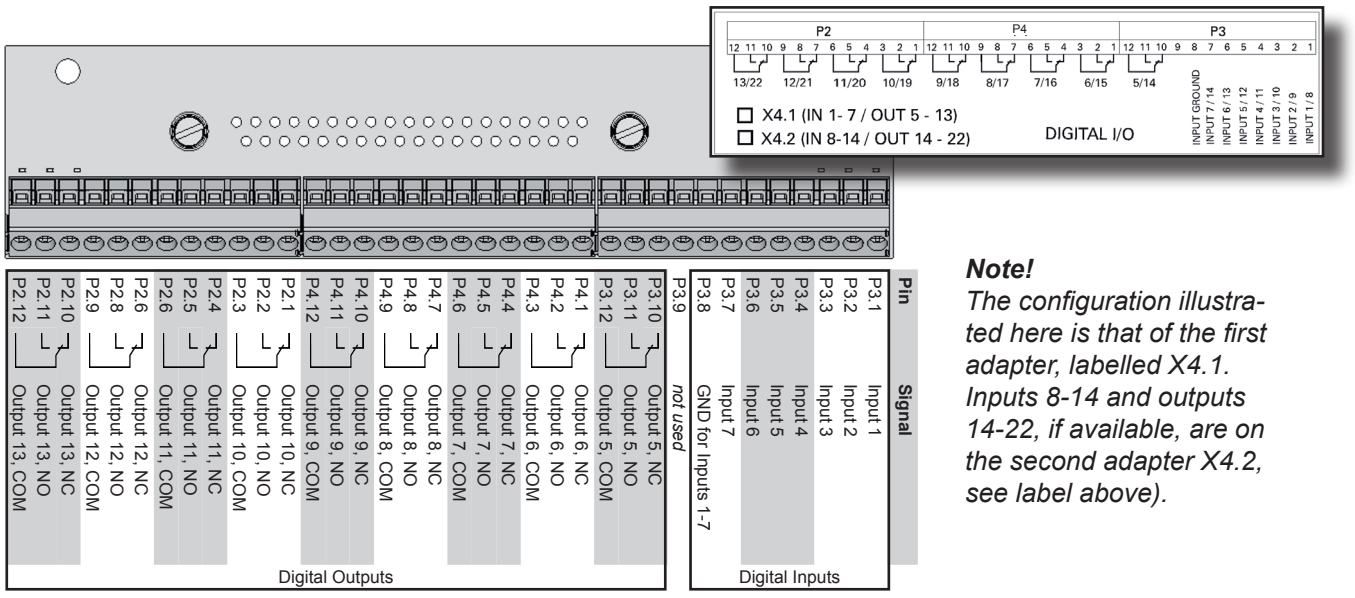
| | |
|---|---|
| Quantity: | 7 (1 terminal block) or<br>14 (2 terminal blocks) |
| Electrical specification: | max. 30 V⎓, internally limited to 2.3 mA<br>H Signal: min. 4 V;<br>L Signal: max. 3 V<br>common ground (GND), electrically isolated from chassis earth |

*Digital outputs*

| | |
|---|---|
| Quantity: | 9 (1 terminal block) or<br>18 (2 terminal blocks), dry change-over relay contacts, can be used as NO or NC |
| Electrical specification: | max. 30 VDC, 1 A, 30 W |

***Notes!***
*Depending on configuration, an analyzer can be fitted with up to two of these terminal blocks (the unit will then feature 14 digital inputs and 18 digital outputs). To aid identification, the sockets are labelled X4.1 and X4.2.*

***Note!***
*Take care of the special installation instructions in section 4.5 of the X-STREAM gas analyzer series manual!*




***Note!***
*The configuration illustrated here is that of the first adapter, labelled X4.1. Inputs 8-14 and outputs 14-22, if available, are on the second adapter X4.2, see label above).*

*Fig. 2-12: Terminal blocks X4.1 and X4.2 - Digital inputs and outputs*

## 2.4 Installation - Electrical



### *Connecting the power cord*

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

| | |
|---|---|
| **Electrical Connections** | |
| Power terminals | Schraubklemmen mit integrierten Sicherungshaltern<br>max. 4 mm² |
| Supported wire cross sections | 0.2 to 4 mm² (24 to 12 AWG) no need to use wire end sleeves |
| Cable skinning length | 8 mm (0.315 inch); |
| Tightening torque, min . | 0.5 Nm (4.4 in.lb) |
| **Power Inlet Fuses** | |
| Data | AC 230 V / T 4 A / 5x20 mm |
| **Cable Inlets** | |
| Variations | Cable glandes, IP 68, or<br>Conduits with adaptors (metric-2-NPT) |
| Outer cable diameter (cable glands) | depending on cable gland |

To install the cable proceed according to the installation instructions for either conduits or cable glands, given on page 2-11.

Insert the power cord through the foremost entry, strip the outer insulation, skin and connect the conductors to the terminals (a descriptive label is attached nearby the terminals), by inserting them from the bottom sides.

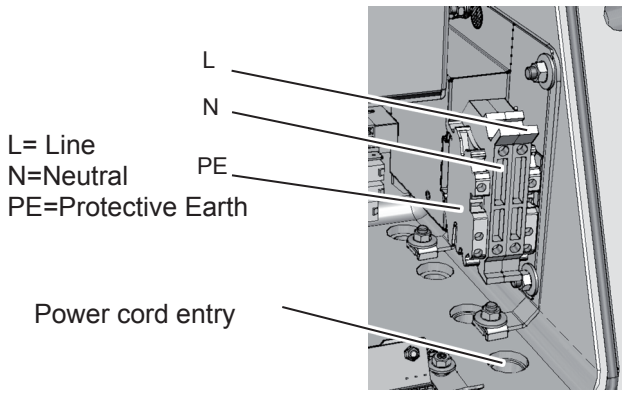



*Fig. 2-13: Power terminals*

**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!**

### *Connecting an optional equipotential bonding conductor*

The X-STREAM X2FD enclosure provides an additional terminal for connecting an equipotential conductor, located at the base part flange´s rear side (see fig. 2-14), near the nameplate label.

Screw thread: M5 x 10 mm

Conductor cross section: min. 4 mm²

The installation has to comply with sound engineering practice (see example to the right). Take care of contact corrosion due to the aluminum cast enclosure.

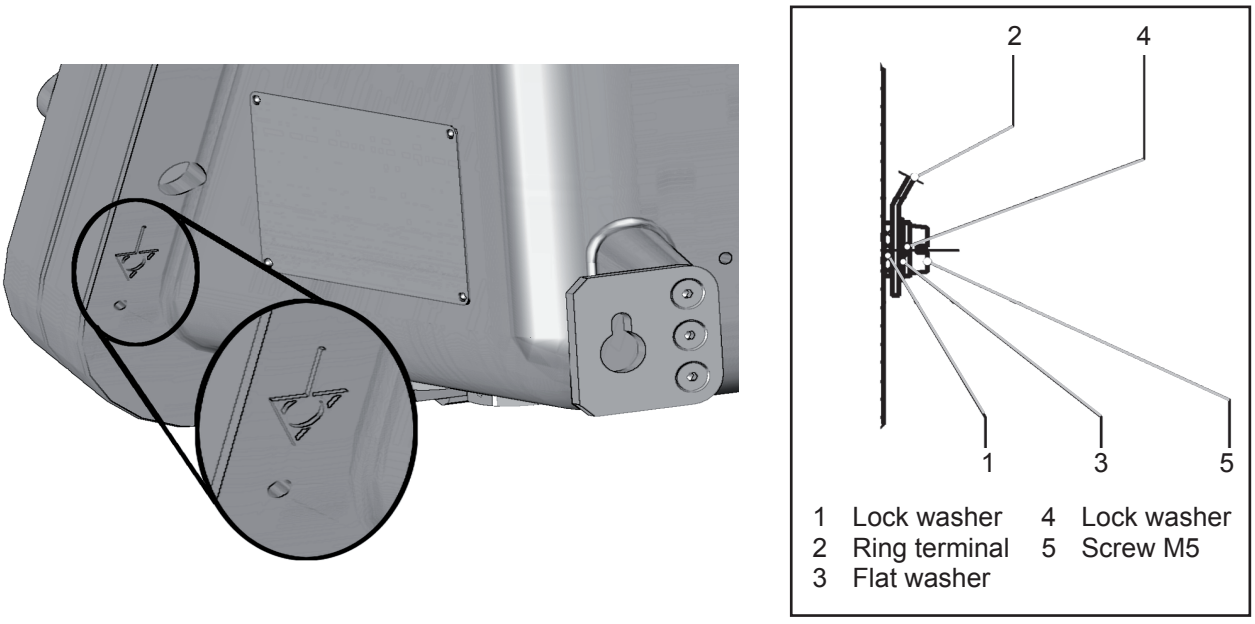



*Fig. 2-14: Equipotential bonding conductor terminal*

## 2.4 Installation - Electrical

**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!**



After all connections are established in the specified manner, and verified,

- fix the cables according to the installation instruction given in the cable glands / conduits manufacturer documentation.
- All cable entries must be sealed by means of either Ex d approved cable glands, conduits or sealing plugs.
- Install the analyzer´s cover by means of ALL 20 screws!

**Tightening torque**:

**25 Nm (221 in.lb)**

**WARNING**

**EXPLOSION HAZARD**

**Do NOT operate the instrument with doors, sealing plugs or covers open! This is permitted only when no hazardous atmosphere is present!**

**Depending on the local regulation, this may require a competent hot work supervisor to issue a hot work permit.**

**Use ALL 20 screws to fix the cover! Violation may cause an explosion!**

# Chapter 3
# Startup

**WARNING**

**EXPLOSION HAZARD**

**Ensure all covers, plugs and housing parts are in place and secured properly before supplying power and signal voltages!**

**Ensure all requirements given by the clarification sheet for performing gas analysis within a flameproof enclosure are considered BEFORE supplying gases (☞ page S-10)!**

**The sheet also gives instructions for the sequence of supply-ing gases during process and analyzer startup .**



## 3.1 Final Check

Ensure that the analyzer has been installed according to the descriptions in chapter 2, and that all covers and doors are closed and fastened.

**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!**

## 3.2 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 ($N_2$) 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 ($N_2$) to avoid hazards caused by toxic, flammable, explosive or harmful to health sample gas components!**

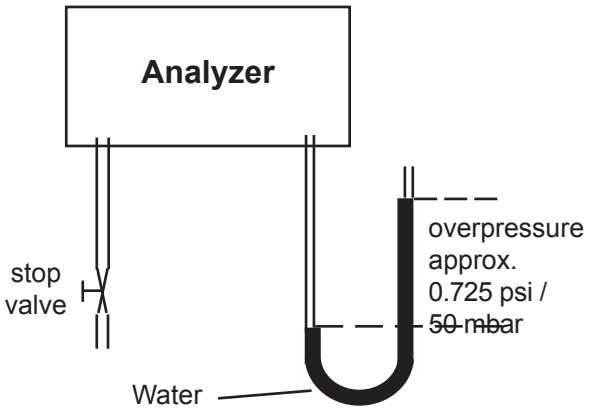



*Fig. 3-1: Leak Testing with U-turn Manometer*

**Max. pressure 7.25 psig (500 mbar)!**

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

## 3.3 Switching On

Once the unit has been unpacked and installed, we recommend to first check the settings, and if necessary adjust them to the user's needs. e.g:

- What hardware is installed?
- Is the unit configured to your needs (alarms, inputs, outputs, etc.)

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.

The following pages describe how to navigate through the menus and what is to be observed when configuring the unit. For the first startup after installation, follow the step-by-step instructions for navigating the menus, allowing you to familiarise yourself with the unit and its software, and if necessary adjust the settings to your needs.



**WARNING**

**EXPLOSION HAZARD**

**Before applying power and signals:**

- **Verify for proper installation**
- **Verify that all covers and plugs are properly installed and in place!**
- **Verify that all gas connections are tight.**

**Violation may result in explosion, personal injury or death!**

**WARNING**

**EXPLOSION HAZARD BY HOT COMPONENTS**

**Temperatures inside an analyzer for VAPOR RECOVERY applications exceed the analyzer's temperature classification for hazardous areas!**

**Special conditions apply to handling and operating this analyzer, consider the safety instructions at the beginning of this manual!**

Switch on the analyzer by applying power.

## 3.4 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** | |
| Setup.. | Menu title |
| Setup..<br>Analog outputs.. | Parent (*Setup*) and current Menu (*Analog outputs*) |
| Analog outputs..<br>Output1 *(2...4)* | As an example, the menu for Output1 is displayed; the menus for outputs 2 to 4 are identical |
| Zero calibration..<br>Span calibration..<br>Adv. Calibration..<br>▼Apply gas.. | Display<br>***Note!***<br>*Menus or lines on a grey background are optional or context-dependent, and are not always displayed* |
| | Access levels: |
|  | Access level 1<br>*(user)* |
|  | Access level 2<br>*(expert)* |
|  | Access level 3<br>*(administrator)* |
|  | Access level 4<br>*(service level)* |

| Convention | Meaning |
|---|---|
| **Within descriptions** | |
| *(Menu title)*<br>6.2.2, page 6-12 | For a detailed description of this *Menü*, 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 |

## 3.5 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.



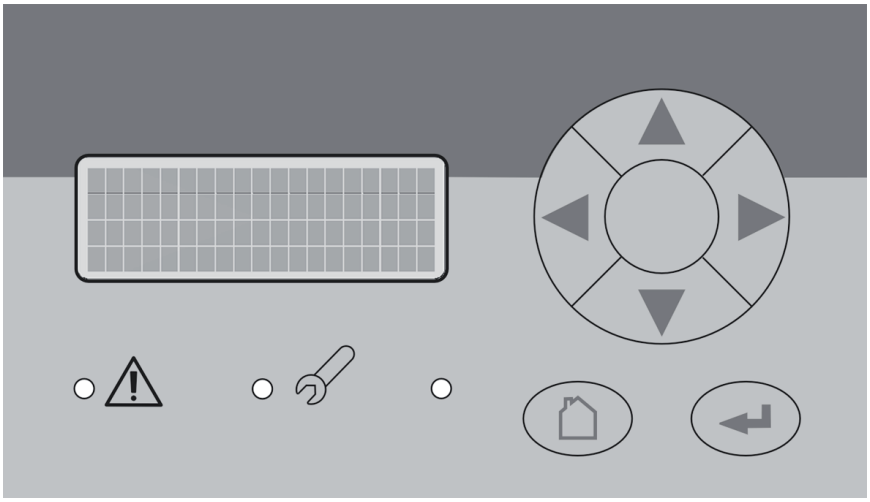
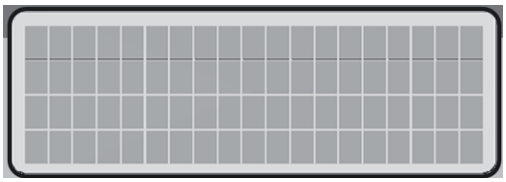


*Fig. 3-2: Front Panel*

## 3.5 The user interface

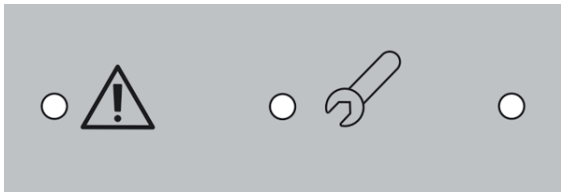
### 3.5.1 Display



The display has 4x20 characters, either liquid crystal or vacuum fluorescent (LCD or VFD).

