Instruction Manual
HASX2NE-IM-EX
12/2014

Gas Analyzers

X-STREAM X2 Series

Non-Incendive (Ex nA nC) Configuration for Zone 2 and Division 2 Installations

Instruction Manual Addendum

ROSEMOUNT® Analytical

EMERSON. Process Management

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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 within this document
is subject to change without notice.
6th Edition 12/2014

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

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EMERSON
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Introduction

This instruction manual provides information about installing, operating and maintaining/ servicing X-STREAM X2 series gas analyzers featuring the ignition protection concept Ex nAC, approved to be used in hazardous (classified) areas of type Zone 2 or Division 2. It shall be read in conjunction with the standard analyzer instruction manual only!

This instruction manual covers several 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 Instruction Manual

ATEX

Directive 94/9/EC, commonly called the ATEX („Atmosphères Explosibles“) products directive.

Containment System

The part of the analyzer containing the gas that may constitute an internal source of release.

Divison 2

Abbr. Div. 2, is a hazardous area comparable to Zone 2. Div. 2 mainly is used in North-American standards and locations.

Enclosure Protection IP66 / Type 4X

To enable outdoor installation, enclosures are classified based on their enclosure protection.

IP stands for "Ingress Protection". The first numeral indicates protection of internal equipment against the ingress of solid foreign objects (**6. = dust tight**), while the second numeral indicates protection of internal equipment against ingress of water (**.6 = protection against heavy seas or a strong jet of water)**.

Type 4X specifies protection against additional environmental conditions such as, corrosion, icing, etc., as specified in NEMA 250 („National Electrical Manufacturers Association“).

Explosive Gas(es)

Flammable gases and gas mixtures of a concentration within the explosion limits and present in mixture with air.

External Explosion Protection

The „External explosion protection“ serves to prevent penetration of explosive gas mixtures into the analyzer enclosure. In addition it avoids ignition on the surface. For this reason the analyzer is purged with protective gas and held at an internal overpressure compared to the surrounding atmosphere.

Flammable Gas(es)

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

Internal Explosion Protection

The „Internal explosion protection“ serves to prevent ignition of gas being present in the analyzer’s Containment System (CS;= sample gas path).

Dependent on the gas composition several options are available:

None required (if gas is noncombustible), dilution by purge gas or/and internal overpressure of the analyzer’s enclosure compared to the CS.

Intrinsically Safe Cell

Special measuring cell for measuring explosive gases, certified by an independent test house.

Explosive gases are not ignited, even in case of failure inside the cell.

Terms

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.

Non-Incendive (Ex n)

Within this manual "non-incendive“ stands for a protection method for equipment marked Ex nAC,intended to be installed in hazardous areas, classified Zone 2 or Division 2.

In the following, the term "non-incendive“ is abbreviated to "Ex n", the code used within related standards.

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 times 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 times 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!

Follow these warnings and notes carefully to minimize risks.

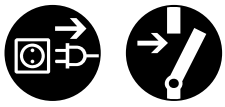
This symbol at the instrument ...	... indicates
	**dangerous voltages** may be accessible. Removing covers is permitted only, if the instrument is disconnected from power - and even in this case by qualified personnel only!
	**hot surfaces** may be accessible. Removing covers by qualified personnel is 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!

Definitions

Symbols Used Within This Manual

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

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

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

SAFETY INSTRUCTIONS

Intended Use Statement

X-STREAM Non-Incendive (Ex nA nC) analyzers are intended to be used in hazardous (classified) areas of Zone 2 or Division 2. Installation in Zone 0, Zone 1 or Division 1 is not permitted and causes risk of explosion!

X-STREAM series gas analyzers are intended to be used as analyzers for industrial purposes. They must not be used in medical, diagnostic or life support applications.

Using X-STREAM 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.
- Explosion protection concepts may become effectless at precense of one (1) failure.
- 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.

Instructions for Safe Use

- Open gas outlets need to end at a safe area, if releasing flammable gas above 25 % LEL.
- All cables (signal and power lines) need to end in safe or protected areas (e.g. in a suitable housing type Ex e).

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 Non-Incendive (Ex nA nC) X-STREAM 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 CD-ROM for an electronic version (PDF)!

The following instruction manuals are available, referenced within and to be read in conjunction with this manual at hand:

HASX2E-IM-HS	X-STREAM X2 series instruction manual
HASICx-IM-H	Infallible containment instruction manual *(if applicable)*

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

SAVE ALL INSTRUCTION MANUALS FOR FUTURE USE!

Safety Instructions

General

⚠ WARNUNG

GENERAL SAFETY NOTE

Consider the subsequently given safety instructions, all safety instructions given in the separate chapters as well as all safety instructions of the associated manuals!

⚠ WARNUNG

EXPLOSION HAZARD

Consider all applicable standards and legislative requirements during installation, startup, operation, maintenance and demounting this analyzer.

Read, understand and consider all instructions given in this manual and the associated manuals of the analyzer before starting to work with this analyzer

Failure to follow may cause explosion, property damage and/or personal injury or death!

⚠ WARNUNG

EXPLOSION HAZARD BY AREA CLASSIFICATION

Analyzers subject of this manual are permitted to be installed in hazardous areas of Zone 2 or Division 2 classification only!

Failure to follow may cause explosion!

⚠ WARNING

EXPLOSION HAZARD BY DAMAGES

Do NOT operate damaged analyzers!

Take out of operation and take care for proper maintenance or repair!

Failure to follow may cause explosion, physical injury or death!

⚠ WARNING

EXPLOSION HAZARD WHEN OPEN

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

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

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 HAZARD

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 hazard!

Failure to follow may cause explosion, property damage and personal injury or death!

⚠ WARNING

EXPLOSION AND ELECTRICAL SHOCK HAZARD

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)!

The power and signal cables must be separated by a distance of minimum 1 cm (0.4 in) inside and outside the analyzer!

⚠ WARNING

EXPLOSION HAZARD

Startup, operation and service must not be performed before reading and understanding all instructions!

Especially all warnings in this and the associated manuals have to be considered! Inspection, maintenance and service must be carried out considering all related standards e.g. for „Inspection and maintenance of electrical installations in hazardous areas“ or „Equipment repair, overhaul and reclamation“.

Startup

⚠ 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 WHEN OPEN

Do NOT operate the instrument with doors 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.

Violation may cause an explosion hazard!

⚠ CAUTION

OPERATION AT LOW TEMPERATURES

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

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

⚠ CAUTION

HIGH TEMPERATURES HAZARD

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

⚠ WARNUNG

EXPLOSION HAZARD AND HARMFUL TO HEALTH GASES

Exhaust may contain explosive or toxic gases!

Gas connections not made properly may cause explosions or death!

Take care that all external gas lines are connected as described and that they are gastight to avoid leakages!

- The unit must be installed in a clean and dry area protected from strong vibrations and frost.
- The unit must not be exposed to direct sunlight and sources of heat. Admissable ambient temperatures (see technical details) must be adhered to.
- Gas inlets and outlets must not be interchanged.All gases must be supplied to the unit already processed. When using this unit with corrosive sample gases, ensure that these gases do not contain components harmful to the gas lines.
- Admissable gas pressure for all gases is 1500 hPa.
- Exhaust lines must be laid inclined downwards, depressurized, protected from frost and according to applicable regulations.
- If it is necessary to disconnect the gas lines, the unit's gas connectors must be sealed with PVC caps to avoid polluting the internal gas lines with condensate, dust, etc.
- To ensure electromagnetic compatibility (EMC), only shielded cables (supplied by us on request, or of equivalent standard) may be used. The customer must ensure that the shielding is correctly fitted. Shielding and terminal housing must be electrically connected; submin-D plugs and sockets must be screwed to the unit.

Safety Instructions

Chapter 1
Technical Description

1.1 Analyzervariations covered by this manual

This manual covers 2 variations of X-STREAM X2 Fieldhousing (X2XF) Gasanalyzers with protection concept "Non-Incendive" (Ex nA nC):

X-STREAM XLFN	X-STREAM **X2** series **single** compartment analyzer
X-STREAM XXFN	X-STREAM **X2** series **dual** compartment analyzer

1.2 Application and Principle of Operation

X-STREAM non-incendive gas analyzers enable the measurement of gas components in hazardous areas (Ex zone 2 or Division 2) without the need of additional external protective equipment:

They have been designed in a way to be built of selected components, which do not create arcs, sparks nor hot spots under normal operating conditions. Thus they cannot ignite a surrounding explosive atmoshere, even if it penetrates the analyzer enclosure.

These protection methods (summarized under the topic „non-incendive“) are specified by standard CAN/CSA 60079-15. Thus the analyzers can be operated in hazardous areas classified Divison 2 (Div. 2) North-American standards (CSA-C/US approval).

In these areas explosive atmosphere is not likely to exist under normal operating conditions, and if so, for short time periods only.

For a comprehensive list of applicable certificates visit our website at

www.emersonprocess.com.

1.2 Application and Principle of Operation

Permitted sample gases

Due to the limitation of use to Zone 2 environments only, measuring flammable gases is by default not permitted for non-incendive analyzers: Standard tubings (containments) would enable those gases to pass off into the housing in case of leakages. Together with the air being present, this would form an explosive mixture. And, as a result of the tight enclosure and therefore missing exchange with the surrounding atmosphere, the explosive mixture would be present for long time periods. Thus the categorization of the internal compartment of the non-incendive X-STREAM analyzer would be no more according to Zone 2 (Div 2), but Zone 0 (Div 1), requiring special protection methods!

To enable measuring flammable gases with non-incendive X-STREAM analyzers, Emerson Process Management has designed special, so called **Infallible Containments**: These are gas paths, considered to be „technically tight“ due to the construction (☞ page 1-8). Using infallible containments properly avoids release of sample gas into the analyzer, and the formation of internal explosive atmosphere.

⚠ WARNING

EXPLOSION HAZARD BY FLAMMABLE GASES

Flammable Gases must be introduced into INFALLIBLE CONTAINMENTS ONLY, to avoid leakage into internal analyzer housing!

Such containments are provided on request.

1.3 Technical Data

1.3.1 Installation Site and Protection Method

Site of installation:

	Admissible Values
Humidity (non-condensing)	< 90 % RH at +20 °C (68 °F) < 70 % RH at +40 °C (104 °F)
Degree of pollution	2
Installation category	II
Elevation	0 to 2000 m (6560 ft) above sea level
Ambient atmosphere	Non corrosive

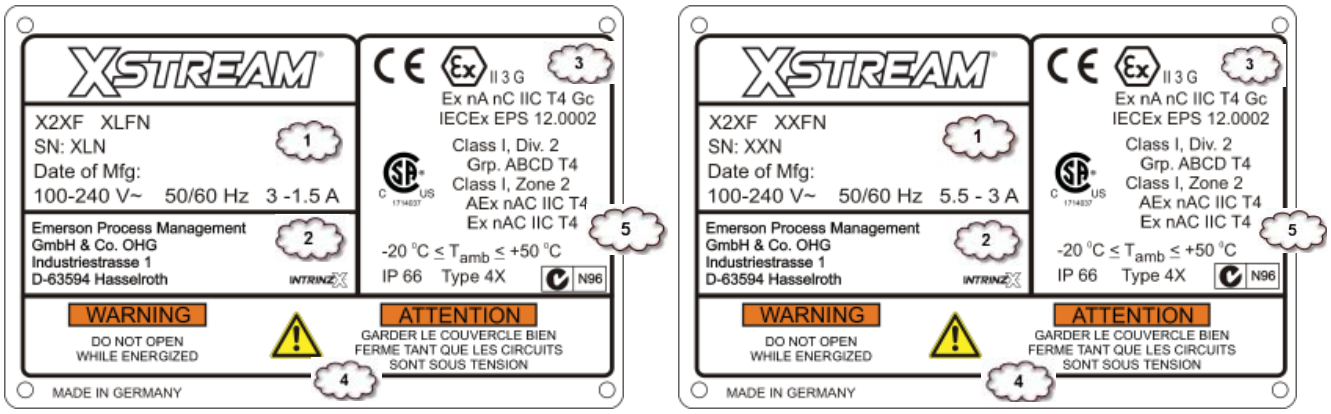
Protection Concept: Ex nAC

		North America (CSA-c/us)	
Hazardous area		Zone 2, Gas	Div 2
Classification		Class I, Zone 2, Gas, AEx nAC IIC T4 Ex nAC IIC T4	Class I, Div 2, Group ABCD
Temperature class		T4	T4
Underlying standards		CAN/CSA-E60079-0: 02 (R2006) CAN/CSA-E60079-15:02 (R2006) ANSI/ISA-12.00.01 -2002 (IEC 60079-0 Mod) ANSI/ISA-12.22.01-2002 (IEC 60079-1 Mod) UL 60079-15:2009	CSA C22.2 No 213-M1987 ISA 12.12.01-2007

Test samples have been approved by independent test institutes according to the relevant standards and found to comply with the requirements.
The certificates can be viewed in the appendix of this manual (☞ page A-1).