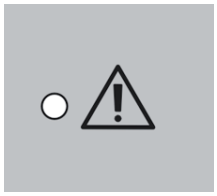
What information is displayed depends on the currently displayed menu.

### 3.5.2 Status LED

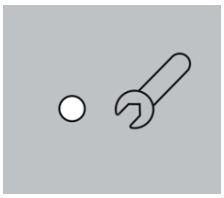


Three status LED indicate the unit's status, recognisable from a distance.

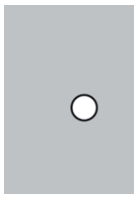
Status is indicated in accordance with the German NAMUR NE 44 recommendations.



"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".

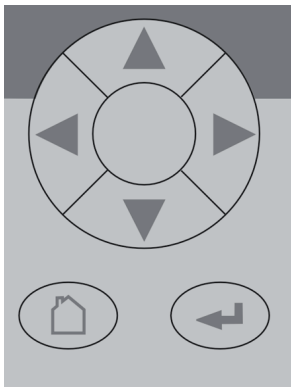


The third, green LED indicates the power supply status:

on: power supply OK

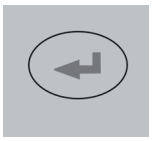
off: power supply interrupted

### 3.5.3 Keys



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



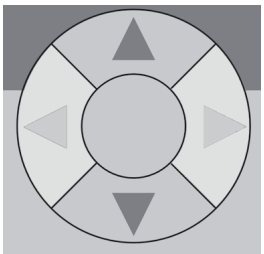


**ENTER** key:

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

**MEASURE** key:

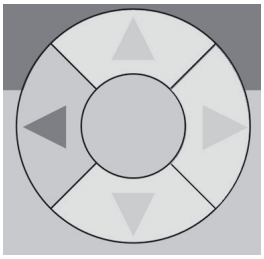
| *Mode* | *Function* |
|---|---|
| Measuring | *(no function)* |
| Browsing | Returns to measurement display |
| Editing | Cancels entry |



**UP / DOWN** keys:

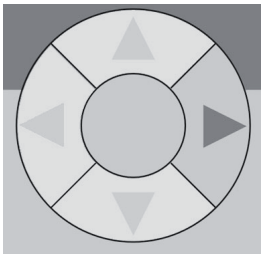
| *Mode* | *Function* |
|---|---|
| Measuring | Leaves the measurement display |
| Browsing | Selects menu line |
| | Goes to previous/next page, when currently in a line beginning with ▲/▼ |
| Editing | Changes current parameter |

## 3.5 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 |

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

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

| Function | Description |
|---|---|
| Displaying TEXT | Simple text (not selectable with cursor) |
| Editing VARIABLES | A variable description ends with a colon and the line can be made up of up to 3 elements:<br>1. description<br>2. value: number or text<br>3. unit (optional)<br>*Examples:*<br>Span gas: 2000 ppm<br>Tol.Check: Off<br>Variables without a colon cannot be edited. |

| Function | Description |
|---|---|
| Executing COMMANDS | 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.<br>*Example:*<br>Start calibration ! |
| Selecting a MENU | A menu line text ends in two dots; when this line is selected and ENTER pressed, a submenu is opened.<br>*Example:*<br>Setup.. |



### 3.6.1 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.

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.

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<br>Line 2..<br>Line 3<br>▼Line 4 | ▲Line 1<br>Line 2..<br>Line 3<br>▼Line 4 | ▲Line 1<br>Line 2..<br>Line 3<br>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 ↵ key.

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

The ← and → 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:

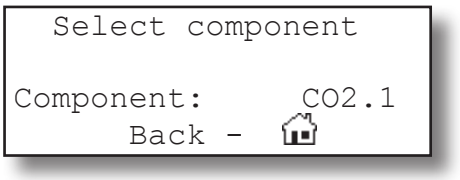
↵ key: the value is verified (e.g. min/max). If the value is possible, it is saved and the new value displayed; if not, an error message is displayed.

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

**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.






### 3.6.2 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 |
|---|---|---|
| 1 | 00000001 | Off |
| 2 | 00000002 | Off |
| 3 | 00000003 | Off |

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

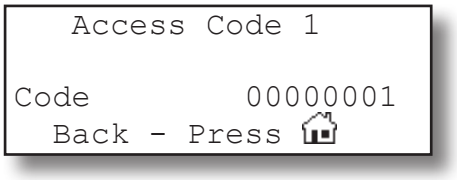
***Note!***

*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**.*

***Entering access codes***

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




Use

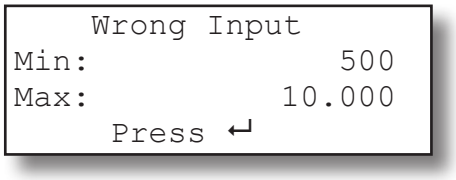
- the UP/DOWN keys to change the currently selected digit,
- the LEFT/RIGHT keys to select a different digit,
- the ENTER key to submit the code

or

- the MEASURE key to leave edit mode and return to the previous display.

### 3.6.3 Special messages

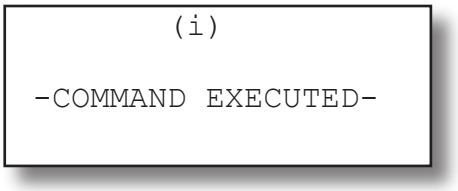
Depending on the last action performed by the user, one of the following messages may be displayed to assist or inform the user (the two confirmation messages are displayed only for a few seconds):




Information on incorrect entry:

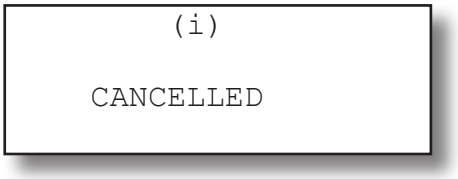
The value entered by the user is outside valid limits. The display indicates what limits apply.

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.

## 3.7 Powering up

### 3.7.1 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.

### 3.7.2 Measurement display

The measurement display is shown

- automaticaly 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).

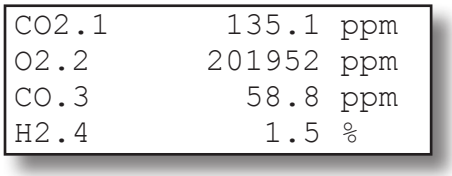
If such messages are active, line 4 alternates between the messages and the parameter selected for line 4.

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; ☞ 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.*




**MEASUREMENT DISPLAY**

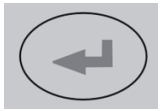
## 3.8 Selecting the language

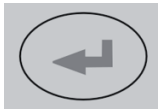
If the analyzer is operational and it becomes clear that the incorrect language has been set, which is unintelligible to the operator, the following sequence of keypresses (starting at the measurement display) can be used to set the language.

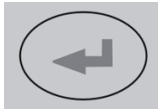

*If the system has been set up accordingly, the code for access level 1 must be entered at this point to enable access to the following menu.*

***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.

## 3.9 Calibrating the analyzer

***Note!***

*To achieve best and proper measuring results it is recommended to perform zero and span calibrations on a regular weekly basis.*

*Also a zero calibration must always precede a span calibration!*

### Zero calibration

Nitrogen (N2) or any other suitable neutral gas is supplied to the gas path. The concentration of the component of interest is declared to be "zero" and so the measured signal during zero calibrations is declared to be 0.

### Span calibration

Span gases with concentrations of 80 % to 110 % of the upper measuring range limit is supplied to the gas path (lower concentrations are acceptable, but influence accuracy of measurements if later sample gas concentrations are higher). The contained concentration of the component of interest is setup as set point, and the measured value during span calibration is then declared to correspond to that concentration.

***Note!***

*If the current concentration is known, ambient air may be used to span calibrate %-Oxygen channels.*

### X-STREAM gas analyzers support several calibration procedures:

### Manual calibration

Typically a calibration procedure is carried out manually by supplying the gases sequentially by hand and activating the procedures via front panel keys.The operator has to take care to consider purge times and supply the proper gases in correct order.

It is the operators responsibility to not perform a span calibration without a preceding zero calibration!

### Advanced calibration

Advanced calibration is a more comfortable variation of manual calibration, providing ONE KEY calibrations supported by internal and/or external valves. The analyzer automatically supplies the right gas and considers purge times.

### Remote calibration

Remote calibrations may be activated by means of digital inputs or Modbus commands. Calibrations activated via digital inputs require either internal or external valves to be installed. Modbus supports both calibrations with or without valves as well as calibration sequences.

### Unattended automatic calibration

Unattended automatic calibrations are activated utilizing the analyzer software time interval setting:

After a specified time interval has elapsed, the analyzer automatically carries out valve supported zero or span calibrations.

The main advantage is that no user interaction is required to start a calibration or during calibrations: The analyzer automatically supplies the right gas, considers purge times and, that a span calibration has to be preceded by a zero calibration.

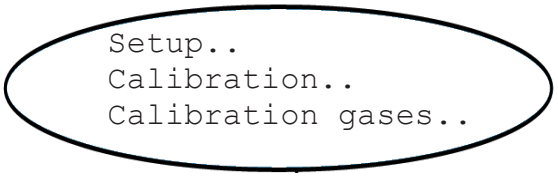
**The following sections describe how to carry out manual calibrations.**

**For information about other calibration procedures see the X-STREAM X2 instruction manual.**

## 3.9 Calibrating the analyzer

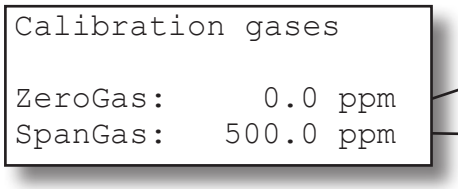
### 3.9.1 Preparing Calibrations

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!***

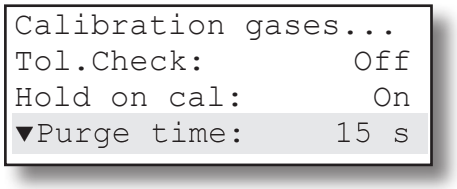
*The units for the calibration gases are taken from the related entry in the display setup menu.*

*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.

## 3.9 Calibrating the analyzer




***Example:***

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

***Situation:***

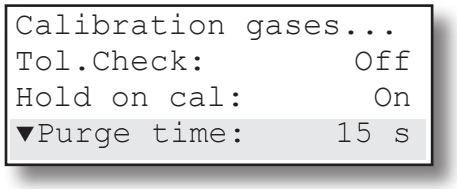
*Due to a fault zero gas is supplied to carry out a span calibration, instead of span gas*.

***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.*




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.

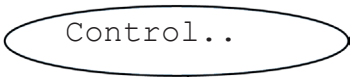
The 3rd option (**AutoOff**) has the same functionality as **10%** except that the maintenance request is reset after 2-3 minutes.

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**.

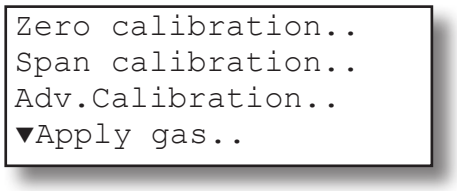
***Note!***

*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..*

### 3.9.2 Manual Calibration




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:

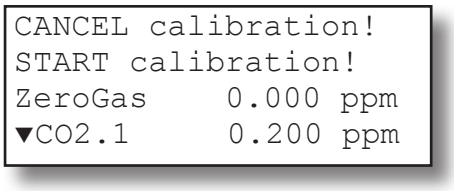
#### 3.9.2.1 Manual Zero Calibration

**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 (recommeded approx. 1 l/min), pressureless and utilizing the right gas fitting.**

**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!**

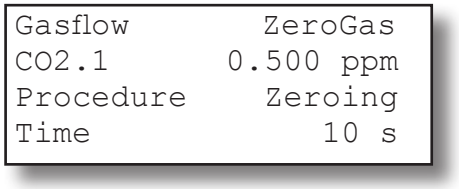

*Multi-channel unit:*
*Select the channel to be calibrated in the SELECT COMPONENT menu.*




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.

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...

### 3.9.2.2 Manual Span Calibration


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

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

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

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

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.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.

# Chapter 4
# Service and Maintenance

***Note!***

*This chapter deals with service and maintenance procedures related to explosion protection only!*

*More detailled instructions about servicing and maintaining general purpose components of X-STREAM gas analyzers are subject of the X-STREAM analyzer instruction manual.*

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Inspection, maintenance and service must be carried out considering all related standards e.g. for „Inspection and maintenance of electrical installations in hazardous areas“.**

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**Service or replacement of safety related components or requiring to open the instrument are permitted only if no hazardous atmosphere is present and both the instrument and connected circuitry are de-energized!**

**Depending on the local regulation this may require a competent hot work supervisor to issue a hot work permit.**

**WARNING**

**POSSIBLE EXPLOSION HAZARD**

**After maintenance or replacement of parts concerning explosion protection an authority on explosion protection has to verify that the analyzer still meets the requirements for explosion protection before it is switched on again.**

**Parts essential for explosion protection must not be repaired, they must be replaced if defective!**

**The authority has to issue a certificate for this and/or attach a test label to the equipment before startup after maintenance or replacement of parts.**

## 4 Service and Maintenance

**WARNING**

**FLAMMABLE GASES - EXPLOSION HAZARD**

**Leaks may cause explosion when measuring flammable gases!**

**When measuring flammable gases it is recommended to perform a leak test on all gas paths, connections and components before startup or applying power. Leak tests should be carried out on a 2 month‘s regular basis and after repair/maintenance.**

**See the analyzer instruction manual for instructions on how to carry out leak tests.**

**WARNING**

**HAZARDOUS GASES**

**When measuring flammable and / or toxic gases it is recommended to purge the system with air or an inert gas, e.g. nitrogen, prior to opening the gas paths.**

**Violation may cause an explosion and/or personal injury or death!**

**WARNING**

**EXPLOSION HAZARD**

**Modifications affecting the integrity of type of protection (e.g. affixing addtional threads, replacing the flame arrestors by other model) are NOT PERMITTED!**

**Violation may cause an explosion and/or personal injury or death!**

**Contents**



## 4.1 Verifications and Tests

Modifications made on the electrical apparatus affecting the integrity of the type of protection or the temperature of the apparatus shall be permitted only if the modified apparatus is resubmitted to a testing station.

In the case of repairs affecting the type of protection, the parts which have been repaired should be subjected to new routine verifications and tests. These tests need not necessarily be made by the manufacturer.



### 4.1.1 Routine Tests on Analyzer

The following tests shall be performed on a regular basis:

#### 4.1.1.1 Visual Inspection

The instrument shall be visually checked for damages to the enclosure, flange and external analyzer components.

**WARNING**

**EXPLOSION HAZARD**

**Do not continue to operate a damaged analyzer!**

**Call for service!**

**Violation may cause an explosion and/or personal injury or death!**

#### 4.1.1.2 Detailed Inspection

Check cable inlets (glands or conduits): If the cable moves, e. g. thighten the cap nut. If tightening is ineffective, replace the cable gland or conduit.

Also consider the original manufacturer‘s instructions for maintenance!

### 4.1.2 Tests on Flame Arrestors



**WARNING**

**EXPLOSION HAZARD AND HAZARD FROM GASES !**

**Maintaining the FA shall be carried out considering all applicable safety and legislative rules. Maintenance should be carried out by instructed and trained personnel only!**

**Before opening gas paths they must be purged with safe air or neutral gas ($N_2$) to avoid hazards caused by toxic, flammable, explosive or harmful to health sample gas components!**

Maintenance is limited to performing visual inspections, leak testing and pressure drop tests on at least a regular basis. The time interval has to be operator defined, considering operating conditions and composition of supplied gases.

The flame arrestor is completely welded, no inner parts are user accessible. Therefore the flame arrestor has to be replaced by a new one, if

- a fire occurred on the flame arrestor element
- the housing or the fittings show visible mechanical damages
- contamination of inner elements is detected (e.g. by pressure drop test)
- the flame arrestor did not pass leak testing

#### 4.1.2.1 Leak Testing

The following procedure describes how to perform a leak test with the flame arrestor installed at the instrument.

**Required tools**

- Manometer for max. 7.25 psi (500 mbar)
- Stop valve

**Procedure**

- Connect the manometer to the analyzer‘s sample gas outlet to the flame arrestor´s outlet fitting (disconnect external gas lines).
- Install the stop valve between gas inlet fitting and a Nitrogen ($N_2$) supply.
- Open the stop valve until the internal gas path is under pressure of approx. 0.725 psi/50 mbar (corresponding to approx. 19.7 inch/500 mm water column)
- Close the stop valve. After a short time for the pressure to balance, the level must not change over a time period of approx. 5 minutes!

**When using a water filled u-tube manometer prevent water from entering backwards into the flame arrestor!**

**Don‘t exceed the maximum pressure applicable to the analyzer as specified in it´s instruction manual!**

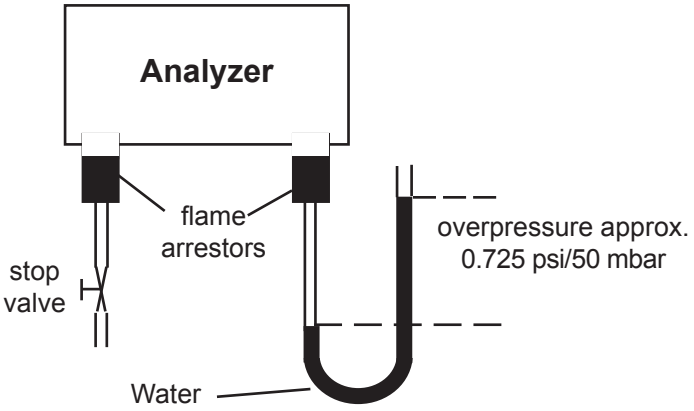



*Fig. 4-1: Leak Testing with U-tube Manometer (Flame arrestor)*



### 4.1.2.2 Pressure Drop Test

To measure the pressure drop at a flame arrestor

- disconnect internal and external gas lines
- connect a flow meter in series to the flame arrestor
- connect an air or nitrogen supply to the flow meter
- connect a manometer in a way to measure the pressure at the flame arrestor inlet against the outlet
- adjust the flow to **1 l/min** and compare the resulting pressure drop to the following **reference value: (5.1 ± 1) hPa**.

**Replace the flame arrestor if the measured pressure value differs more than 10 % from the reference value given above.**

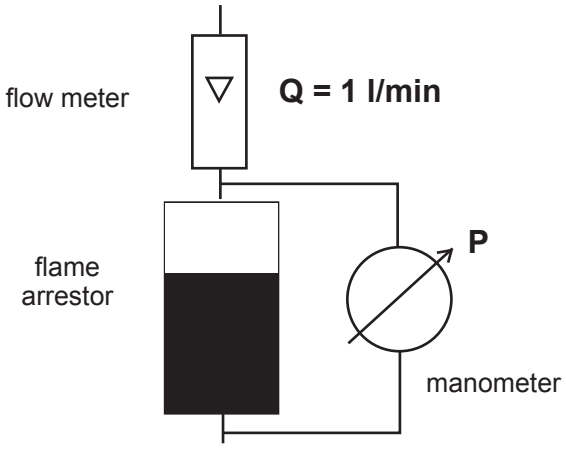



*Fig. 4-2: Pressure Drop Test*

## 4.2 Replacement of Parts

**WARNING**

**EXPLOSION HAZARD !**

**Replacement of parts found defective is permitted only by using original parts, or suitable approved parts, if permitted by the table below!**

**Violation voids the approvals and may cause explosions!**

Parts beside the cast enclosure, the safety of the X-STREAM X2FD relies on:

| *Specifically for ATEX approved analyzers* | |
|---|---|
| ***Cable glands***  **NOT FOR analyzers for vapor recovery applications!** | Any ATEX approved flameproof type without compound, suitable according EN 60079-14, e. g.<br>- 8163/2 A2F M20 by Stahl<br>**Spare part # ??????** |
| | |
| ***Cable glands*** **for all ATEX approved variations** | Any ATEX approved flameproof type with compound, suitable according EN 60079-14, e. g.<br>- ADE 1FC ISO 20 No. 05 by CAPRI, or<br>- 8163/2–PXSS2K M20 by Stahl |
| | |
| ***Cable entries stopping plugs*** | Any ATEX approved flameproof type, e. g.<br>- 120209 by CAPRI<br>Male thread: M20 x 1,5<br>Spare part # ETC01754 |

## 4.2 Replacement of Parts

| *Specifically for CSA-C/US approved analyzers* | |
|---|---|
| ***Metric-to-NPT adapters*** | Any CSA-C/US certified flameproof type<br>Male thread: M20 x 1,5<br>Female thread: ½“ or ¾“ per request<br>e.g.<br>- AD-U series by Redapt Ltd.<br><br>¾“ version spare part # ETC01877 |
| | |
| ***Cable entries stopping plugs*** | Any CSA-C/US certifed flameproof type<br>Male thread: M20 x 1,5<br>e.g.<br>- PD-U by Redapt Ltd.<br><br>Spare part # ETC01878 |

| *For ATEX and CSA analyzers* | |
|---|---|
| ***Flame arrestors*** | Type: FA 01, FA 02, FA 03<br>by EMERSON PROCESS MANAGEMENT<br>FA 01: Spare part # 42716625<br>FA 02: Spare part # 42716625-V1<br>FA 03: Spare part # 42716625-V2 |
| | |
| ***Enclosure screws*** | Material: stainless steel A2-70<br>Thread: M16 x 45 ISO 4762 A2<br>Modified to drawing 4.271-6945<br>by EMERSON PROCESS MANAGEMENT<br>Spare part # 42716945 |

## 4.3 Vapor Recovery Application - Special Information

**WARNING**

**EXPLOSION HAZARD BY HOT COMPONENTS**

**Consider the waiting time statement on the front door label before opening!**

**Do not open the instrument when energized.**

**Ensure that external circuitry is disconnected or de-energized before opening the instrument.**

**The waiting time is calculated to ensure, temperatures of hot components are below the analyzer temperature class for hazardous areas!**

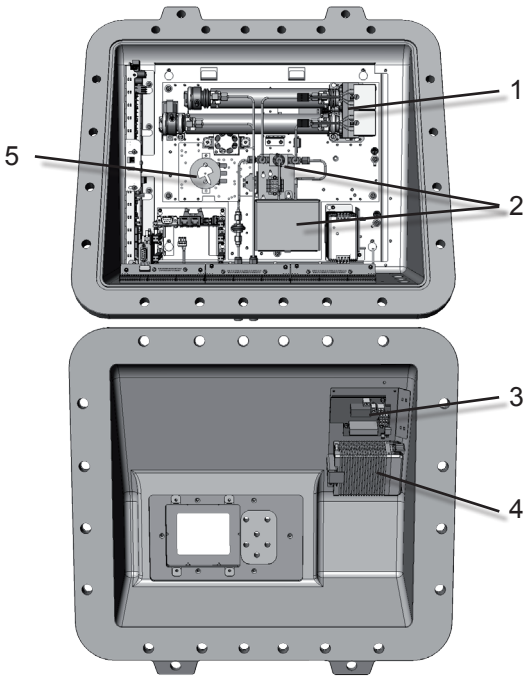
**Accessible components still may be hot and harmful to humans!**

X2FD analyzers, intended for vapor recovery applications (measuring $CH_4$ and non-$CH_4$), contain additional components and have a special configuration:

- Below the two IR channels a converter assembly is installed, thermostated to about 270 °C.
- Inside the front door a second power supply unit and another electronics board is installed to supply the converter.

An overtemperature switch limits the temperature of the converter in case of failure of the temperature control board.

Inside the converter assembly there is a small stainless steel vessel, filled with catalytic converter material, which is a consumable and needs to be replaced depending on the required converter efficiency:




1: IR measurement
2: High temperature converter assembly
3: Additional temperature control
4: Additional power supply unit
5: Overtemperature switch

*Fig. 4-3: Vapor recovery application setup*

## 4.3 Vapor Recovery Application - Special Information

### 4.3.1 Determining the converter efficiency

***Note!***
*The analyzer is configured to measure $CH_4$ at channel 1 (CH1), with the converter installed in front of its measurement cell.*
*The total content of hydorcarbons ($C_nH_m$) within the sample gas is measured at channel 2 (CH2).*


Page 2

- Ensure *„Pump“* within the control menu is set to **ON**.

  ***Note!***
  „Pump“ *is used to disable (**Off**) or enable (**On**) the gas flow through the converter!*
- Apply the calibration gas for CH2 (e. g. $C_6H_{14}$). As CH1 and CH2 inside the analyzer are piped in parallel, this gas now goes through the converter.
- When stabilized, write down the measurement reading of CH1 ($CH_4$ channel **with converter**)
- Now change *„Pump“* to **Off**, to let the gas bypass the converter.
- When stabilized, write down the measurement reading of CH1 ($CH_4$ channel **without converter**)
- Calculate the converter efficiency:

$$\eta = 1 - \frac{\text{reading with converter}}{\text{reading without converter}}$$

- If the result is below 0.9 (90 %), the converter material should be replaced as described in the next section.

Part number for converter replacement material: ETC02579

***Notes!***
*While „*Pump*“ is set to* **Off***, the NAMUR status* Function Check *is actvated.*

*Don‘t forget to set* „Pump“ *to* ***On*** *again, after finishing the calculation of converter efficieny!*

## 4.3 Vapor Recovery Application - Special Information

### 4.3.2 Replacement Instructions

To replace the converter material:

- consider all applicable safety instructions and measures to switch off the analyzer and connected signals
- read the waiting time label on the front door and wait for the time specified
- carefully open the front door (High weight! Take care not to damage the door!)

The converter is installed behind a metallic cover, which is fixed with a screw nut and a key (Fig. 4-5). Loosen the screw nut a few turns (don‘t remove it) and push the cover upwards until the key is free to remove the cover (Fig. 4-6).

Now you have access to the inner thermostated jacket (Fig. 4-6).