1.3 Technical Data

1.3.2 Nameplate Label



Area	Description	Area	Description
1	The analyzer´s electrical data, manufacturing data and serial number	2	Manufacturer address
4	Additional warning: Do not open the instrument when energized!		

	Certification Data	3 EU (ATEX)	5 North America
	Area classification	***II*** other than mines ***3*** Category **3** Equipm. (Zone 2) ***G*** for explosive **G**as atmosphere	***Class I*** Flammable gases, vapor, liquids ***Div. 2*** Equipment for Div. 2 ***Grp. ABCD*** All Class I gases ***T4*** Temperature Class (135 °C)
			Class I Flammable gases, vapor, liquids ***Zone 2*** Equipment for Zone 2
	Protection concepts	***Ex*** Explosion protected ***nA nC*** non-sparking, enclosed break ***IIC*** Group **II**, Gas Group **C** ***T4*** Temperature Class (135 °C) ***Gc*** Equipment Protection Level T_{amb} Ambient Temperature Range ***IP66, Type 4X*** Enclosure Rating (Outdoor use)	***AEx, Ex*** Explosion protected ***nAC*** non-sparking, enclosed break ***IIC*** Group **II**, Gas Group **C** ***T4*** Temperature Class (135 °C) T_{amb} Ambient Temperature Range ***IP66, Type 4X*** Enclosure Rating (Outdoor use)

Fig. 1-1: *Nameplate Label Details*

1.3.3 General Technical Data

	XLFN	XXFN
Temperatures		
operational, max.*)	0 (-20)…+50 °C / 32 (-4)…122 °F	
storage	-20…+70 °C / -4…-158 °F	
Weight, max	up to approx. 25 kg / 55.1 lb	up to approx. 45 kg / 99.2 lb
IP or Type rating	IP 66, Type 4X for outdoor use, but protected against direct sun light	
Gas connections		
max number	8	
max for purging (incl. / separate)	1 separate	
material	stainless steel	
sizes	6/4 mm; ¼"	
Power supply unit	wide range, internal	
Power supply	Mains supply voltage fluctuations are not to exceed ±10 percent of the nominal voltage	
nominal voltage	100–240 V∿ 50 / 60 Hz	
voltage range	85–264 V∿ 47–63 Hz	
nominal input current, max		
standard, max	1.3–0.7 A	1.5–0.8 A
w/ temperature control, max	3–1.5 A	5.5–3 A
Power input fuses	AC 230 V / T 6.3 A / 5x20 mm	
Electrical in- and outputs		
power	screw terminals with integrated fuse holders, max. 4 mm² / AWG 11	
signals	screw terminals, max. 1.5 mm² / 15 AWG	
special	Ethernet: RJ45 socket	
Cable entries	Cable glands, IP 68	
permissible cable outer dia	7…12 mm / 0.27"…0.47"	

*): *Limitations apply to selected measurement principles and ranges,*
☞ *Measurement specifications!*

1.4 Dimensions

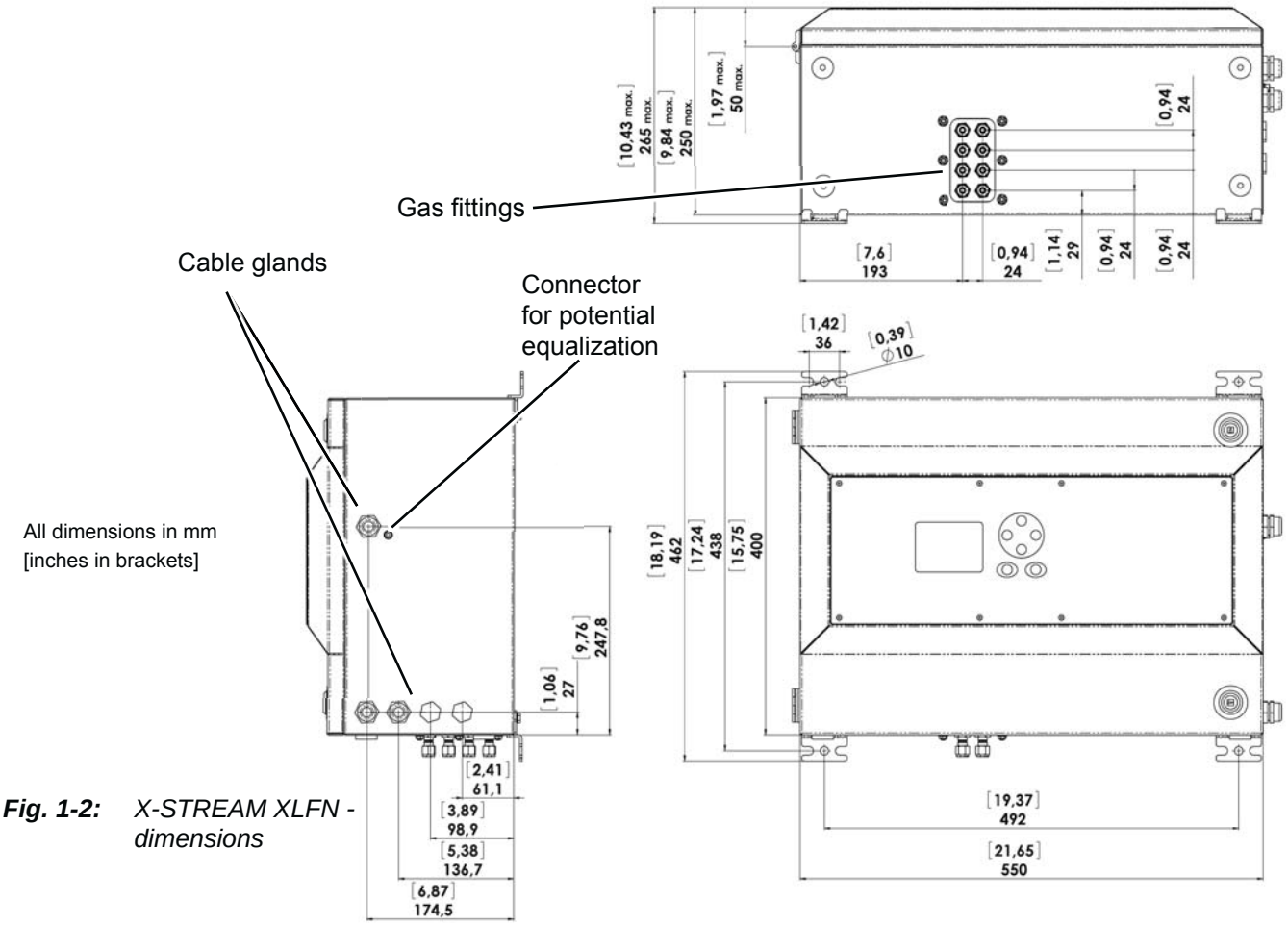


Fig. 1-2: *X-STREAM XLFN - dimensions*

General 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
Australia	C-Tick
others	NAMUR

1.4 Dimensions

All dimensions in mm
[inches in brackets]

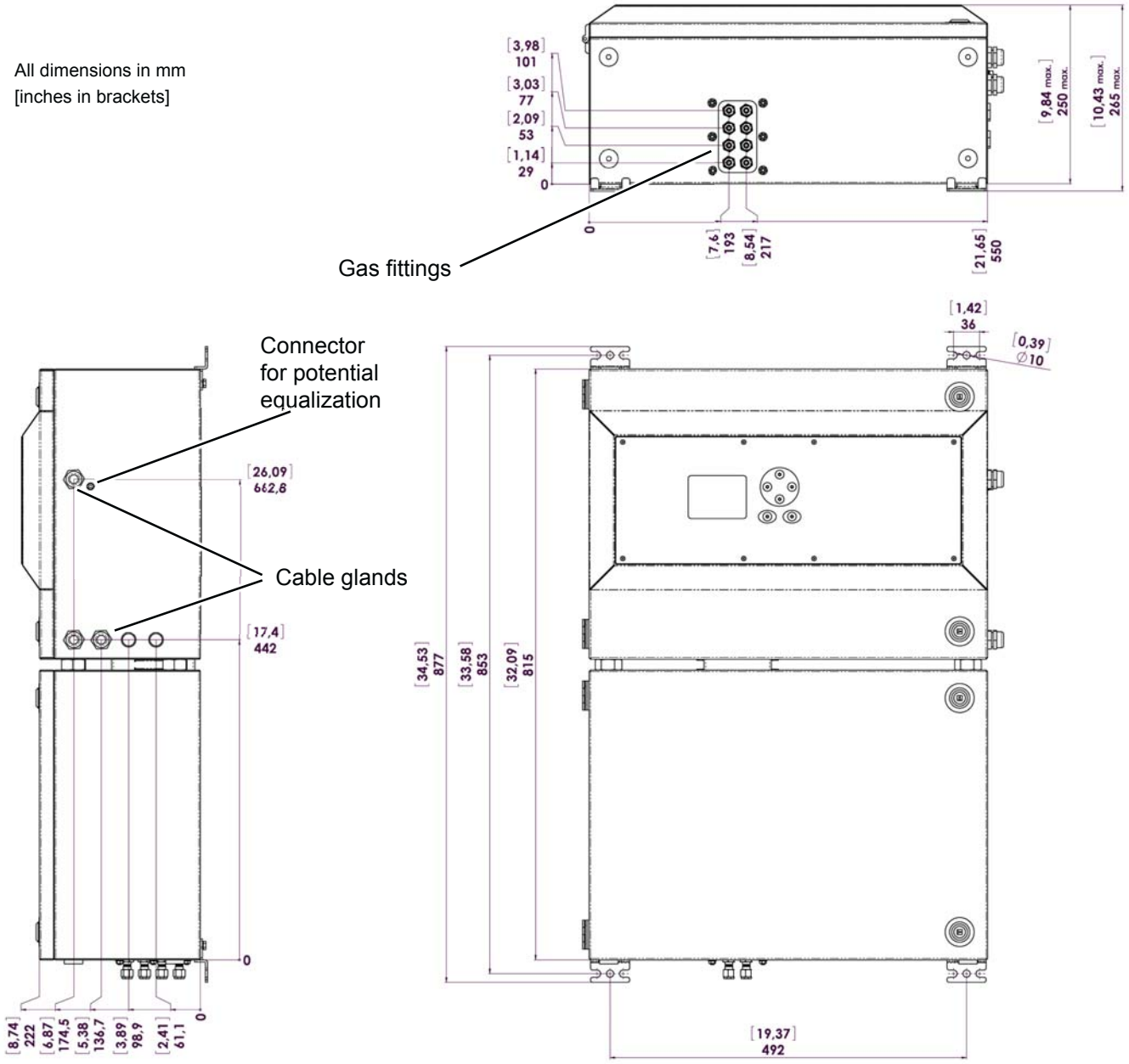


Fig. 1-3: *X-STREAM XXFN - dimensions*

1.5 Gas Specifications

Gas components	Non-flammable gases resp. gas mixtures; concentration does not exceed LEL (lower explosion limit) **OR** flammable gases passed into an infallible containment only!
Maximum sample gas pressure	Atmospheric pressure or <1500 hPa at normal ambient pressure, depending on the integrated measuring principle (see related X-STREAM series instruction manual)
Sample gas flow	Depending on measuring principle (see related X-STREAM series instruction manual)

⚠ WARNING

EXPLOSION HAZARD BY FLAMMABLE GASES

Flammable Gases must be introduced into INFALLIBLE CONTAINMENTS ONLY, to avoid leakage into internal analyzer housing!

Such containments are provided on request.