**Heating elements are inside the isolating jacket!**

**Accessible components still may be hot and harmful to humans!**

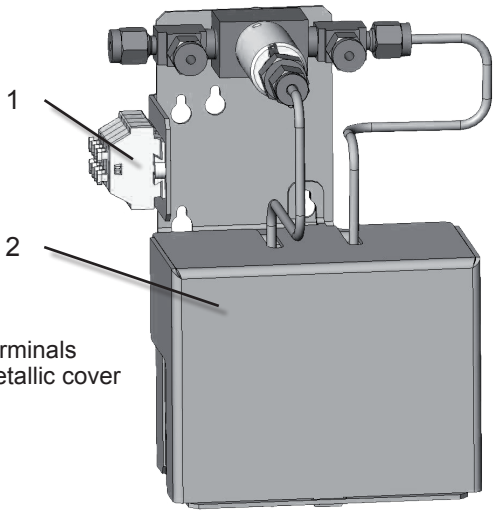



*Fig. 4-4: Converter assembly*

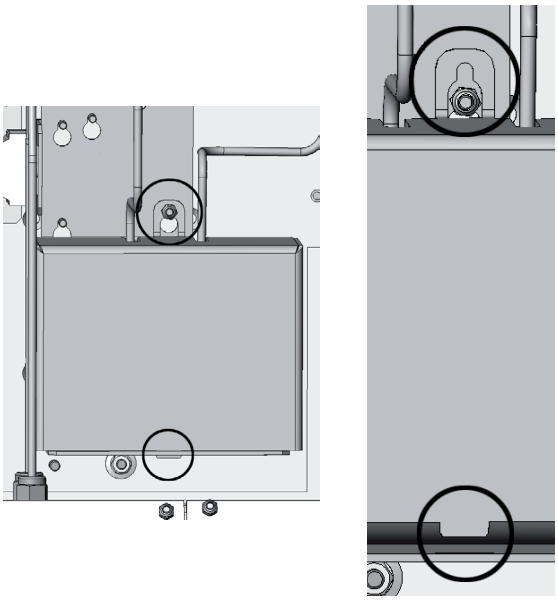
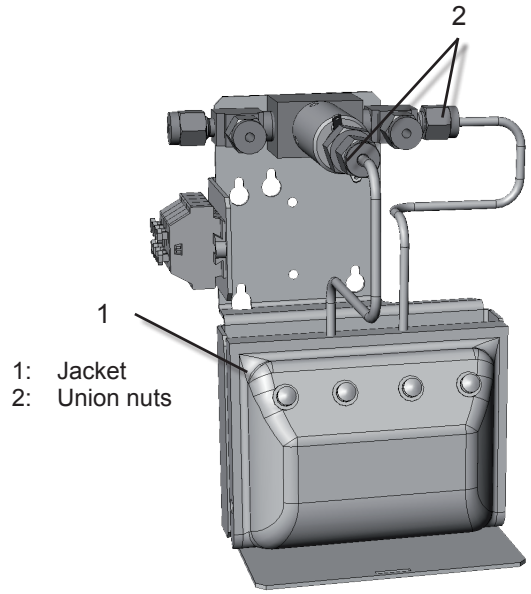


*Fig. 4-5: Converter assembly details*

## 4.3 Vapor Recovery Application - Special Information

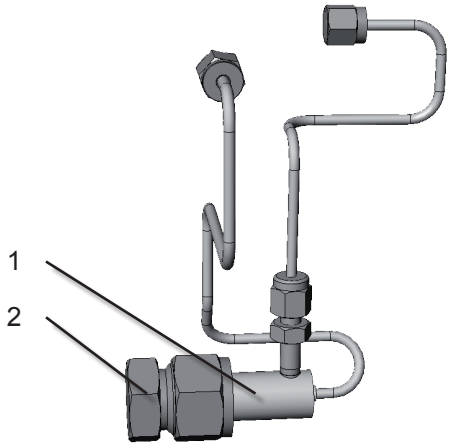
1. Loosen the lace cord that keeps the jacket closed.
2. Open the jacket to get access to the converter.
3. Loosen the union nuts of the fittings that connect the gas lines from the converter to the solenoid valve (Fig. 4-7).




1: Jacket
2: Union nuts

*Fig. 4-6: Heated jacket*

4. Take the converter vessel with connected gas lines out of jacket and analyzer.

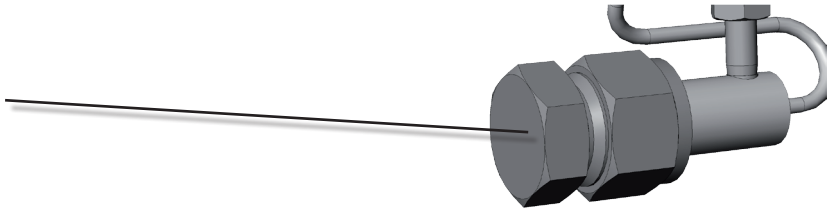



1: Converter vessel
2: End cap

*Fig. 4-7: Converter, laid open*

## 4.3 Vapor Recovery Application - Special Information

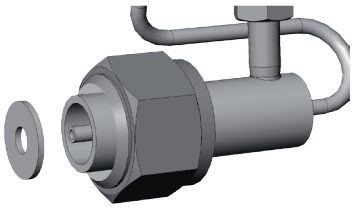
5. Remove the end cap.



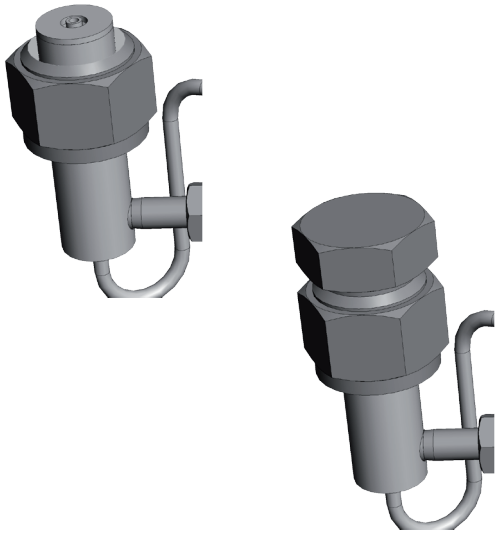
6. Remove the washer.

Behind the washer, the vessel is filled with converter material.

7. Remove this old material and fill the vessel with new converter material, considering to
   - hold the vessel vertically while filling
   - completely fill the vessel
   - keep the inner pipe free of converter material.



8. Put the washer on top of the vessel / new material.

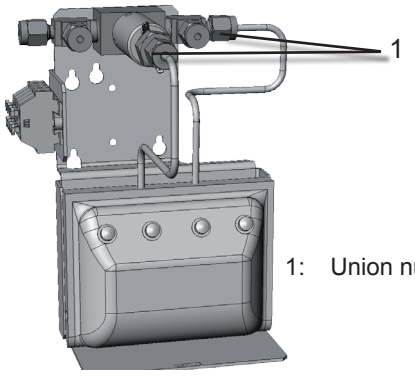


9. Install the end cap.

*Fig. 4-8: Converter filling sequence*

## 4.3 Vapor Recovery Application - Special Information

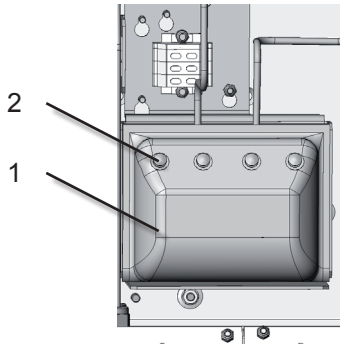
10. Insert the converter vessel into the jacket and place it into the assembly.
11. Connect the open gas lines to the fittings of the solenoid valve (Fig. 4-9). Carefully fix the union nuts.
12. At this point we recommend to perform a leak test to ensure the gas connections are tight! If some are not, they are accessible now.




1: Union nuts

*Fig. 4-9: Jacket in converter assembly*

13. Lay the lace cord around the boot hooks and close the jacket.




1: Jacket
2: Boot hooks (8 pcs)

*Fig. 4-10: Heated jacket*

14. Install the metallic cover in such a way, that when it is pushed downwards, the key fits into the small slot and the screw nut is on top of the butt strap.
15. Fix the cover with the screw nut.
16. Make sure all installation has been done properly and close the front door. Fix the door by means of ALL 20 screws.

    **Tightening torque**:

    **25 Nm (221 in.lb)**

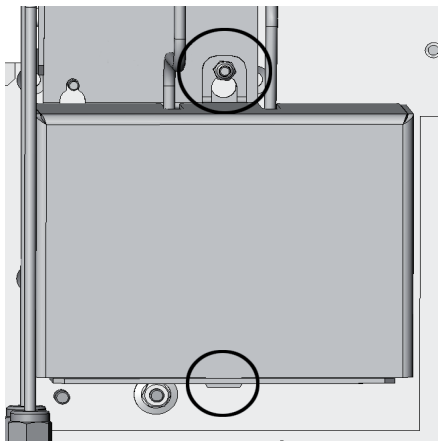


*Fig. 4-11: Converter metallic cover*

17. You‘re done!

## 4.3 Vapor Recovery Application - Special Information

### 4.3.3 Failure Situation

Separated from the converter assembly an independent over temperature protection device is installed. This device is setup to take control of the jacket heaters if the measured temperature inside the jacket exceeds about 310 °C ( 590 °F), e. g. due to a failure with the temperature control board.

The overtemperature device is self-resetting, so the heaters are not continuously disconnected from power, but only as long as the measured temperature is above the limit. If the temperature goes below this limit, the jacket heaters again are powered. This behaviour results in a failure operating temperature of 300 to 315 °C ( 572 to 600 °F).

Also, the overtemperature protection device is connect to a X-STREAM digital input. This digital input is setup to provide a failure signal if the overtemperature protection device has taken control of the jacket heaters.

**If a failure status is active, check the jacket heaters temperature control. Continuously operating the converter material at a temperature above 280 °C (536 °F) affects the concentration measurement accuracy!**

**WARNING**

**EXPLOSION HAZARD BY HOT COMPONENTS**

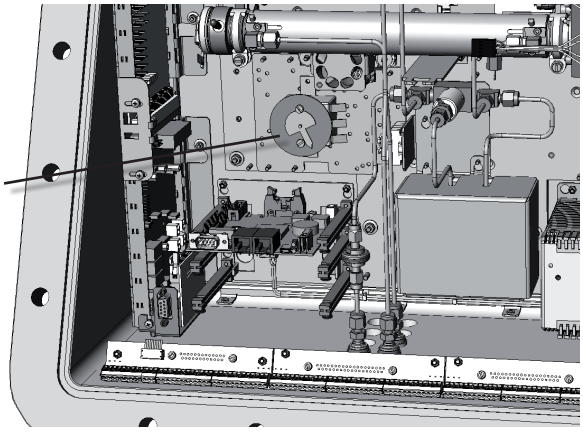
**Consider the waiting time statement on the front door label before opening!**

**Do not open the instrument when energized.**

**Ensure that external circuitry is disconnected or de-energized before opening the instrument.**

**The waiting time is calculated to ensure, temperatures of hot components are below the analyzer temperature class for hazardous areas!**

**Accessible components still may be hot and harmful to humans!**




1: Overtemperature protection device

*Fig. 4-12: Location of Overtemperature Protection Device*

## 4.4 Perform a Calibration

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

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.

**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 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!**

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 has to be excluded from any autocalibration procedures! **You have to care for not calibrating the trace moisture sensor each time a calibration is performed!**

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

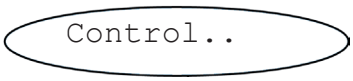
**Before performing any actions**, make sure the required calibration gas is applied and flowing!

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.

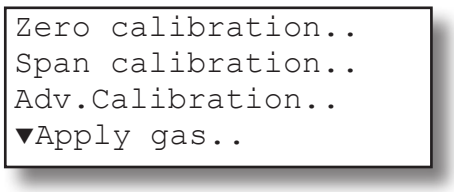
Ensure the warm-up time after switching on has elapsed! Warm-up time depends on installed measuring system and configuration, ☞ measurement specifications in section 1.7!

## 4.4 Perform a Calibration

### 4.4.1 Manual Calibration




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:

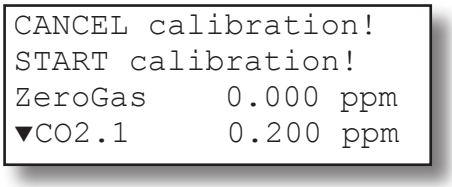
#### 4.4.1.1 Manual Zero Calibration

**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 (recommeded approx. 1 l/min), pressureless and utilizing the right gas fitting.**

**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!**

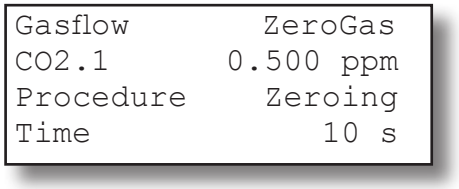

*Multi-channel unit:*
*Select the channel to be calibrated in the SELECT COMPONENT menu.*




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.

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**

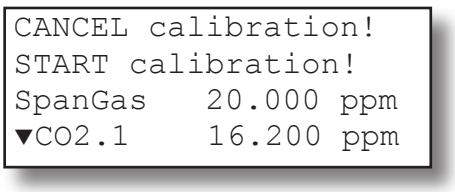
the SELECT COMPONENT menu (multi channel analyzer only), select another channel to perform the steps described above to zero calibrate this channel, too,

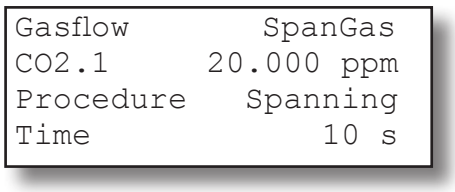
**or**

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...

### 4.4.1.2 Manual Span Calibration


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

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

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.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.