1.6 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 (Tables 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 %
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 Table 1-5

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

1.6 Measurements 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. [11]
Influence of gas flow [1] [4]	≤ 0.5 %	≤ 1 % [11]
Maximum gas pressure [8]	≤ 1500 hPa abs. (≤ 7 psig)	≤ 1500 hPa abs. (≤ 7 psig)
Influence of pressure [2]		
– At constant temperature	≤ 0.10 % per hPa	≤ 0.10 % per hPa
– With pressure compensation [7]	≤ 0.01 % per hPa	≤ 0.01 % per hPa
Permissible ambient temperature [9]	0 (-20) to +50 °C (32 (-4) to 122 °F)	0 (-20) to +50 °C (32 (-4) to 122 °F)
Influence of temperature [1] [13] (at constant pressure)		
– On zero point	≤ 1 % per 10 K	≤ 1 % per 10 K
– On span (sensitivity)	≤ 5 % (0 to +50 °C / 32 to 122 °F)	≤ 1 % per 10 K
Thermostat control [6] [12]	none / 60 °C (140 °F) [5]	none / 60 °C (140 °F) [10]
Warm-up time [6]	15 to 50 minutes [5]	approx. 50 minutes

Note! 1 psi = 68.95 hPa

[1] Related to full scale
[2] Related to measuring value
[3] From gas analyzer inlet at gas flow of 1.0 l/min (electronic damping = 0 s)
[4] Constant pressure and temperature
[5] Dependent on integrated photometer bench
[6] Depending on measuring range
[7] Pressure sensor is required
[8] Limited to atmospheric if internal sample pump
[9] Temperatures below 0 °C (-4 °F) with thermostat control only
[10] Thermost. controlled sensor: 75 °C (167 °F)
[11] Flow variation within ± 0.1 l/min
[12] Optional thermostatically controlled box with temperature 60 °C (140 °F)
[13] Temperature variation: ≤ 10 K per hour

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

	Trace Moisture (tH_2O)
Measurement range	-100 to -10 °C dew point (0…100–3000 ppm)
Measurement accuracy	±2 °C dew point
Repeatability	0.5 °C dew point
Response time (t_{95})	5 min (dry to wet)
Operating humidity	0 to 100 % r.h.
Sensor operating temperature	-40 to +60 °C
Temperature coefficient	Temperature compensated across operating temperature range
Operating pressure	Depending on sequential measurement system, see analyzer specification [1] max. 1500 hPa abs / 7 psig
Flow rate	Depending on sequential measurement system, see analyzer specification [1] 0.2 to 1.5 l/min

[1] If installed in series to another measurement system, e. g. IR channel

Note! 1 psi = 68.95 hPa

Note! Do not calibrate, see special calibration notes in chapter 4!

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

1.6 Measurements Specifications

	Oxygen Sensors	
	Paramagnetic (pO_2)	Electrochemical (eO_2)
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]	≤ 1 % per week	≤ 1 % per week
Repeatability [1] [4]	≤ 1 %	≤ 1 %
Response time (t_{90}) [3]	< 5 s	approx. 12 s
Permissible gas flow	0.2–1.5 l/min	0.2–1.5 l/min.
Influence of gas flow [1] [4]	≤ 2 % [10]	≤ 2 %
Maximum gas pressure [7]	≤ 1500 hPa abs. (≤ 7 psig) [13]	≤ 1500 hPa abs. (≤ 7 psig)
Influence of pressure [2]		
– At constant temperature	≤ 0.10 % per hPa	≤ 0.10 % per hPa
– With pressure compensation [6]	≤ 0.01 % per hPa	≤ 0.01 % per hPa
Permissible ambient temperature [8]	0(-20) to +50 °C (32 (4) to 122 °F)	5 to +45 °C (41 to 113 °F)
Influence of temperature [1] [12] (at constant pressure)		
– On zero point	≤ 1 % per 10 K	≤ 1 % per 10 K
– On span (sensitivity)	≤ 1 % per 10 K	≤ 1 % per 10 K
Thermostat control	60 °C (140 °F) [11]	none
Warm-up time	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] n. a.
[6] Pressure sensor is required
[7] Limited to atmospheric if internal sample pump
[8] Temperatures below 0 °C (-4 °F) with thermostat control only
[9] n. a.
[10] For ranges 0–5…100 % and flow 0.5…1.5 l/min
[11] Optional thermostatically controlled sensor with temperature 60 °C (140 °F)
[12] Temperature variation: ≤ 10 K per hour
[13] No sudden pressure surge allowed

Tab. 1-4: *Oxygen - 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.

1.6 Measurements Specifications

	0–10…< 50 ppm CO 0–5…< 50 ppm CO_2	
Detection limit (4 σ) [1] [2]	< 2 %	
Linearity [1] [2]	< 1 %	
Zero-point drift [1] [2] [3]	< 2 % resp. < 0.2 ppm [9]	
Span (sensitivity) drift [1] [2] [4]	< 2 % resp. < 0.2 ppm [9]	
Repeatability [1] [2]	< 2 % resp. < 0.2 ppm [9]	
Response time (t_{90}) [7]	< 10 s	
Permissible gas flow	0.2–1.5 l/min.	
Influence of gas flow [1] [2]	< 2%	
Maximum gas pressure [10]	≤ 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

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

1.7 Infallible Containments

A containment is the entirety of the gas paths inside the analyzer.

Infallible Containments are characterized by the fact, that no unintended release of gas into the analyzer can happen.

This is based on connections being velded, soldered or designed as glass-to-metal connections resp. eutectic or similar methods.

Containments complying to the conditions described above are called "in the long run technically tight". This term is used, because total tightness for gases is not achievable. Technical tightness is also conceded to metallically tightening tube fittings, such as e.g. used with Emerson Process Managements gas analyzers.

Such equipment remain technically tight, if the tightness is based on design, or if it is ensured on a permanent basis by maintenance and monitoring.

In case of X-STREAM gas analyzers, the function test for infallible containments is performed according to the standard EN 60079-2.

X-STREAM non-incendive analyzers can be used for measuring flammable gases, if the gas paths for sample gas (and flammable calibration gases) are designed as infallible containments, currently available for thermal conductivity measurements only.

1.8 Instructions for safe use

- Open gas outlets need to end at a safe area, if releasing flammable gas above 25 % LEL.
- All cables (signal and power lines) need to end in safe or protected areas (e.g. in a suitable housing type Ex e).

Chapter 2
Installation

This chapter describes the proper installation procedure for the Non-Incendive X-STREAM analyzer version.

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!

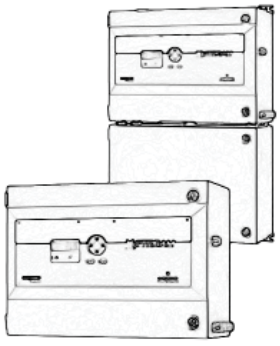
2.1 Scope of Supply

⚠ WARNING

EXPLOSION HAZARD WHEN MISSING INFORMATION

Compare the content of your package with the pictures below.

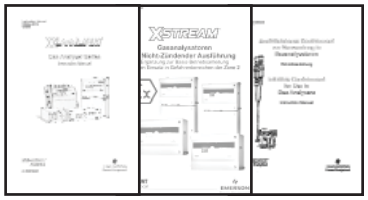
Call your local sales office if something is missing, and DO NOT continue to install your analyzer, until all parts are at hand!



Analyzer

USB stick

Trace oxygen cell (if applicable)



Up to three manuals:
- X-STREAM X2 series manual
- This manual addendum
- Infallible containment manual*)

*) For instruments with infallible containment (option) only!

Fig. 2-1: *Scope of Supply*

2.2 General Safety Instructions

⚠ WARNING

EXPLOSION HAZARD

Consider all applicable standards and legislative requirements when installing the analyzer, and connecting power and signal cables. Take care of the relevant installation standards, as there are (but not limited to) e.g. EN 60079-14 (Europe), National Electrical Code (NEC-NFPA 70; USA), Canadian Electrical Code (CEC; Canada), IEC 60079-14 (International), and all corresponding standards.

Consider all instructions given in this, and all associated analyzer manuals!

Read and understand all instructions given in the manuals before beginning to install the analyzer!

Failure to follow the instructions may cause explosion, property damage and personal injury or death!

⚠ WARNING

EXPLOSION HAZARD

Installing this instrument requires opening the housing and working at open instrument. This is permitted only if no hazardous atmosphere is present, and the instrument and all connected external ciruitry is de-energized!

X-STREAM gas analyzers do not provide a power switch and are operable when connected to power!

Depending on the local legislation, this may require a hot work permit to be issued.

⚠ WARNING

EXPLOSION HAZARD BY GASES

X-STREAM analyzers utilize not only sample gas but one or more pressurized carrier gases and/or calibration gases.

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

2.2 General Safety Instructions

⚠ WARNING

EXPLOSION HAZARD AND ELECTRICAL SHOCK HAZARD

Safe operation requires the instrument to be installed in a way not affecting the ingress protection (IP66 / Type 4X)! Take care of the instructions for installation.

Open covers or covers not properly closed affect the ingress protection and result in unsafe operation! Do not operate the instrument without properly closed covers!

Connecting and disconnecting non-incendive X-STREAM gas analyzers is permitted only, if the instrument and all associated power & signal lines are de-energized!

Failure to follow the instructions may cause explosion, property damage and personal injury or death!

⚠ WARNING

EXPLOSION HAZARD BY DAMAGES

Do NOT operate damaged analyzers!

Take out of operation and take care for proper maintenance or repair!

Failure to follow may cause explosion, physical injury or death!

⚠ CAUTION

HEAVY INSTRUMENT

X-STREAM field housings, intended for outside and wall mounted use, weigh between 26 kg (57 lb) and 45 kg (99 lb) depending on options installed.

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

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

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

2.3 Abstract

Save operation of Emerson Process Management gas analyzers requires a proper installation. Therefor all procedures that are described in this section as well as those of the analogous sections of the related X-STREAM series instruction manual need to be followed strictly.

2.4 Mounting the Analyzer

Before mounting the instrument, verify that the installation site of the instrument is determined adequately by means of Fig. 2-2 or Fig. 2-3.

Mount the analyzer to a stand or a wall by means of 4 mounting brackets, provided at the instruments rear side.