# 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 instructions to be followed!**

**Only trained personnel, observing all applicable technical and legal requirements, and aware of the possible risks is permitted to dismount these analyzers.**

**Failure to follow may result in explosion, death or personal injury!**

**WARNING**

**EXPLOSION HAZARD WHEN OPEN**

**Dismounting requires to open the instrument and is permitted only if no hazardous atmosphere is present and both the instrument and connected circuitry are de-energized!**

**Depending on the local regulation this may require a competent hot work supervisor to issue a hot work permit.**

**Failure to follow may result in explosion!**

**CAUTION**

**HEAVY INSTRUMENT**

**X-STREAM X2FD analyzers, to which this manual relates, intended to be wall mounted and/or outdoor installed, weigh up to approx. 63 kg (139 lbs), depending on included options!**

**Support the instrument before loosening the fixing screws (risk of dropping instrument).**

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

**Failure to follow may result in personal injury!**

## 5.1 Dismounting & Disposal

**WARNING**

**GASES HAZARDOUS TO HEALTH**

**Follow the safety precautions for all applied 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.**

**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 recyclers specialised in this field. Let the instrument and the packing material duly and environmentally friendly be disposed of. Ensure the equipment is free of dangerous and harmful substances (decontaminated).**

**Take care of all local regulations for waste treatment.**

**Consider all instructions regarding dismounting and disposal!**

**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
- support the instrument before loosening the fixing screws (risk of dropping instrument) and take it off its stand or wall
- fill out the Declaration of Decontamination ( ☞ X-STREAM X2 instruction manual) properly
- hand over the dismounted instrument together with the Declaration of Decontamination to a disposal specialist. The disposal specialist then has to disassemble the instrument, and recycle and dispose it in compliance with all applicable waste treatment regulations.

# Appendix

This chapter contains

# A.1 EC Declaration of Conformity

## EC DECLARATION OF CONFORMITY

Document number: RAE/X2FD-ATEX-E4
Date: February 2011

We,

**Emerson Process Management GmbH & Co. OHG**

located at

Industriestrasse 1, D-63594 Hasselroth, Germany

declare under our sole responsibility that our gas analyzer, type

**X-STREAM X2FD,**

with flameproof enclosure, approved for service in hazardous locations

by FTZU (NB 1026), Pikartská 7, CZ 716 07 Ostrava - Radvanice, The Czech Republic

and marked

CE 0035 Ex II 2 G
Ex d IIB + $H_2$ T4
FTZÚ 08 ATEX 0028X

conforms to the provisions of the following European Directives:

**2004/108/EC** **EMC Directive**
with the application of the harmonized standards including the latest amendments:

**EN 61326-1:2006**

**94/9/EC** **Equipment and protective systems in potentially explosive atmospheres**
with the application of the harmonized standards including the latest amendments:

**EN 60079-0: 2006, EN 60079-1 :2007**

Production is monitored according annex IV by
TÜV RHEINLAND INDUSTRIE SERVICE GMBH
Am Grauen Stein, D-51105 Köln, Germany
Notified Body of the European Union under directive 94/9/EC, identification no. 0035

The standards published in the EC's OFFICIAL JOURNAL with reference to directive 73/23/EC (e.g. EN 61010-1) have been used to fulfill 1.2.7 of Annex II of directive 94/9/EC to eliminate electrical risks.

Hasselroth, February 2011

*(Signature)*

Andy Kemish
*(Name)*

VP Rosemount Analytical Europe
*(Function name)*

ROSEMOUNT® Analytical

EMERSON. Process Management

This declaration confirms the compliance with announced directives but does not include the assurance of properties.
The safety and installation instructions of the documentation have to be followed.

## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

# EC-Type Examination Certificate

(1)
(2) **Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

(3) EC-Type Examination Certificate Number:

**FTZÚ 08 ATEX 0028 X**

(4) Equipment or protective system: **Flameproof Gas Analyzer Type X-STREAM 2FD**

(5) Manufacturer : **Emerson Process Management GmbH & Co. OHG**

(6) Address: **Industriestrasse 1, D-63594 Hasselroth, Germany**

(7) This equipment or protective system and any of acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The Physical Technical Testing Institute, notified body number 1026 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report N°

**08/0028 dated March 2008**

(9) Compliance with Essential Health and Safety Requirements has been assured by compliance with:

**EN 60079-0:2006** **EN 60079-1:2007**

(10) If the sign „X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and testing of the specified equipment or protective system in accordance to the directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

(12) The marking of the equipment or protective system shall include the following:

**II 2G Ex d IIB+$H_2$ T4**

This EC-Type Examination Certificate is valid till: **30.04.2013**

Responsible person:

Dipl. Ing. Sindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FYZIKÁLNĚ-TECHNICKÝ ZKUŠEBNÍ ÚSTAV FTZÚ Ex AO 210 NB 1026

Date of issue: 09.04.2008

Number of pages: 1/3

This certificate is granted subject to the general conditions of the Physical Technical Testing Institute.
This certificate may only be reproduced in its entirety and without any change, schedule included.

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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(13) **Schedule**

(14) **EC-Type Examination Certificate N° FTZÚ 08 ATEX 0028X**

(15) Description of Equipment or Protective System:

Analyzer type X-STREAM 2FD is designed with flameproof enclosure and consists of enclosure body and cover with sight glass. The body and cover are made of Al alloy and fastened by bolts. There are six threaded insert in the enclosure cover providing passage of control rod. The enclosure has four threaded holes for cable glands or plugs and eight threaded holes for flame arresters or their closing devices.

*Technical parameters:*

Ambient temperature: $-30\ °C \leq T_{amb} \leq +50\ °C$

Power supply: 100 – 240 VAC; 50/60 Hz; 3 – 1 ,5 A

(16) Report No. : FTZÚ 08/0028 ... 2+10+12 pages

(17) Special conditions for safe use: --

Specified screws M16x45 ISO 4762 A2-70 in compliance with drawing No: 4.271-6945 /4
The gaps correspond to drawing No: 4.271-7112 /1

(18) Essential Health and Safety Requirements:

Covered by standards mentioned in (9) of this certificate.

Responsible person:

Dipl. Ing. Šindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FYZIKÁLNĚ-TECHNICKÝ ZKUŠEBNÍ ÚSTAV FTZÚ Ex AO 210 NB 1026

Date of issue: 09.04.2008

Number of pages: 2/3



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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(13) **Schedule**

(14) **EC-Type Examination Certificate N° FTZÚ 08 ATEX 0028X**

(19) **LIST OF DOCUMENTATION**

| | | | |
|---|---|---|---|
| ➢ Drawing No | 4.271-7120/4 | ... | on 24.01.08 |
| | 4.271-6974/1 | ... | on 24.07.07 |
| | 4.271-6957/1 | ... | on 11.10.07 |
| | 4.271-6636/2 | ... | on 03.06.05 |
| | 4.271-6949/3 | ... | on 03.12.07 |
| | 4.271-7112/1 | ... | on 16.11.07 |
| | 4.271-6969/4 | ... | on 19.07.07 |
| | 4.271-6970/4 | ... | on 10.01.08 |
| | 4.271-6971/4 | ... | on 22.11.07 |
| | 4.271-6945/4 | ... | on 08.01.08 |
| | 4.271-6984/4 | ... | on 01.08.07 |
| | 4.271-6891/4 | ... | on 16.04.07 |
| ➢ Description | | ... | on 24.1.2008 |
| ➢ Instruction for use | | ... | on 02/2008 |

PHYSICAL-TECHNICAL TESTING INSTITUTE FTZÚ Ex AO 210 NB 1026

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## A.2 ATEX EC Type Examination Certificate

Physical Technical Testing Institute
Ostrava-Radvanice

(1) **Supplement No. 1 to**
**EC-Type Examination Certificate**

(2) **Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

(3) EC-Type Examination Certificate Number:

**FTZÚ 08 ATEX 0028X**

(4) Equipment or protective system: **Analyzer Type X-STREAM XEFD and X-STREAM X2FD**

(5) Manufacturer: **Emerson Process Management GmbH & Co. OHG**

(6) Address: **Industriestrasse 1, D-63594 Hasselroth, Germany**

(7) This supplement of certificate is valid for: - new model (variant) – extension of series

(8) Modification of certified apparatus (protective system) and any of its approved variants are specified in documentation, list of which is mentioned in schedule of this certificate.

(9) This supplement to type examination certificate is valid only for type examination of design and construction of product sample in accordance with Annex 3 Paragraph 6) of Directive No. 94/9/EC. The Directive contains further requirements, which manufacturer shall fulfil before products are placed on market or introduced in service.

(10) Safety requirements of modified parts were fulfilled by satisfying the following standards:

**EN 60079-0:2006** **EN 60079-1:2007**

(11) Marking of equipment shall contain symbols:

**II 2G Ex d IIB+$H_2$ T4**

(12) This type examination certificate is valid till: **30. 04. 2014**

Responsible person:

Dipl. Ing. Šindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FTZÚ AO 210 NB 1026

Date of issue: 30.04.2009

Number of pages: 3
Page: 1/3

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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(13) **Schedule**

(14) **Supplement No. 1 to**
**EC-Type Examination Certificate N° FTZÚ 08 ATEX 0028X**

(15) Description of Equipment: X-STREAM is the process analyzer protected by the flame proof enclosure. Internal volume of the analyzer can be purified by the synthetic gas or by the inert gas through flame arrestors installed on the inlet and the outlet of purification path. The analyzer is equipped by the breathing devices formed by the flame arrestor in the case of gas analyzed pressure above from 1100 hPa to 1500 hPa. Analyzer marked as "....X2FD" is equipped with the alpha-numeric display. Analyzer marked as "...XEFD" is equipped with the graphic display. Other small modifications concern the internal mechanical layout as well as the internal interconnection of I/O boards not having influence on the level of protection.

*Technical parameters*:

| | |
|---|---|
| Ambient temperature | - 30 °C to + 50 °C |
| Power supply | 100-240 VAC; 50/60 Hz; 3-1,5 A |
| Pressure of the analyzed gas | max. 1500 hPa |
| Flow rate of the analyzed gas | max. 1,5 liter/min. |
| Flow rate of the purging gas | max. 2 liter/min. |

(16) Report No.: FTZÚ 08/0028 ... 2+10+12 pages + FTZÚ 08/0028 D1 ... 2+10+12 pages

(17) Special conditions for safe use:

Special conditions for the safe use are specified at the chapter 1.5.1 of the Instruction Manuals of the manufacturer No. HASXMDE-IM-EX 4/2009 and HASXEDE-IM-EX 9/2009

(18) Essential Health and Safety Requirements:

Covered by standards mentioned in (9) of this certificate.

Responsible person:

Dipl. Ing. Šindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FTZÚ AO 210 NB 1026

Date of issue: 30.04.2009

Number of pages: 3
Page: 2/3

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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(13) **Schedule**

(14) **Supplement No. 1 to**
**EC-Type Examination Certificate N° FTZÚ 08 ATEX 0028X**

(19) **LIST OF DOCUMENTATION**

| | | | |
|---|---|---|---|
| ➢ Drawing No | 4.271-6949/3c | ... | on 02.02.09 |
| | 4.271-7012/2c | ... | on 03.02.09 |
| | 4.271-6957/1b | ... | on 02.02.09 |
| ➢ Description | | ... | on 04.02.2009 |
| ➢ Instruction for use HASXMDE-IM-EX | | ... | on 4/2009 |
| ➢ Instruction for use HASXEDE-IM-EX | | ... | on 9/2009 |

Responsible person: Date of issue: 30.04.2009

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Head of certification body

Number of pages: 3
Page: 3/3

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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(1) **Supplement No. 2 to**
**EC-Type Examination Certificate**

(2) **Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

(3) EC-Type Examination Certificate Number:

**FTZÚ 08 ATEX 0028X**

(4) Equipment: **Analyzer type X-STREAM XEFD and X-STREAM X2FD**

(5) Manufacturer: **Emerson Process Management GmbH & Co. OHG**

(6) Address: **Industriestrasse 1, D-63594 Hasselroth, Germany**

(7) This supplement of certificate is valid for:
- new model (variant) – extension of series
- verification according to a standard EN 60079-0:2009
- prolongation of certificate validity

(8) Modification of certified apparatus (protective system) and any of its approved variants are specified in documentation,a list of which is mentioned in the schedule of this certificate.

(9) This supplement to type examination certificate is valid only for type examination of design and construction of product sample in accordance with Annex 3 Paragraph 6) of Directive No. 94/9/EC. The Directive contains other requirements which manufacturer shall fulfil before products are placed on market or introduce in service.

(10) Safety requirements of modified parts were fulfilled by satisfying the following standards:

**EN 60079-0:2009; EN 60079-1:2007**

(11) Marking of equipment shall contain symbols:

**II 2G Ex d IIB+$H_2$ T4 Gb**

(12) This type examination certificate is valid till: **27.01.2017**

Responsible person:

Dipl. Ing. Šindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FTZÚ AO 210 NB 1026

Date of issue: 27.01.2012

Number of pages: 3
Page: 1/3

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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(13) **Schedule**

(14) **Supplement No. 2 to**
**EC-Type Examination Certificate N° FTZÚ 08 ATEX 0028X**

(15) Description of Equipment:

The object of this supplement is as follow:
Extension of new variant – vapour recovery application.
This application is served by a special configuration of the X-STREAM X2FD and X-STREAM XEFD flameproof analyzer. The configuration consists of a dual channel IR measurement, connected to the inlet and outlet of a converter. This converter is installed inside the X-STREAM analyzer and is heated to about 280°C. This application is used for simultaneous measurement of $CH_4$ and non-$CH_4$.
*Technical parameters:*

| | |
|---|---|
| Ambient temperature | 30 °C to +50 °C |
| Power supply | 100-240V AC; 50/60 Hz; 3-1.5 A |

Verification of analyzer X-STREAM according to a new standard EN 60079-0:2009.

(16) Report No.: 08/0028 D2 dated 26.01.2012

(17) Special conditions for safe use:

Special conditions for safe use are specified at the chapter 1.5.1 of the Instruction Manuals of the manufacturer No. HASXMDE-IM-EX 01/2012 and HASXEDE-IM-EX 01/2012.
Appropriate certified cable glands shall be used accordance with EN 60079-14.

(18) Essential Health and Safety Requirements:

Covered by standards mentioned in (10) of this certificate.

Responsible person: Date of issue: 27.01.2012

Dipl. Ing. Šindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FTZÚ AO 210 NB 1026

Page: 2/3



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## A.2 ATEX EC Type Examination Certificate

**Physical Technical Testing Institute**
**Ostrava-Radvanice**

(13) **Schedule**

(14) **Supplement No. 2 to**
**EC-Type Examination Certificate N° FTZÚ 08 ATEX 0028X**

(19) LIST OF DOCUMENTATION

| | | |
|---|---|---|
| ➢ Drawings No | 4.271-6957/1c | 19.10.2011 |
| | 4.271-7389/2 | 10.02.2009 |
| | 4.271-8080/3 | 27.07.2011 |
| | 4.271-8081/3 | 28.07.2011 |
| | 4.271-8121/4 | 15.12.2011 |
| | 655228/3h | 27.11.2009 |
| ➢ Description | | 21.12.2011 |
| ➢ Instruction for use HASXMDE-IM-EX | | 01/2012 |
| ➢ Instruction for use HASXEDE-IM-EX | | 01/2012 |

Responsible person: Date of issue: 27.01.2012

Dipl. Ing. Šindler Jaroslav
Head of certification body

PHYSICAL-TECHNICAL TESTING INSTITUTE FTZÚ AO 210 NB 1026

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## A.3 CSA Certificate of Compliance

CSA INTERNATIONAL

# Certificate of Compliance

**Certificate:** 1714037 (LR 105173) **Master Contract:** 185562

**Project:** 2507282 **Date Issued:** March 14, 2012

**Issued to:** **Emerson Process Management GmbH & Co. OHG**
**Industriestrasse 1**
**Hasselroth, 63594**
**Germany**
**Attention: Uwe Schmidt**

***The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.***

C US

*Nicholas Cameron*

**Issued by:** Nicholas Cameron

**PRODUCTS**

**CLASS 2258 02** - PROCESS CONTROL EQUIPMENT - For Hazardous Locations
**CLASS 2258 82** - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - Certified to US Standards
**CLASS 8721 05** - LABORATORY EQUIPMENT - Electrical
**CLASS 8721 85** - ELECTRICAL EQUIPMENT FOR LABORATORY USE - Certified to US Standards

**CLASS 8721 05 - LABORATORY ELECTRICAL EQUIPMENT**

**CLASS 8721 85 - ELECTRICAL EQUIPMENT FOR LABORATORY USE (Certified to U.S. Standards)**

Gas analyzer, Model: X-STREAM, rated 100-240Vac, 50/60 Hz, 3 - 1.5A, Class I, Pollution Degree II.

- **X-STREAM (XLF) or X-STREAM Enhanced Field Housing Gas Analyzer (XEF)**: Wall mounting with field wiring terminals, for outdoor use type 4 & IP66 and display;
- **X-STREAM (X2GP) or X-STREAM Enhanced (XEGP) General Purpose Gas Analyzer:** Table Top or Rack Mount with appliance inlet for indoor use and display (optional with field wiring terminals for indoor use);
- **X-STREAM Gas Analyzer Core (XCA)** Table Top or Rack Mount with appliance inlet for indoor use and no display (optional with field wiring terminals for indoor use);

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## A.3 CSA Certificate of Compliance

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**Certificate:** 1714037 (LR 105173) **Master Contract:** 185562

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Gas analyzer, Model: X-STREAM, rated 100-240Vac, 50/60 Hz, 1, 3 – 0,7A, Class I, Pollution Degree II.
- **X-STREAM Gas Analyzer Core Compact (XCK)** Table Top or Rack Mount with appliance inlet for indoor use and no display (optional with field wiring terminals for indoor use);
- **X-STREAM (X2GK) or X-STREAM Enhanced (XEGK) General Purpose Compact Gas Analyzer:** Table Top or Rack Mount with appliance inlet for indoor use and display (optional with field wiring terminals for indoor use);
- **X-STREAM X100 Compact Gas Analyzer (X100GK):** Table Top or Rack Mount with appliance inlet for indoor use and display (optional with field wiring terminals for indoor use);

Gas analyzer, Model: X-STREAM, rated 100-240Vac, 50/60 Hz, 5.5 - 3A, Class I, Pollution Degree II.
- **X-STREAM (XXF) or X-STREAM Enhanced Field Housing Gas Analyzer (XDF)**: Wall mounting with field wiring terminals, for outdoor use type 4 & IP66 and display;

Gas analyzer, Model: X-STREAM, rated 24Vdc, 2.5A, Class I, Pollution Degree II.
- **X-STREAM (X2GC or X2GK)or X-STREAM Enhanced (XEGC or XEGK)General Purpose Compact Gas Analyzer** Table Top or Rack Mount with 24Vdc in connector and display;
- **X-STREAM Compact Gas Analyzer Core (XCC or XCK):** Table Top or Rack Mount with 24Vdc in

**Conditions of Acceptability**

- For the X-STREAM Models X2GP, XCA and XEGP and the AC powered versions of X2GK, X2CK, XEGK and X100GK the equipment is supplied with an approved power supply cord set or power supply cord with plug that is acceptable to the authorities in the country where the equipment is to be used. Units supplied without a power cord and that are not permanently connected are considered as component. Component-type units must be provided with a Fire, Mechanical and Electrical enclosure and must be re-evaluated by CSA.

- The plug/connector is used as the disconnected device. The switch for X2GP/XCA/XEGP/XCK/X2GK/ XEGK/X100GK is not considered the disconnect device. All units must be provided with a disconnect device.

**CLASS 2258-02 PROCESS CONTROL EQUIPMENT – For Hazardous Locations**

**CLASS 2258-82 PROCESS CONTROL EQUIPMENT – For Hazardous Locations – Certified to U.S. Standards.**

**X-Stream FD (XFD)**: Flameproof for Hazardous Locations

Class I, Zone 1, Ex d IIB+H2, T3 and/or Class I, Division 2, Groups B, C, and D, T3

Class I, Zone 1, AEx d IIB+H2, T3 and/or Class I, Division 2, Groups B, C, and D, T3

Gas analyzer, Model: X-Stream, rated 100-240Vac, 50/60 Hz, 2–1 A. Class I, Pollution Degree II; Type 4 & IP66

Ambient Temperature Range: -30°C to +50°C Maximum internal case pressure = 110kpa

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## A.3 CSA Certificate of Compliance

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**Certificate:** 1714037 (LR 105173) **Master Contract:** 185562

**Project:** 2507282 **Date Issued:** March 14, 2012

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XFD-abcdefghijklmnop

a = Language: A, B, C, D or E

b = Ambient Conditions: 1, 2, 3, 4, 5 or 6

c = Instrument: 1, 2, 3, 4, 5, 6 or 7

d = Bench 1: any combination of 2 or 3 alpha-numeric characters

e = Bench 1 – Special Linearization or Calibration: 0, 1, 2, 3, 4 or 5

f = Bench 2: any combination of 2 or 3 alpha-numeric characters

g = Bench 2 – Special Linearization or Calibration: 0, 1, 2, 3, 4 or 5

h = Enclosure: 1, 2, 3, 4, 5 or 6

i = Hazardous Area Options and Special Approvals: B or D

B = CSA Certification

D = CSA Certification with a Breathing Device for Venting (Same Device as option “p”)

j = Input/Output Options: 1, 2, 5 or 6

k = Communication Interface: A, B, C or D

l = Sample Handling: 0, 1, 3, 5 or 7

m = Gas Path Sensors: 0, 1, 2, 3, 4 or 5

n = Gas Path Tubing: A, B, C, D or E

o = Gas Path Fittings: 3, 4, 5 or 6

p = Flame Arrestors: 2, 3, 4, 5, 6, 7 or 8

**X-Stream FD (X2FD)**: Flameproof for Hazardous Locations

Class I, Zone 1, Ex d IIB+H2, T3 and/or Class I, Division 2, Groups B, C, and D, T3

Class I, Zone 1, AEx d IIB+H2, T3 and/or Class I, Division 2, Groups B, C, and D, T3

Gas analyzer , Model: X-Stream, rated 100-240Vac, 50/60 Hz, 3 - 1.5A, Class I, Pollution Degree II; Ambient Temperature Range: -30°C to +50°C

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## A.3 CSA Certificate of Compliance

CSA INTERNATIONAL

**Certificate:** 1714037 (LR 105173) **Master Contract:** 185562

**Project:** 2507282 **Date Issued:** March 14, 2012

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X-Stream FD (X2FD) has same electronics as the X-STREAM General Purpose Gas Analyzer (X2GP) with new Hazardous Locations Enclosure.

X2FD-abcdefghijklmnopqrstuv

a = Language: A, B, C, D, E or F

b = Ambient Conditions: 1, 2, 3, 4, 5 or 6

c = Instrument: 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14 or 15

d = Bench 1: any combination of 2 or 3 alpha-numeric characters

e = Bench 1 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

f = Bench 2: any combination of 2 or 3 alpha-numeric characters

g = Bench 2 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

h = Bench 3: any combination of 2 or 3 alpha-numeric characters

i = Bench 3 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

j = Bench 4: any combination of 2 or 3 alpha-numeric characters

k = Bench 4 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

l = Enclosure: 1, 2, 3, 4, 5 or 6

m = Hazardous Area Options and Special Approvals: B or D

B = CSA Certification

D = CSA Certification with a Breathing Device for Venting (Same Device as option “v”)

n = Analog Outputs: 1, 2, 3 or 4

o = Digital Inputs/Relay Outputs: 0, 1 or 2

p = Communication Interface: 0, A, B, C or D

q = Spare: 0

r = Sample Handling: 0, 1, 2, 3, 4, 5 or 6

s = Gas Path Sensors: 0, 1, 2, 3, 4, 5, 6, 7 or 8

t = Gas Path Tubing: A, B, C, D, E, F, G, H or I

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## A.3 CSA Certificate of Compliance

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**Project:** 2507282 **Date Issued:** March 14, 2012

u = Gas Path Fittings: E, F, G, H, I, J, K or L

v = Flame Arrestors: 2, 3, 4, 5, 6, 7 or 8

**X-STREAM FD (XEFD)**: Flameproof for Hazardous Locations

Class I, Zone 1, Ex d IIB+H2, T3 and/or Class I, Division 2, Groups B, C, and D, T3

Class I, Zone 1, AEx d IIB+H2, T3 and/or Class I, Division 2, Groups B, C, and D, T3

Gas analyzer , Model: X-STREAM, rated 100-240Vac, 50/60 Hz, 3 - 1.5A, Class I, Pollution Degree II; Ambient Temperature Range: -30°C to +50°C

X-STREAM FD Enhanced (XEFD) has same electronics as the X-STREAM Enhanced General Purpose Gas Analyzer **(XEF)** with same Hazardous Locations Enclosure as X-STREAM X2FD.

XEFD-abcdefghijklmnopqrstuv

a = Language: A, B, C, D, E, F or G

b = Ambient Conditions: 1 or 4

c = Instrument: 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14 or 15

d = Bench 1: any combination of 2 or 3 alpha-numeric characters

e = Bench 1 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

f = Bench 2: any combination of 2 or 3 alpha-numeric characters

g = Bench 2 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

h = Bench 3: any combination of 2 or 3 alpha-numeric characters

i = Bench 3 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

j = Bench 4: any combination of 2 or 3 alpha-numeric characters

k = Bench 4 – Special Linearization or Calibration: 0, 1, 2, 3, 4, 5, A, B, C or D

l = Enclosure: 1, 2, 3 or 4

m = Hazardous Area Options and Special Approvals: B or D

B = CSA Certification

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## A.3 CSA Certificate of Compliance

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**Certificate:** 1714037 (LR 105173) **Master Contract:** 185562

**Project:** 2507282 **Date Issued:** March 14, 2012

D = CSA Certification with a Breathing Device for Venting (Same Device as option "v")

n = Analog Outputs: 1, 2, 3 or 4

o = Digital Inputs/Relay Outputs/Analog Inputs: 0, 1, 2, 5 or A

p = Communication Interface: 0, A or B

q = Advanced Software capabilities: 0, 1, 2 or 3

r = Sample Handling: 0, 1, 2, 3, 4, 5 or 6

s = Gas Path Sensors: 0, 1, 3, 5, 7 or 9

t = Gas Path Tubing: E, F, G, H, I, J, K or L

u = Gas Path Fittings: E, F, G, H, I, J, K or L

v = Flame Arrestors: 2, 3, 4, 5, 6, 7 or 8

**X-STREAM FN (XLFN, XXFN, XEFN, XDFN)**: Non-Incendive for Hazardous Locations

Class 1 Zone 2 Ex nAC IIC T4

Class 1 Zone 2 AEx nAC IIC T4

Class I Div 2 Groups ABCD

-20 °C to +50 °C IP66 Enclosure Type 4X

- **X-STREAM (XLFN) or X-STREAM Enhanced (XEFN)Field Housing Gas Analyzer:**

Gas analyzer, Model: X-STREAM, rated 100-240Vac, 50/60 Hz, 3 - 1.5A, Class I, Pollution Degree II

- **X-STREAM (XXFN) or X-STREAM Enhanced Dual (XDFN) Field Housing Gas Analyzer**:

Gas analyzer, Model: X-STREAM, rated 100-240Vac, 50/60 Hz, 5.5 - 3A, Class I, Pollution Degree II

**APPLICABLE REQUIREMENTS**

CAN/CSA-C22.2 No. 61010-1-04 - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements

UL Std No. 61010-1, 2nd Edition - Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements

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## A.3 CSA Certificate of Compliance

CSA INTERNATIONAL

| | | | |
|---|---|---|---|
| **Certificate:** | 1714037 (LR 105173) | **Master Contract:** | 185562 |
| **Project:** | 2507282 | **Date Issued:** | March 14, 2012 |