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

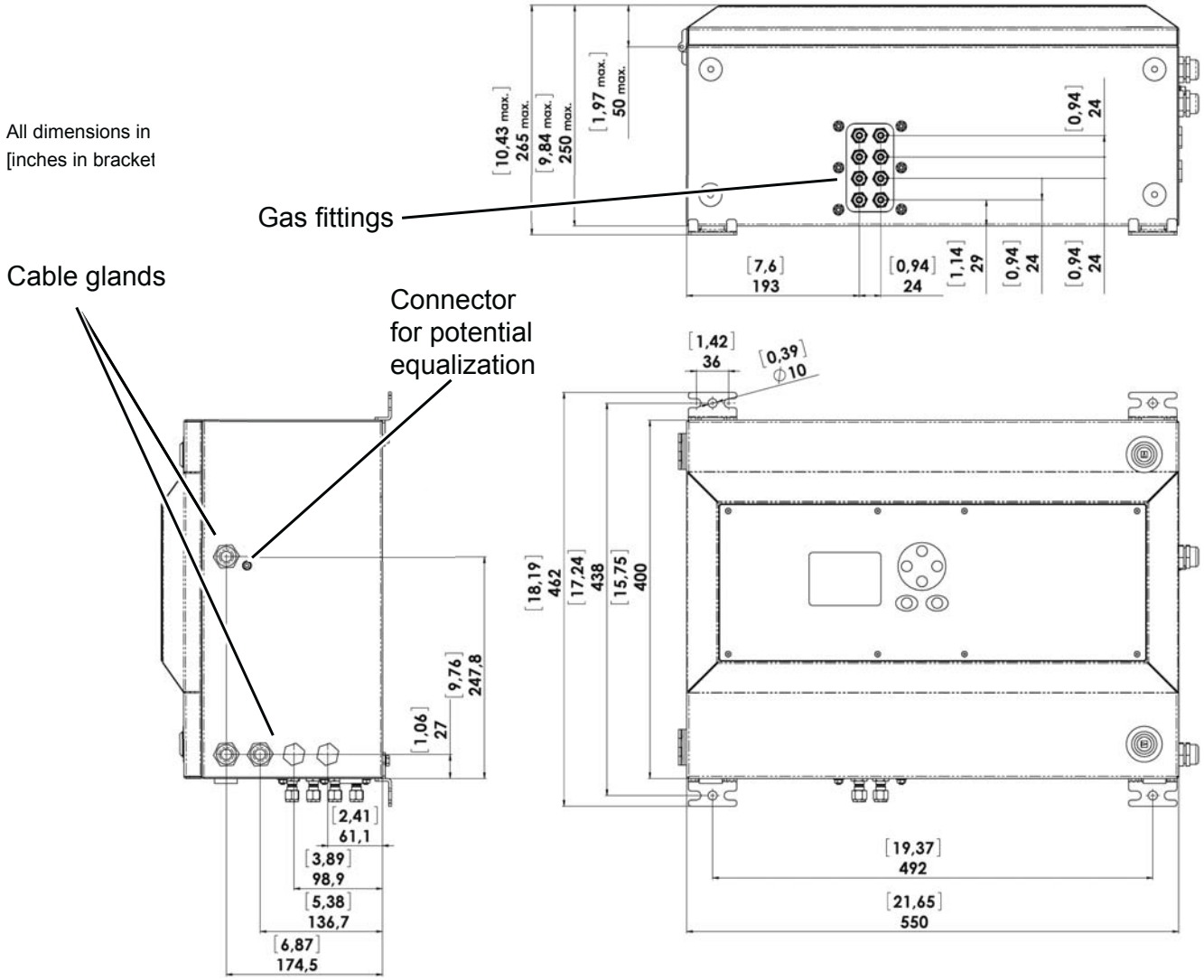


Fig. 2-2: *X-STREAM XLFN - Dimensions*

2.4 Installation - Mounting

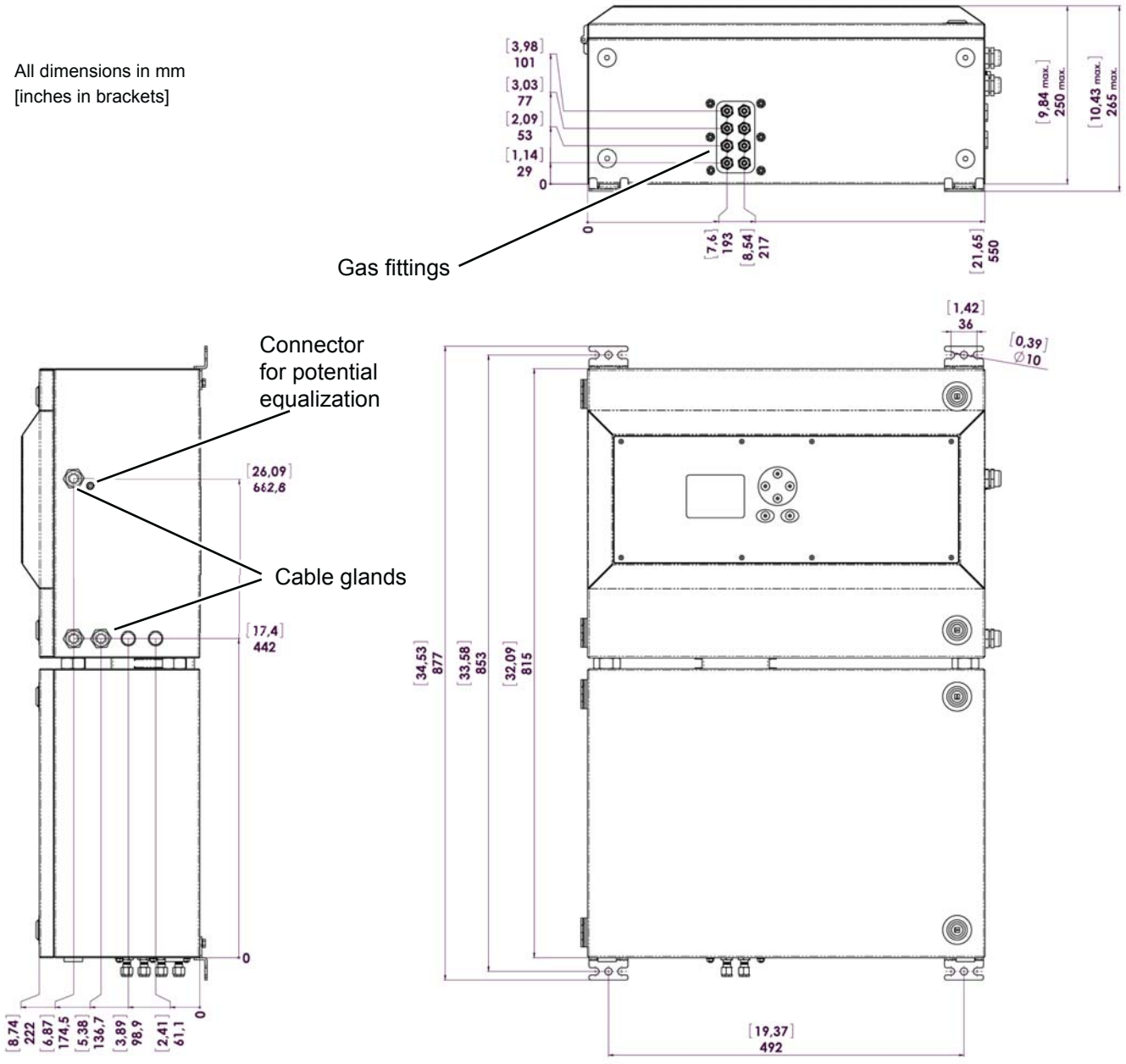


Fig. 2-3: *X-STREAM XXFN - Dimensions*

2.5 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.

WARNING

EXPLOSION HAZARD

Consider that some gases may be harmful to explosion protection safety components, if due to an internal leak released into the enclosure!

If need be take into account additional safety measures!

Enclosure 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).

Contact your Emerson Sales office for information on purge gas flow and pressure.

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

Open reference option

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

This nitrogen

- **at least should be of quality 5.0, which means nitrogen of purity ≥ 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!

2.6 Gas Connections

⚠ WARNING

EXPLOSION HAZARD BY FLAMMABLE GASES

Take care that all external gas lines are connected as described and that they are gastight to avoid leakages! Also, gas lines for flammable gases must end in a safe area!

Faulty connected gas lines lead to explosion hazard or even to mortal danger!

⚠ WARNING

EXPLOSION HAZARD BY HARMFUL TO HEALTH GASES

Take care that all external gas lines are connected as described and that they are gastight to avoid leakages! Faulty connected gas lines lead to mortal danger!

Don‘t breathe the emissions! Emissions may contain harmful to health or toxic components, and may cause headache, sickness, unconsciousness and death.

Dispose emissions by a safe gas flue and check its function periodically!

⚠ CAUTION

Do not confuse gas inlets and outlets. All gases supplied must be prepared beforehand. When supplying aggressive gases, ensure that the gas lines are not damaged.

Max. admissable pressure: 1500 hPa!

Exhaust lines must be installed to incline downwards and be unpressurized and protected against frost, and conform to legal requirements.

More information is provided in the related X-STREAM series instruction manual.

2.6 Installation - Gas Connections

TRACE OXYGEN MEASUREMENT

The sensor for trace oxygen measurements is a consumable. As soon as it is in contact with oxygen, the remaining lifetime counts down.

For this reason, the sensor is shipped as separate unit, within a sealed bag, to avoid unintended contact with oxygen! Install the sensor considering all associated instructions short before startup of the analyzer.

Do not use synthetic gas lines, as ambient oxygen may penetrate into the gas lines and influence the measurement!

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

The number and configuration of the gas inlets and outlets depends on the use, the unit is to be put to, and is noted on a sticker on the underside of the instrument next to the connectors.

To simplify installation, we recommend labelling the gas lines in accordance with these markings. This avoids confusion, should the analyzer need to be disconnected for maintenance. Should it be necessary to open the gas lines, the gas connectors should be sealed with PVC caps, to prevent pollution by moisture, dust, etc.

Gas connections

Gas connections	
max number	8
max for purging (incl. / separate)	2 incl.
material	PVDF; stainless steel (opt.)
sizes	6/4 mm; ¼"

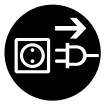
See figures 2-2 and 2-3 for an arrangement of gas in- & outlets.
All connections are labeled as follows (exemplary):

	IN	OUT
1	SAMPLE	SAMPLE
2		
3		
4		PURGE GAS

Fig. 2-4: *Labelling of Gas Connectors (example)*

2.7 Electrical Installation




⚠ WARNING

EXPLOSION AND ELECTRICAL SHOCK HAZARD

Failure to follow the instructions provided below may cause warranty invalidation, property damage and personal injury or death!

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

Take care of the relevant installation standards, as there are (but not limited to) e.g. EN 60079-14 (Europe), National Electrical Code (NEC-NFPA 70; USA), Canadian Electrical Code (CEC; Canada), IEC 60079-14 (International) and others, and all corresponding standards.

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!

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 (operate power switch / circuit breaker in building installation)!

Connecting and disconnecting flameproof X-STREAM analyzers is permitted only, if the instrument and all associated power & signal lines are de-energized!

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.

- Connect the housing to a ground or equipotential bonding conductor.
- Keep all cabels, entering the housing, as short as possible.
- The cable glands are intended for cables with an outer diameter of 7 to 12 mm [0.27 to 0.47 in]. Special adapters enabling to mount thinner or multiple cables in one connection can be provided on request.
- Supply terminals are intended for cables with a cross section of up to 4 mm^2 [11 AWG]
- Use shielded cables only for signal lines to ensure electromagnetic compatibility (EMC).

Signal in- and outputs

Preparation of signal cables

All signal cables are connected to screw-type terminals located inside the housing. Access to the internal components is gained by releasing the two (upper enclosure´s) fasteners and opening the front panel sidewards.

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

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

Installing cable glands with shielded cables

1. Strip the cabel
2. Expose braided shield

3. Feed cable through dome nut and clamping insert
4. Fold braided shield over clamping insert

5. Make sure that braided shield overlaps the O-ring by 3⁄32“ (2 mm)
6. Push clamping insert into body and tighten dome nut
7. Assemble into housing and you´re done!

2.7 Installation - Electrical

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

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

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

Characteristics of terminals:

Accepted wire gauge:	0.14 ... 1.5 mm² (26 AWG…16 AWG), end sleeves not required
Skinning length:	5 mm (0.2")
Thread:	M2
Min. tightening torque:	0.25 Nm (2.21 in.lb)

⚠ WARNING

EXPLOSION AND ELECTRICAL SHOCK HAZARD

All power and signal cables must end in a safe area or within a protective enclosure (e.g. Ex e enclosure)!

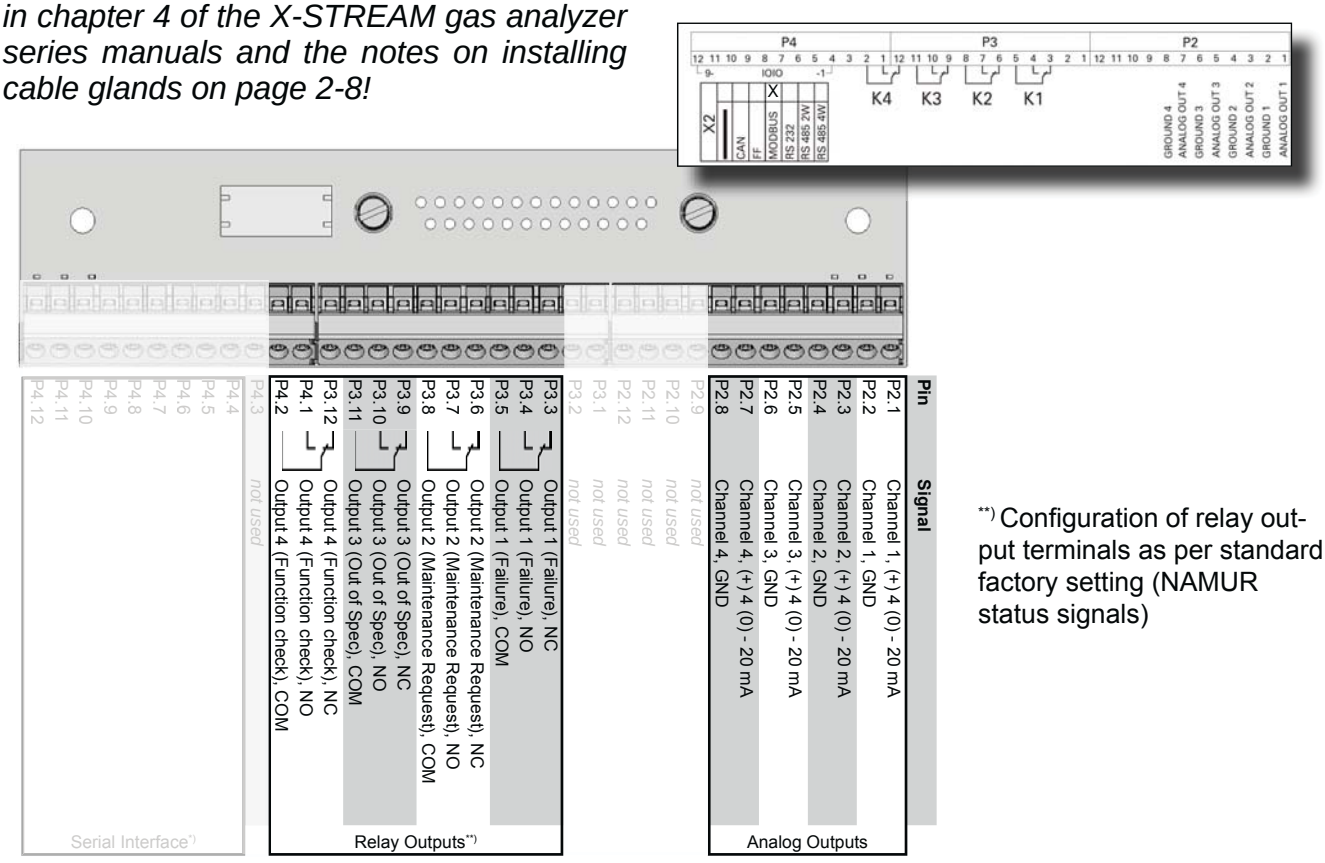
Verify the power cord is layed with a distance of at least 1 cm (0.4 in) to any signal cable to ensure proper insulation from signal circuits!