CAN/CSA-E60079-0:02 (R2006) - Electric Apparatus for Explosive Gas Atmospheres, Part 0: General Requirements

CAN/CSA-E60079-1:02 (R2006) - Electric Apparatus for Explosive Gas Atmospheres, Part 1: Construction and Verification Test of Flameproof Enclosures of Electrical Apparatus “d”

CAN/CSA-E60079-15:02 (R2006) - Electric Apparatus for Explosive Gas Atmospheres, Part 15: Type of protection "n"

CSA C22.2 No 213-M1987 - Non-Incendive Electrical Equipment for Use in Class I,Division 2 Hazardous Locations

CAN/CSA-C22.2 No. 94-M91 (R2006) - Special Purpose Enclosures

CAN/CSA C22.2 No. 60529:05 - Degrees of protection provided by enclosure (IP Code)

ANSI/ISA-12.00.01-2002 (IEC 60079-0 Mod) - Electric Apparatus for Use in Class I, Zones 0, 1 & 2 Hazardous (Classified) Locations: General Requirements

ANSI/ISA-12.22.01-2002 (IEC 60079-1 Mod) - Electric Apparatus for Use in Class I, Zones 1 Hazardous (Classified) Locations Type of Protection – Flameproof “d”

UL 60079-15:2009 - Electric Apparatus for Explosive Gas Atmospheres, Part 15: Construction, Test and Marking of Type of Protection ’n’ Electrical Apparatus

IEC 60529 Edition 2.1-2001-02 - Degrees of protection provided by enclosure (IP Code)

UL 50 11th Edition - Enclosures for Electrical Equipment

ANSI/ISA 12.12.01-2011 - Non-Incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations

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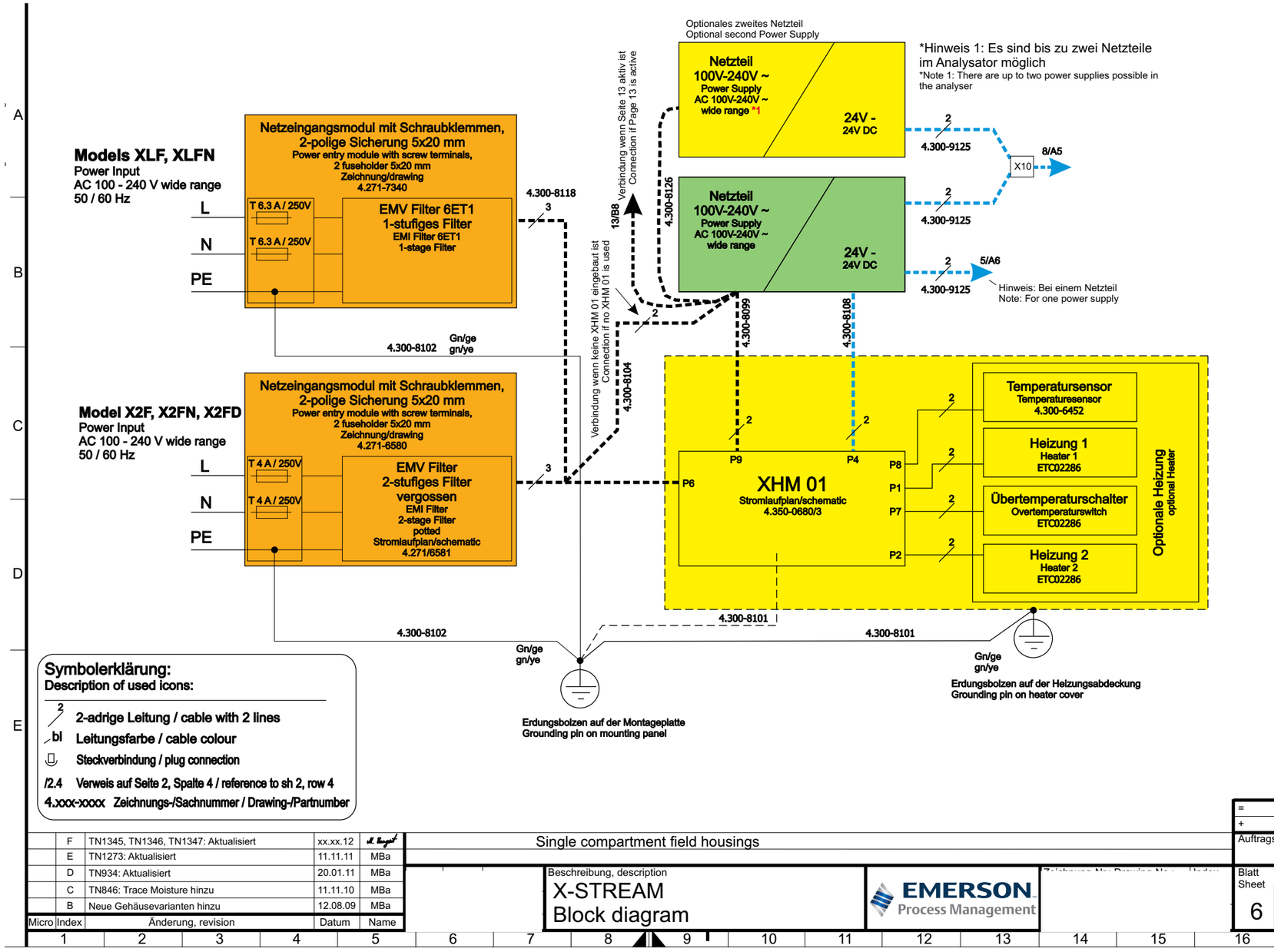
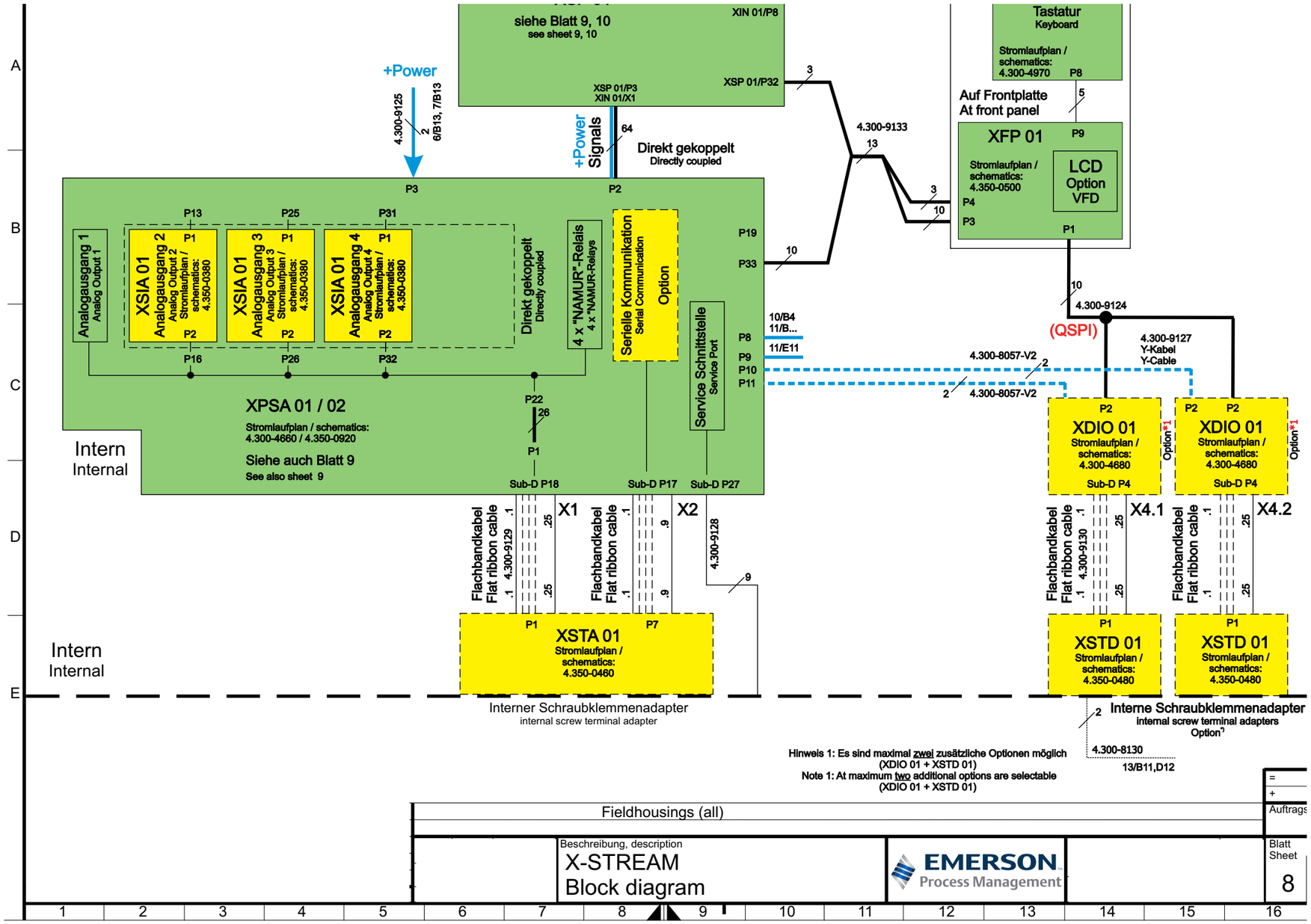
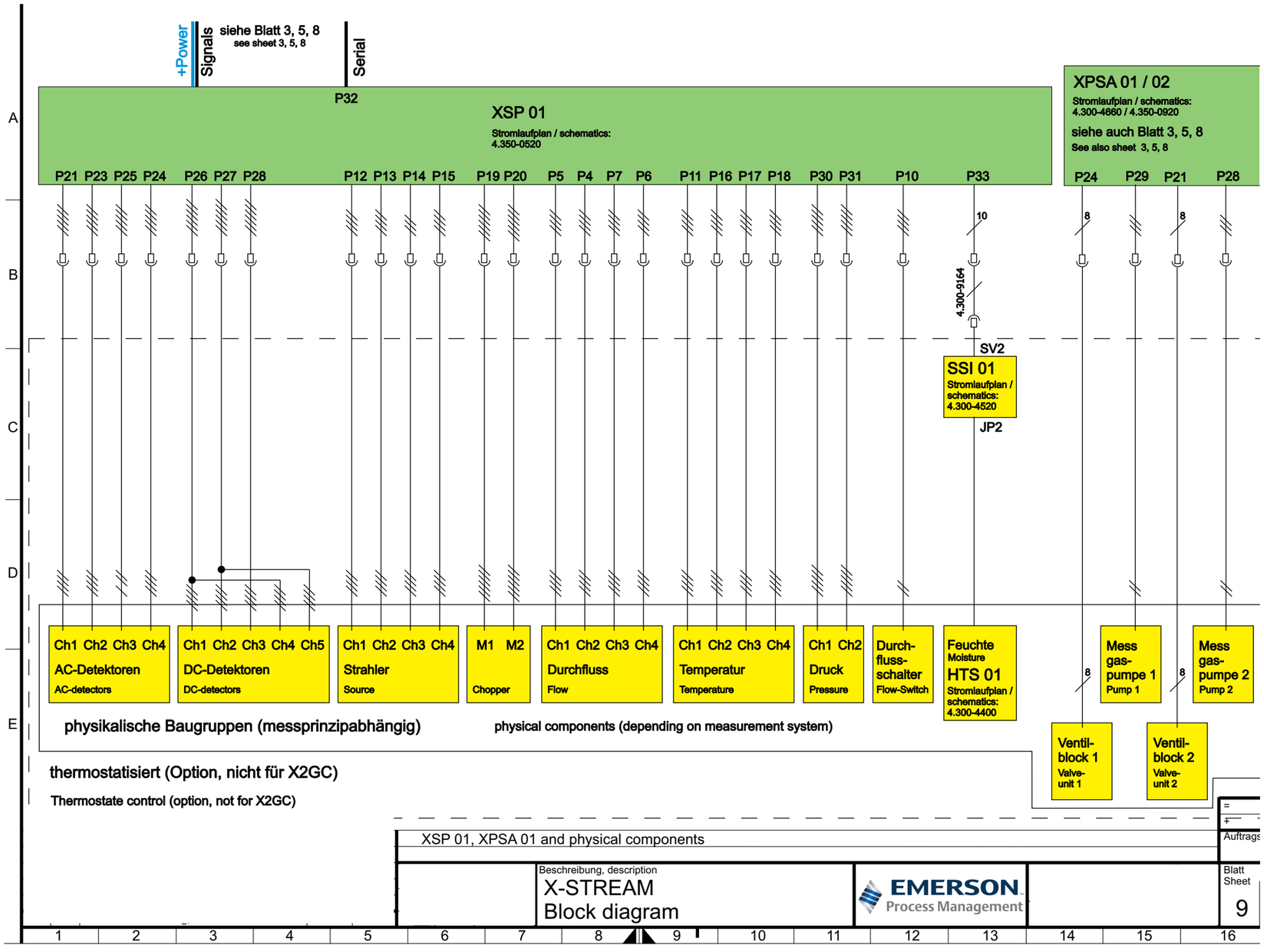
## A.4 Block diagram