Analog signals
Relay outputs 1 - 4

Terminals for analog signals and relais outputs 1 - 4 are located on the outer left module (terminal block X1; Fig. 2-5).

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

Note!
Consider the special installation instruc-tions in chapter 4 of the X-STREAM gas analyzer series manuals and the notes on installing cable glands on page 2-8!



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

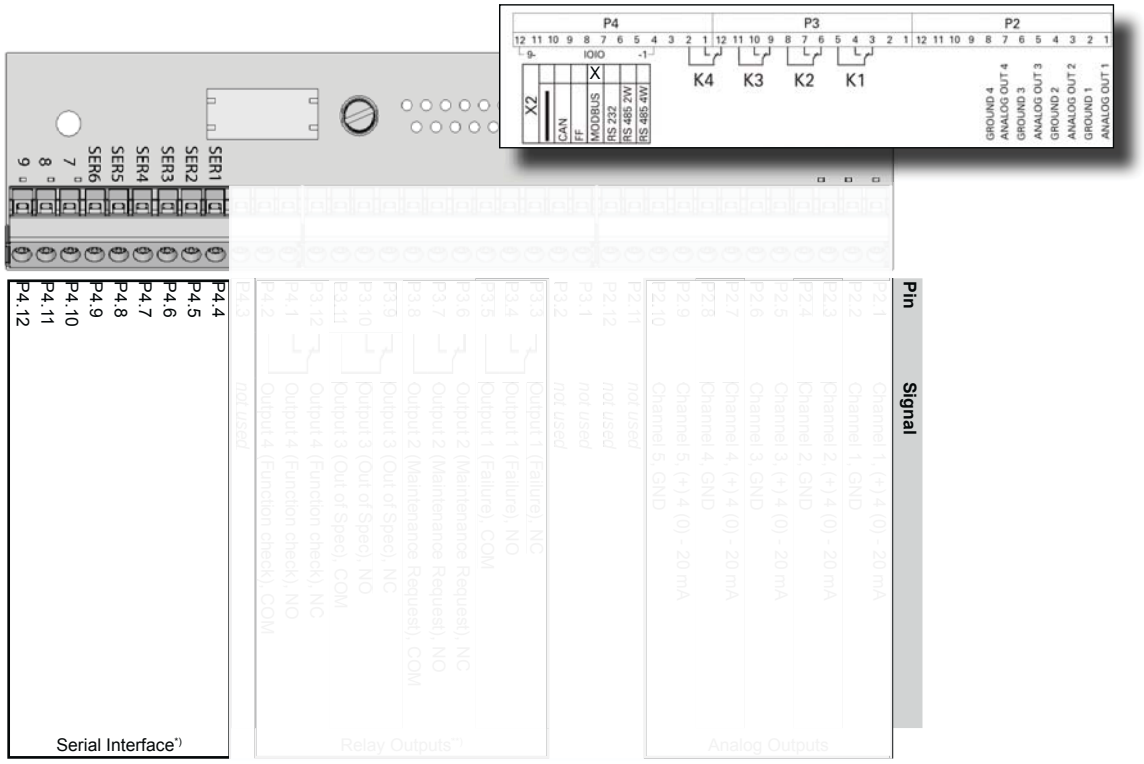
Fig. 2-5: *Terminals Block X1 - Analog Signals and Relay Outputs 1-4*

2.7 Installation - Electrical

Serial 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	*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*

Fig. 2-6: *Terminals Block X1 - Serial Interface*

Notes!

Consider the special installation instructions in chapter 4 of the X-STREAM gas analyzer series manuals and the notes on installing cable glands on page 2-9!

X-STREAM analyzers are classified as DTE (Data Terminal Equipment).

The type of serial interface is marked on a label nearby the terminals (see sample above)

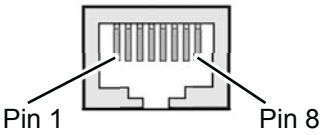
RJ45 Ethernet connection

This connector is an option for X-STREAM X2 series.

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.



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

Fig. 2-7: *Ethernet Connector*

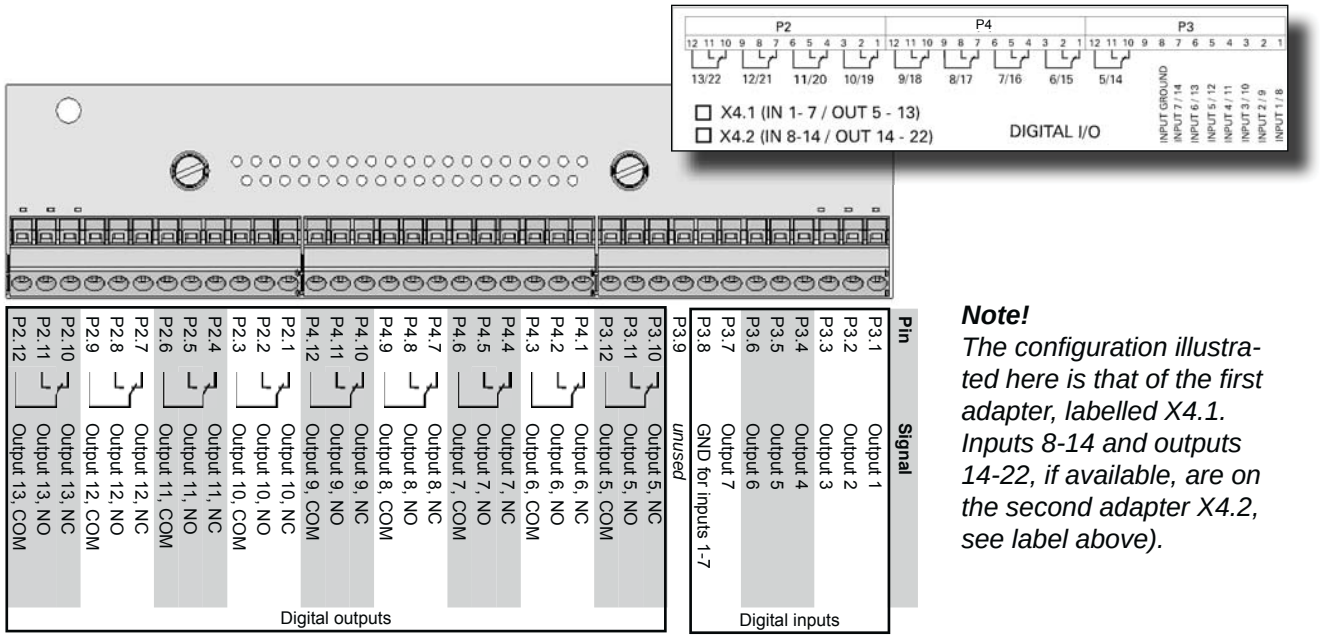
2.7 Installation - Electrical

Digital in- and outputs

7 or 14 digital inputs	electrical specification	max. 30 V, internally limited to 2.3 mA HIGH: min. 4 V; LOW: max. 3 V common GND
9 or 18 additional relay outputs	electrical specification	max. load. 30 V; 1 A; 30 W resistive
	mechancial specification	Dry relay change-over contacts can be used as NO or NC

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.

Consider the special installation instructions in chapter 4 of the X-STREAM gas analyzer series manuals and the notes on installing cable glands on page 2-8!



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. 2-8: *Terminals Block X4.1 and X4.2 - Digital Inputs and Outputs*

2.7 Installation - Electrical

Connecting the power cord

⚠ WARNING

EXPLOSION HAZARD / ELECTRICAL SHOCK HAZARD

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

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 the 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 (operate power switch/ circuit breaker in building installation)!

Failure to follow may cause explosion, property damage and personal injury or death!

⚠ 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!

Failure to follow may cause personal injury or death!

⚠ WARNING

EXPLOSION HAZARD

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 hazard!

Failure to follow may cause explosion, property damage and personal injury or death!

2.7 Installation - Electrical

⚠ WARNING

EXPLOSION AND ELECTRICAL SHOCK HAZARD

All power and signal cables must end in a safe area or within a protective enclosure (e.g. Ex e enclosure)!

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

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

Power Supply Terminals	
Design, max. cross section	Screw type terminals with integral fues holders max. 4 mm² (12 AWG)
Recommended cross section	min. 1,5 mm² (15 AWG)
Skinning length:	8 mm (0.315"); no need to use wire end sleeves
Tightening torque:	min. 0.5 Nm (4.4 in.lb)
Input Fuses	
Specification	AC 230 V / T 6.3 A / 5x20 mm

- Feed the power cable through the uppermost cable gland at the instrument´s right side and strip the outer insulation.
- Strip the individual wires and connect to the terminals (a label is located next to the terminals on the mains filter housing).
- Finally, tighten the outer dome nut to secure the power cable.

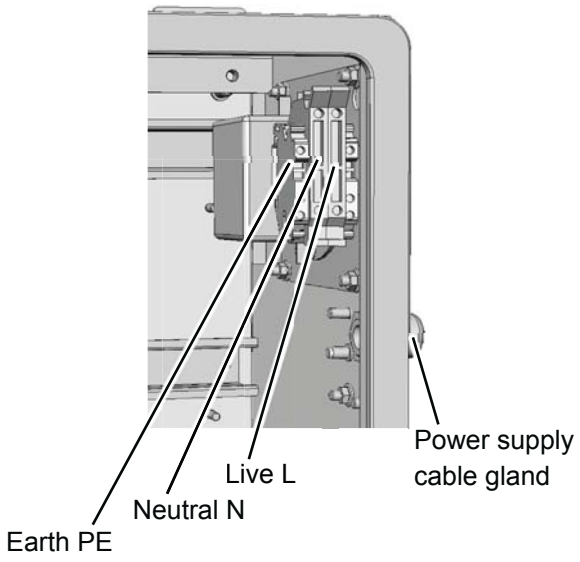


Fig. 2-9: *Power Terminals*

⚠ WARNING

EXPLOSION 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!

⚠ CAUTION

CRUSHING HAZARD

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

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

When all connections are correctly made and checked,

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

2.7.1 External Equipotential Bonding Connector

The instrument provides a thread (metric M5) right beside the power cable inlet, to connect an equipotential bonding conductor.

The installation has to comply with sound engineering practice (for an example see Fig. 2-10). Consider formation of contact corrosion and take measures to avoid this!

2.7 Installation - Electrical

Take care to use a cable for the equipotential connection with at least the same cross section as provided by the power cable!

Maximum depth of the enclosure thread is 6 mm!

Take care to use a screw of a proper length, to ensure the ring terminal (item 2) is properly fixed!

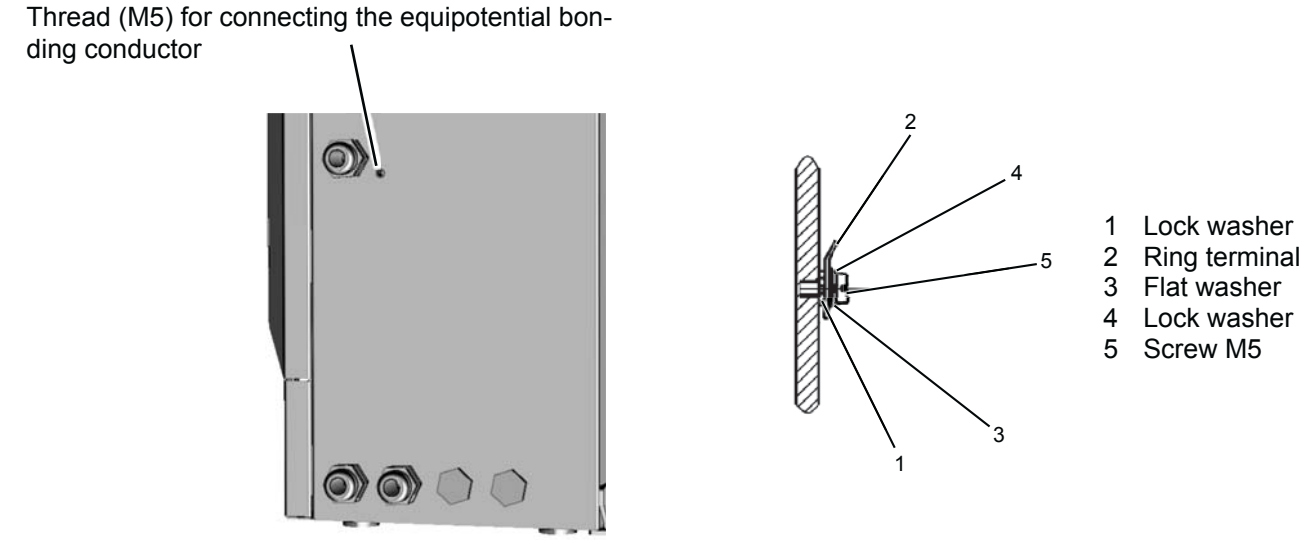


Fig. 2-10: *Equipotential Bonding Conductor Terminal*

Chapter 3
Startup

3.1 Safety Instructions and Final Check

⚠ WARNING

EXPLOSION HAZARD

Startup, operation and service must not be performed before reading and understanding all instructions!

Especially all warnings in this, and all associated manuals have to be considered!

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

All unused cable connections need to be closed with the provided permissible sealing plugs (part # ETC00791; Fig. 3-1)

Unused openings for cable connections in the housing need to be closed with a special screw (part # ETC00790; Fig. 3-2).

Fig. 3-1: *Sealing Plug for Cable Connections*

Fig. 3-2: *Hexagon Socket Screw As Sealing Plug for Unused Cable Inlet Openings*

⚠ WARNING

EXPLOSION HAZARD

Use the above mentioned approved components only!

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 (N2) to avoid hazards caused by toxic, flammable, explosive or harmful to health sample gas components!

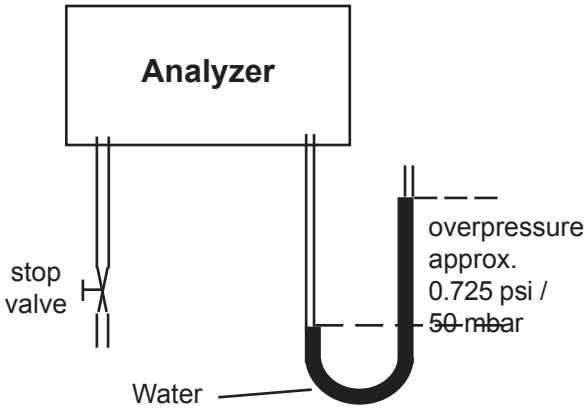


Fig. 3-3: *Leak Testing With U-Turn Manometer*

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

⚠ 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!

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 perform a leak test, 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.

⚠ 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 instructions in the X-STREAM X2 series manual!

After all safety aspects are followed and chekked, the instrument may be powered .

3.4 Symbols and Typographical Conventions

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

Convention	Description
Within Text	
(MENU TITLE) 6-12	For a detailed description of *MENU*, see page 6-12.
CONTROL	Identifies the CONTROL menu, e.g. "press ENTER to open CONTROL"
CONTROL - RANGES	From within the CONTROL menu, select the RANGES menu.
"*Valves*" "*Control..*"	Parameter or menu line name
Never, 1 min	Values to be selected
0 ... 2000	Value to be entered
ENTER	press key (here: *ENTER* key)

3.5 The user interface

All X-STREAM X2 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.

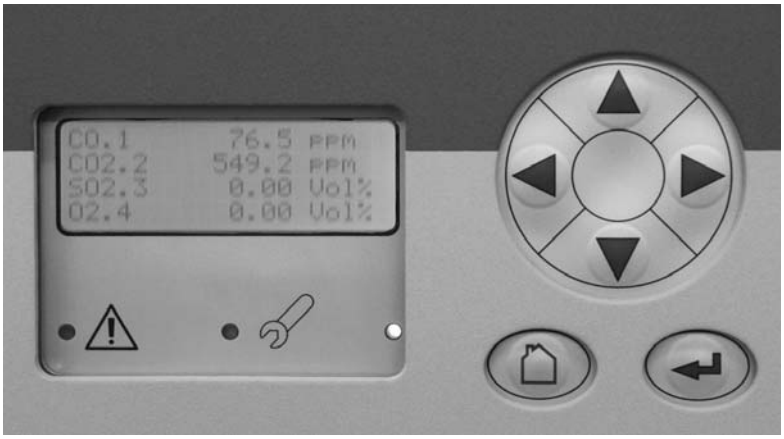
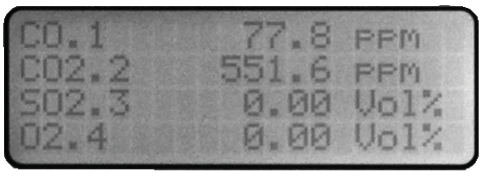


Fig. 3-4: *Front Panel*

3.5 The user interface

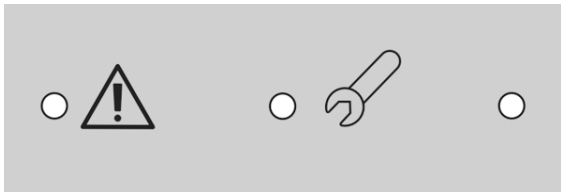
3.5.1 Display



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

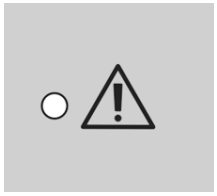
What information is displayed depends on the currently displayed menu.

3.5.2 Status LED

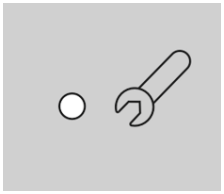


Three status LED indicate the unit's status, recognisable from a distance.

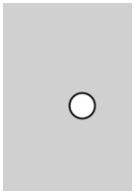
Status is indicated in accordance with the German NAMUR NE 44 recommendations.



"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".

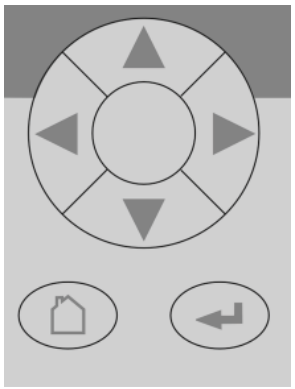


The third, green LED indicates the power supply status:

on: power supply OK

off: power supply interrupted

3.5.3 Keys



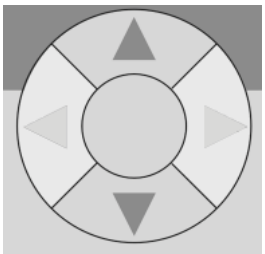
Six keys enable the use of the menu system. Depending on the operational mode (measuring, browsing menus, editing) they have the following functions:

ENTER key:

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

MEASURE key:

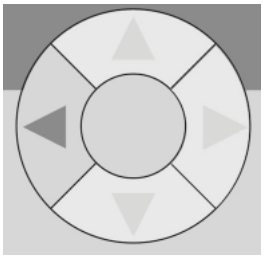
Mode	***Function***
Measuring	*(no function)*
Browsing	Returns to measurement display
Editing	Cancels entry



UP / DOWN keys:

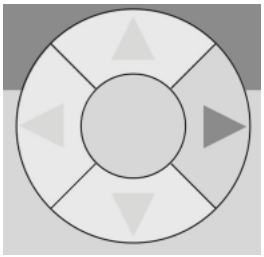
Mode	***Function***
Measuring	Leaves the measurement display
Browsing	Selects menu line
	Goes to previous/next page, when currently in a line beginning with ▲/▼
Editing	Changes current parameter

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: 1. description 2. value: number or text 3. unit (optional) *Examples:* Span gas: 2000 ppm Tol.Check: Off 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. *Example:* 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. *Example:* 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 Line 2.. Line 3 ▼Line 4	▲Line 1 Line 2.. Line 3 ▼Line 4	▲Line 1 Line 2.. Line 3 Line 4
Menu continues downwards..	Menu continues upwards and downwards..	Menu continues upwards.

Editing

Editing mode enables the setting of a parameter. It is initiated by pressing the ↵ 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:

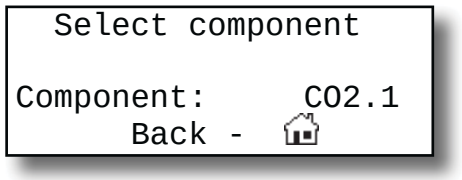
↵ key: the value is verified (e.g. min/max). If the value is possible, it is saved and the new value displayed; if not, an error message is displayed.

 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.

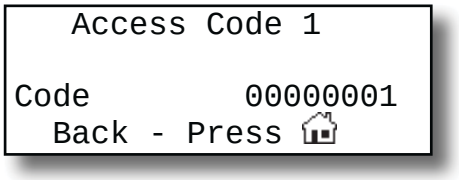
Note!

*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

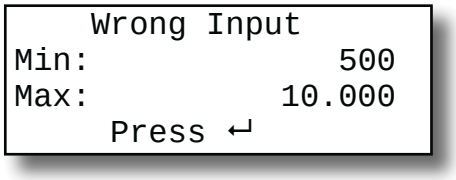
- the UP/DOWN keys to change the currently selected digit,
- the LEFT/RIGHT keys to select a different digit,
- the ENTER key to submit the code

or

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

3.6.3 Special messages

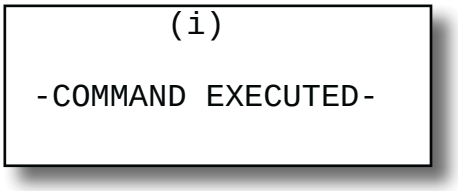
Depending on the last action performed by the user, one of the following messages may be displayed to assist or inform the user (the two confirmation messages are displayed only for a few seconds):



Information on incorrect entry:

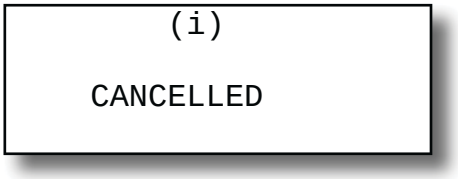
The value entered by the user is outside valid limits. The display indicates what limits apply.

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).

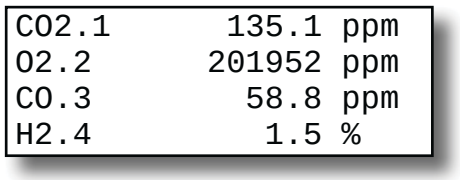
If such messages are active, line 4 alternates between the messages and the parameter selected for line 4.

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

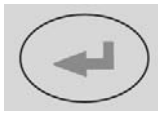
3.8 Selecting the Language

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 Checking the settings

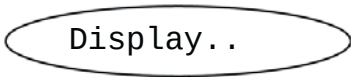
The following sections are structured so that the user can work through them one by one after powering up the unit. After completing these steps, the unit will be configured to the user's needs and functioning correctly.

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

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

Note!

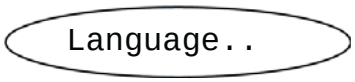
If you are unfamiliar with the language set: ☞ *page 3-13 shows the sequence to be used to set a different language.*



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

Note!

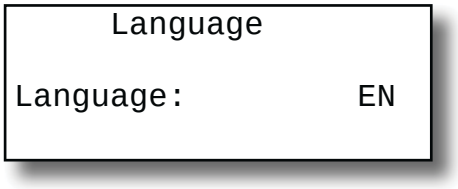
The factory setting for this unit is "no code required". For ease of operation, it is recommended to use the factory settings for access codes while setting up the unit for the first time. In the following sections, therefore, no more reference will be made to any need for entering a code.