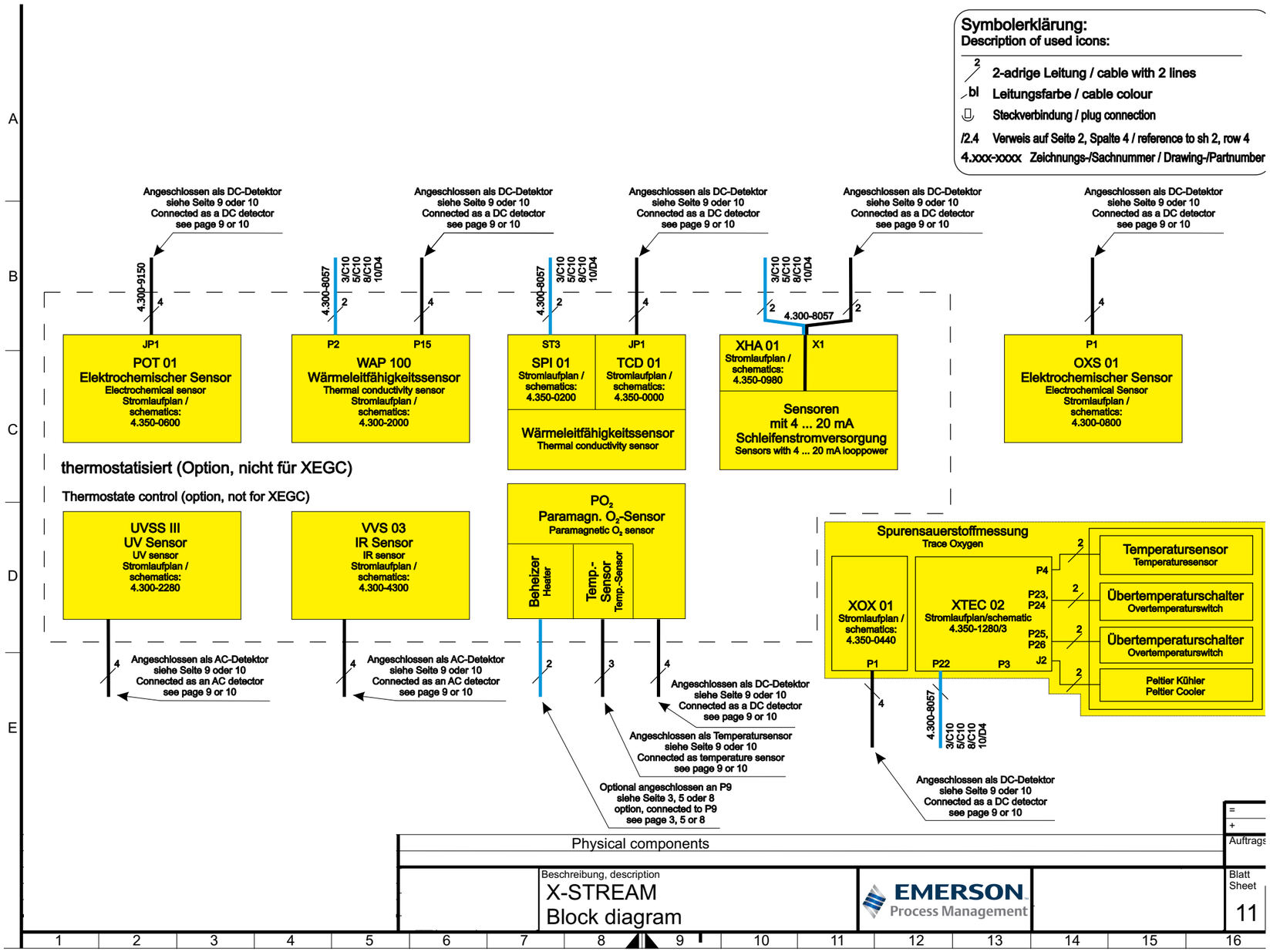
## A.4 Block Diagram



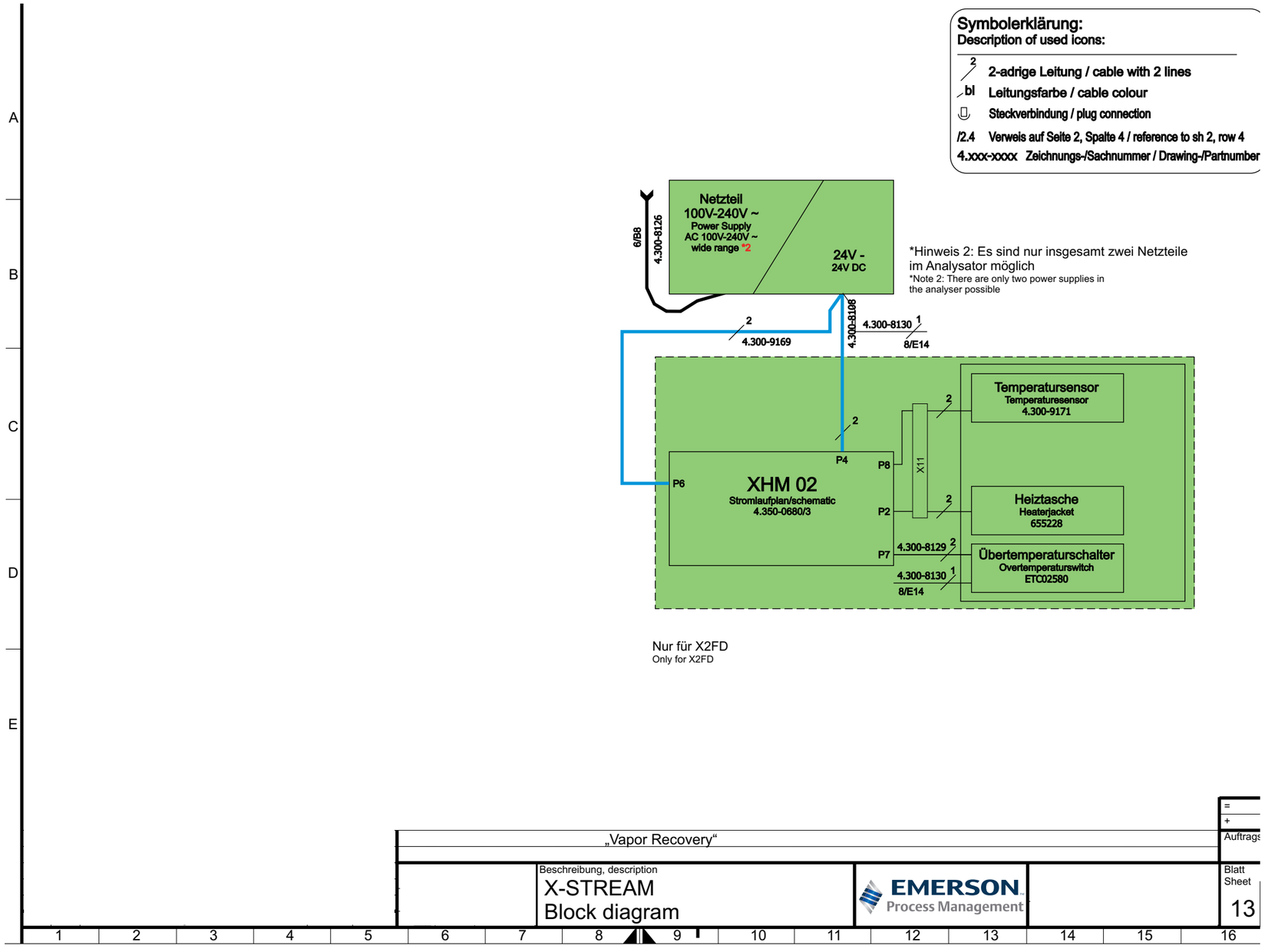
## A.4 Block Diagram



## A.4 Block Diagram

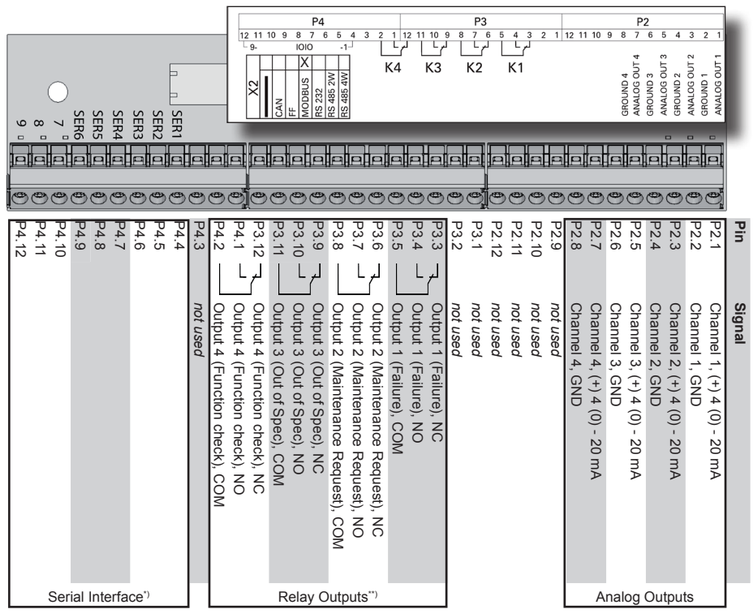


## A.4 Block Diagram



## A.5 Assignment of Terminals and Sockets

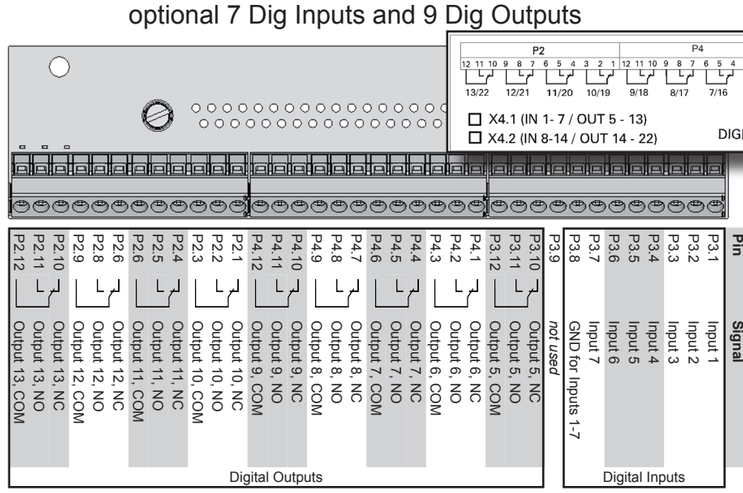
XSTA: Standard strip with standard and optional signals



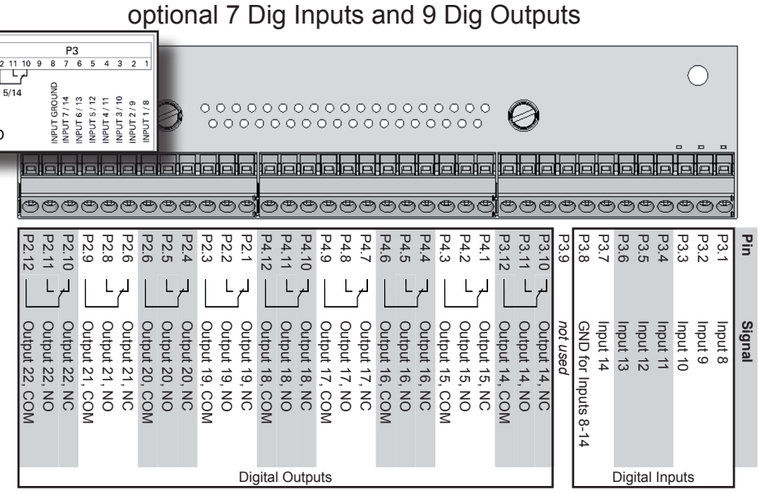

*) See table below

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

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



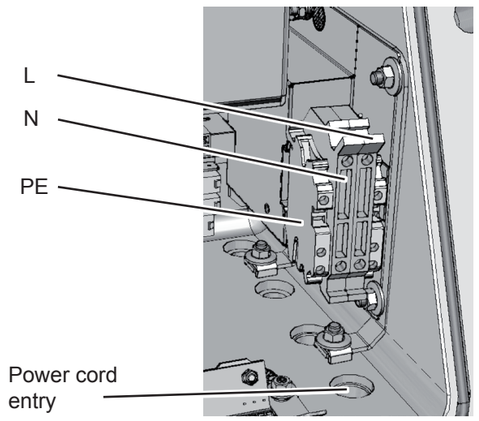

XSTD: Second optional strip with another set of optional 7 Dig Inputs and 9 Dig Outputs




### Assignment of serial interface terminals

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

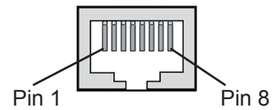
Signal Terminals Strips




L = Line
N = Neutral
PE = Protective Earth

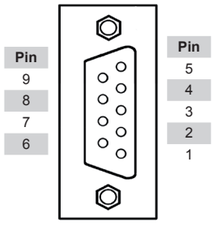
***Note!***
*Line and neutral terminals with built-in fuse holders*

Power terminals




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

Ethernet connector for Modbus




| 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

**Instruction Manual**
HASXMDE-IM-Ex
03/2012

# X-STREAM X2FD

# X-STREAM X2FD

**Instruction Manual**
HASXMDE-IM-Ex
03/2012


**EUROPE**

**Emerson Process Management GmbH & Co. OHG**
Rosemount Analytical
Process Gas Analyzer Center of Excellence
Industriestrasse 1
63594 Hasselroth, Germany
T +49 6055 884 0
F +49 6055 884 209
**www.RosemountAnalytical.com**

**ASIA-PACIFIC**

**Emerson Process Management**
Asia Pacific Private Limited
1 Pandan Crescent
Singapore 128461
Republic of Singapore
T +65 6 777 8211
F +65 6 777 0947
**analytical@ap.emersonprocess.com**
**www.RosemountAnalytical.com**

**AMERICAS**

**Emerson Process Management**
Rosemount Analytical
10241 West Little York, Suite 200
Houston, TX 77040 USA
T 866 422 3683
T +1 713 396 8880
T +1 713 396 8759
F +1 713 466 8175
**gc.csc@emerson.com**
**www.RosemountAnalytical.com**

**MIDDLE EAST AND AFRICA**

**Emerson Process Management**
Emerson FZE
P.O Box 17033
Jebel Ali Free Zone
Dubai, United Arab Emirates
T +971 4 811 8100
F +971 4 886 5465
**analytical@ap.emersonprocess.com**
**www.RosemountAnalytical.com**

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