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

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

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



3.9 Checking the settings

3.9.1 Installed options

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

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

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

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

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

Page 1

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

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

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

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

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

Page 2

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

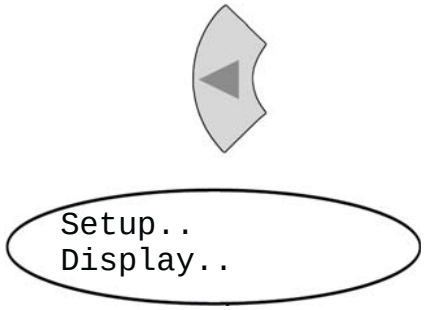
In the two pages of the COMMUNICATION menu, you can verify the parameters of the serial interface, and if necessary select the protocol to be used for data transfer.

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

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

3.9 Checking the settings

3.9.2 Configuring the display

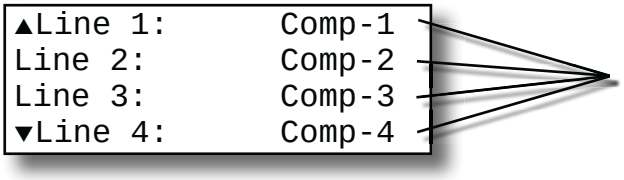


Press the LEFT key to return to the display setup menu.

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

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

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



Page 2

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

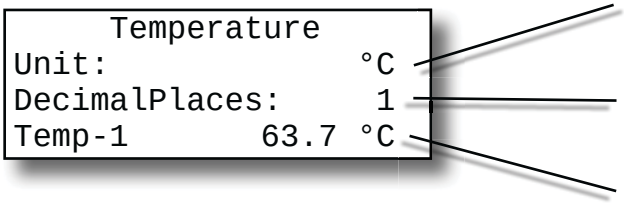
Note!

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

Page 3

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

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

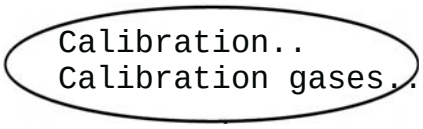


Set temperature unit
Options available: **°C, °F**

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

Current temperature; here: sensor 1.

3.9.3 Calibration setup



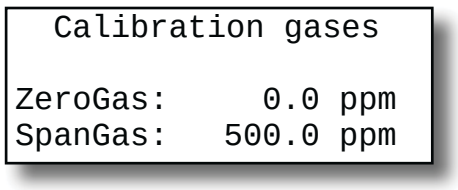
Once the display settings have been checked, press the LEFT key to return to the SETUP menu, then open the CALIBRATION menu where e.g. the calibration gas concentrations can be entered..

Note!

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

Multi-channel unit:

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

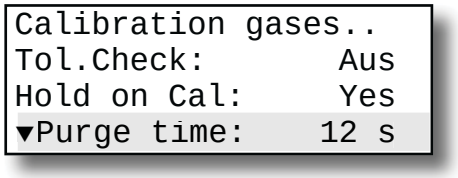


In the CALIBRATION GASES menu, the values for zero and span gas should be entered: these values should be taken from the gas supplier's certification. Values must be correctly set for results to be accurate.

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

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

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



Page 1

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

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

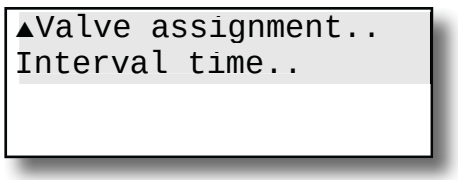
“Purge time”: When gas flow is controlled by internal or external valves, these allow the appropriate calibration gas to flow into the unit as soon as the calibration procedure is started. Due to the limited gas flow and the distance between valves and measuring cell, some time is required before the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

Note!

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

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

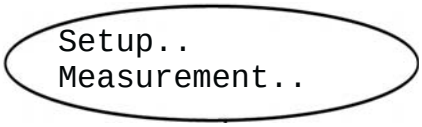
If any of these parameters need to be changed, ☞ X-STREAM X2 instruction manual for more information.

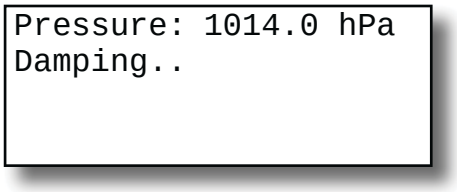


Page 2

3.9 Checking the settings

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





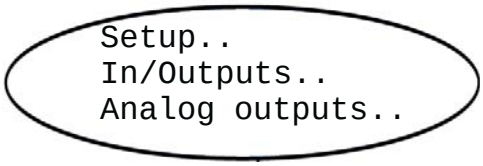
The first line allows the user to enter the current air pressure manually when no pressure sensor is installed, or to read the current pressure if a sensor is installed (☞ INSTALLED OPTIONS menu). The measurement unit is set in the DISPLAY SETUP menu.

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

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

3.9.4 Setting the analog outputs

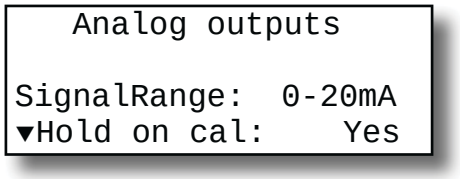
Press the LEFT key to return to the SETUP menu, and then open the IN/OUTPUTS menu. and from there the ANALOG OUTPUTS menu.



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

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

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



Page 1

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

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

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

Operational modes conforming to NAMUR 43 recommendations (NE 43)

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

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

Setting the “SignalRange” parameter to a value other than **0-20 mA** or **4-20 mA** defines specific analog output signal levels for system failures. Since these values are not sent during normal operation, a data capture system is able to distinguish between the following situations:

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

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

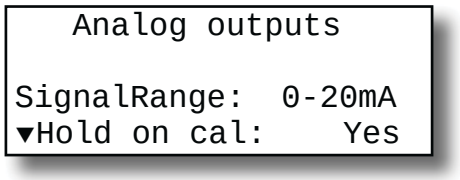
			Output signal, if				
"Signal-Range“	**Operation Mode**	**Failure Signal Level acc. NE 43**	**Measured value is valid**	**Measured value is below lower range limit**	**Measured value is above upper range limit**	**An internal failure occured**	**Cable is broken**
0-20 mA	Dead-Zero	-	0 ... 20 mA	< -19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

Note!

*The application of values marked * or ** depends on the setting of "SignalRange" (☞ Analog outputs menu, page 6-31).*

Tab. 3-1:** Analog Output Signals**: Settings and Operational Modes

3.9 Checking the settings



Page 1

The behaviour of the outputs during calibration can also be set on page 1 of the ANALOG OUTPUTS menu (“Hold on cal” parameter):

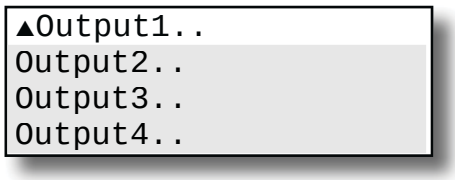
When the parameter is set to **Yes**, the following occurs during calibration:

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

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

Note!

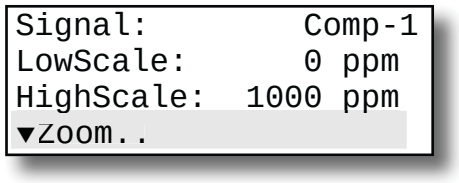
This behaviour may be undesireable if for example the unit is connected to a data capture system.



Page 2

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

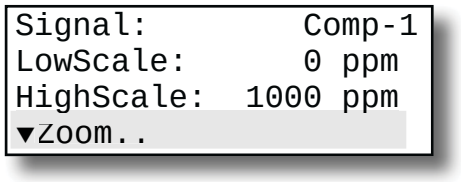
3.9 Checking the settings

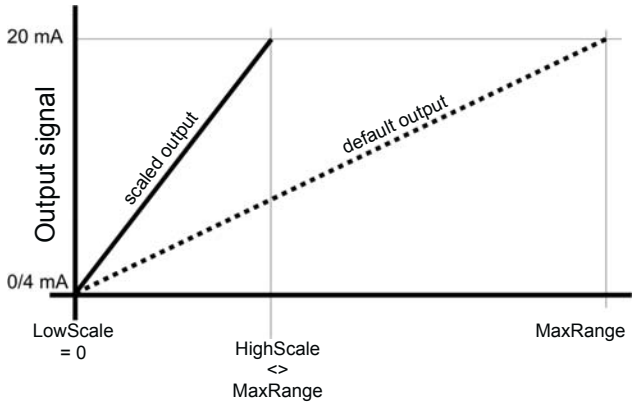


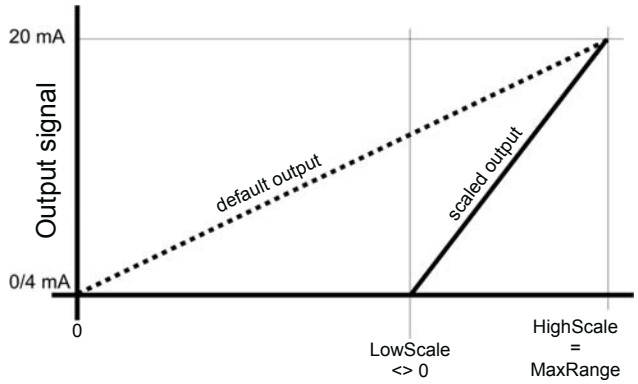
The “Signal” parameter defines the value to be sent to the selected output. The following options (partly dependent on the number of measuring channels and sensors installed) are available:

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

3.9 Checking the settings







The “LowScale” and “HighScale” parameters allow a concentration value to be set to correspond to the lower (0 or 4 mA) or upper signal value (20 mA). The limits for these parameters are given by the "MinRange" and "MaxRange" parameters, specifying the physical measuring ranges of each instrument.

Concentrations outside the range defined by "LowScale" and "HighScale" are not supported by an analog output.

Note!

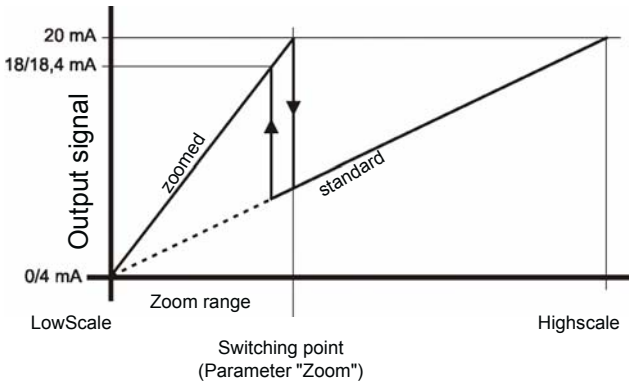
Scaling may affect the analog outputs accuracy!

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

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

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

3.9 Checking the settings




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

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

Note!

Zooming may affect the analog outputs accuracy!

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

X-STREAM analyzers support the zooming of analog outputs with the following options:

The zoom function can be activated in different ways; this is set in the “Switching” line:

- **Manual**: The operator must activate the zoom function manually, with either
  - the “Status” parameter in the last line of this menu

  or
  - a parameter in the CONTROL - ZOOM.. menu
- **Auto**: The analog output is switched depending on the measured concentration.
- **Inputs**: This requires setting a digital input. If an external signal is present at that input, the analog output is switched.

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

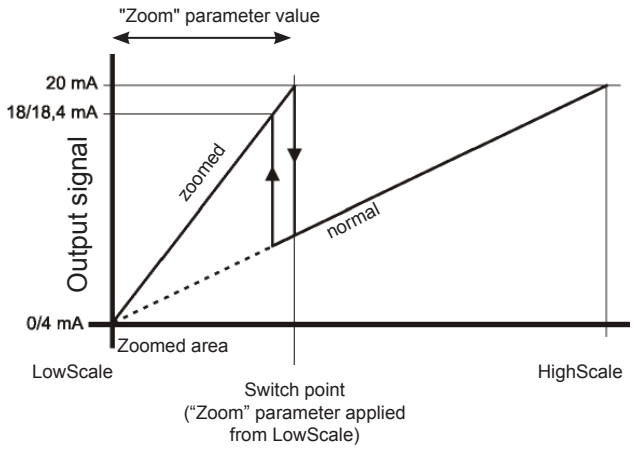
3.9 Checking the settings

Note!

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

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

Position: LowScale

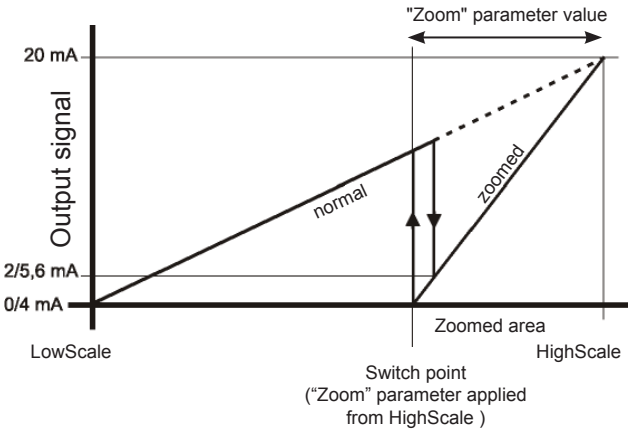


If the parameter is set to **LowScale**, the zoomed area is at the lower end of the measurement range.

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

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

Position: HighScale



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

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

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

3.9.4.1 References to the accuracy of the analog outputs

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

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

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

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

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

Example
Analyzer data:
MinRange: 500 ppm
MaxRange: 5000 ppm

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

Tab. 3-2: *Analog Outputs - Scaling (examples)*

3.9.5 Setting concentration alarms

Note!

If concentration alarms are not being used,go straight to page 5-34.

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


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

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

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

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

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

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

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

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

Example 1:

The oxygen measuring range is 10 %. If the SpanRange is set to 220 %, the maximum permissable span gas concentration is 22 %, enabling to use ambient air (21 % O_2) as a span gas.

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

Example 2:

Range upper limit: 1000 ppm,

SpanRange: 100 %.

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

Example 4:

Range upper limit: 1000 ppm,

SpanRange: 110 %.

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

Example 4:

Range upper limit: 1000 ppm,

SpanRange: 220 %.

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

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

Tab. 3-3: *Influence of “SpanRange” Parameter on Concentration Alarm Limits*

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

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

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

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

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

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

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

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

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

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

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

- Window mode: An alarm is triggered, if the concentration drops below or exceeds the limits of a concentration window, .
- High pre-alarm and main alarm: A pre-alarm and a main alarm are set for rising concentrations.
- Low pre-alarm and main alarm: A pre-alarm and a main alarm are set for falling concentraions.

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

Note!

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

3.9 Checking the settings

- **Defining a window**

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

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

Standard mode:

An alarm results in the assigned relay being activated.

Settings:

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

Failsafe mode:

An alarm results in the assigned relay being deactivated.

Settings:

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

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

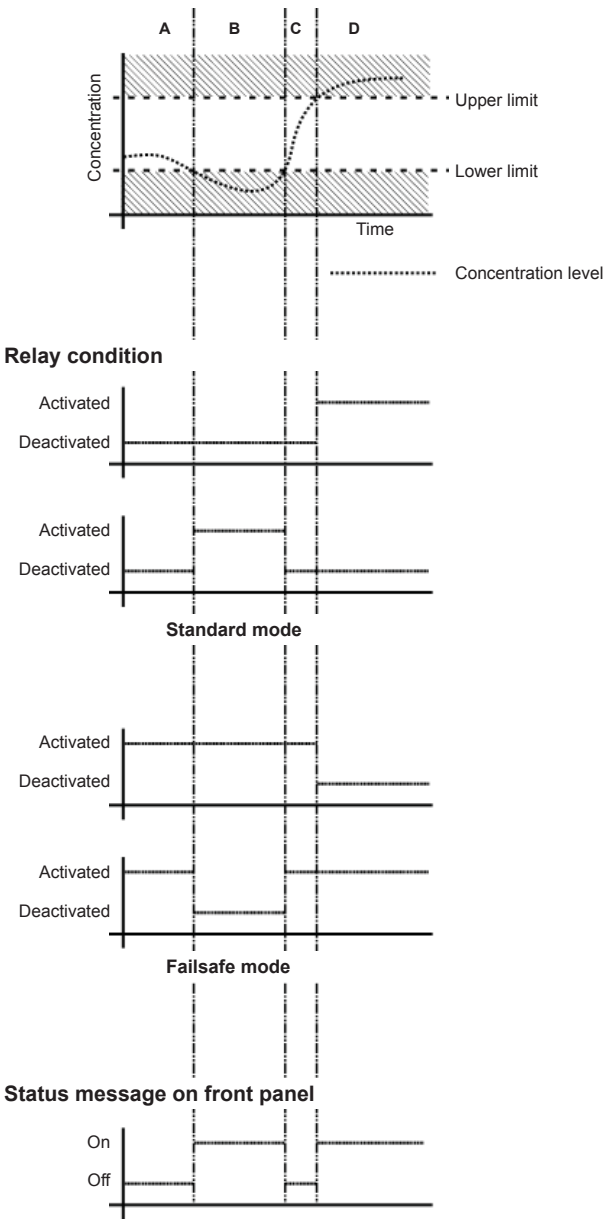


Fig. 3-5: *Limits Defining a Window for valid Concentrations*

- **Defining high pre-alarm and main alarm**

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

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

Standard mode:

An alarm results in the assigned relay being activated.

Settings:

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

Failsafe mode:

An alarm results in the assigned relay being deactivated.

Settings:

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

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

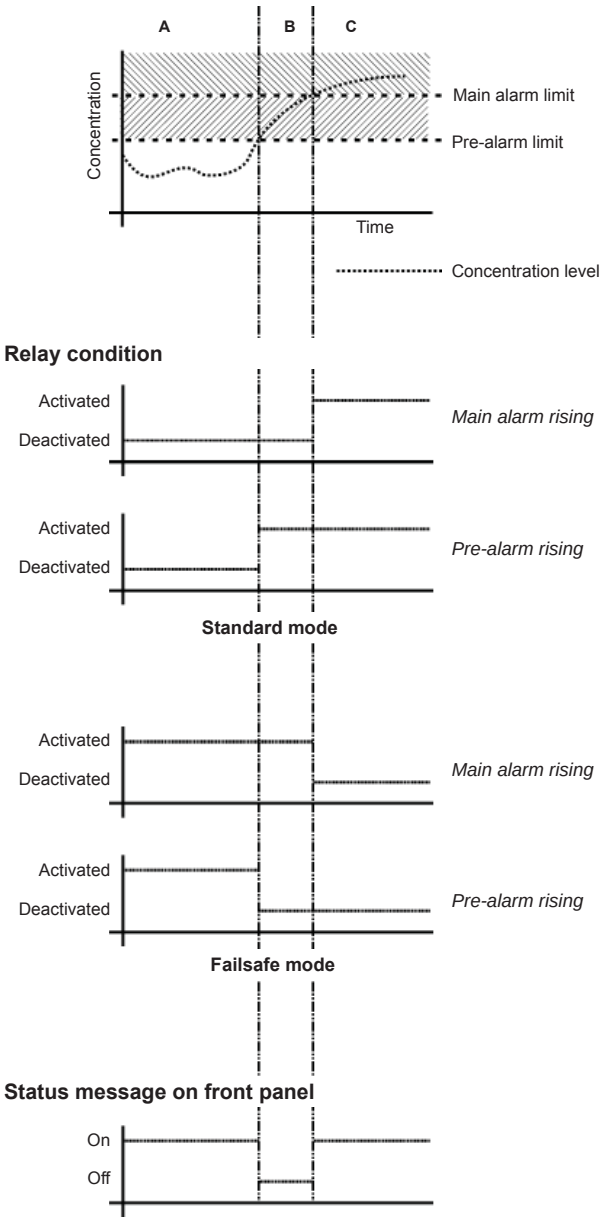


Fig. 3-6: *High Pre-Alarm and Main Alarm*

3.9 Checking the settings

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

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

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

Standard mode:

An alarm results in the assigned relay being activated.

Settings:

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

Failsafe mode:

An alarm results in the assigned relay being deactivated.

Settings:

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

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

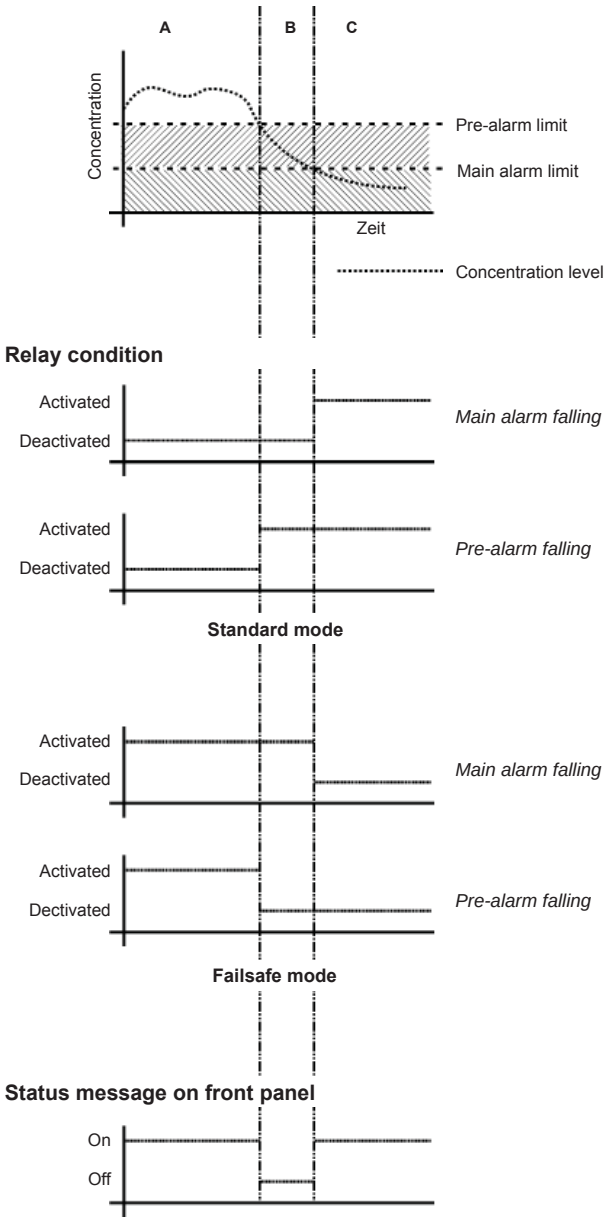


Fig. 3-7: *Low Pre-Alarm and Main Alarm*

3.9.6 Backing up the settings

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

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

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

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

Page 2

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

Page 1

Press the DOWN key to reach page 2.

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

Page 2

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

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

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

3.9 Checking the settings

```
   Copying data
  - PLEASE WAIT -

Procedure     X:E000
```

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

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

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

```
        (i)

 -COMMAND EXECUTED-
```

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

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

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

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

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

Chapter 4
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 X2 gas analyzers are subject of the gas analyzer instruction manual.

4.1 Maintenance Safety Instructions

⚠ WARNING

EXPLOSION HAZARD

Inspection, maintenance and service must only be carried out by trained personnel, considering all related standards e.g. for „Inspection and maintenance of electrical installations in hazardous areas“ or „Equipment repair, overhaul and reclamation“.

All applicable standards for servicing and maintaining equipment in hazardous areas have to be considered!

⚠ WARNING

EXPLOSION HAZARD WHEN OPEN

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.

4.1 Maintenance Safety Instructions

⚠ WARNING

EXPLOSION HAZARD BY MODIFICATION

Modifications affecting the integrity of type of protection (e.g. affixing additional threads) are NOT PERMITTED!

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

⚠ WARNING

EXPLOSION HAZARD BY REPLACED PARTS

Replacement of parts found defective is permitted only by using original parts!

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.

After maintenance or replacement of components relevant for explosion protection, an authority has to certify, that the analyzer still meets the requirements for explosion protection. A related document must be issued and/or a label be applied to the analyzer before setting into operation.

Any modifications to the device, not authorized by Emerson Process Management will void the product certification(s).

Violation voids the approvals and may cause explosions!

⚠ WARNING

HAZARDS BY GASES

When measuring flammable 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!

4.2 Maintenance Instructions

To assure instrument performance and safety, the analyzer has to be checked regularly, at least once a year.

During maintenance especially parts found relevant for explosion protection have to be taken into account. For non-incendive X-STREAM gas analyzers this particularly includes the enclosure and the corresponding gaskets. Enclosure and gaskets need to be checked for damages, and gaskets must be sufficiently tight (☞ leakage test, page 4-4).

During maintenance, the optional gas sampling pump has to be evaluated for grinding moving parts, creating sparks.

Internal connectors have to be regarded accordingly. They need to be fixed, to not produce sparks during operation.

By visual inspection of the interior of the analyzer, especially the electrical components, it must be verified that components are not overloaded. Overloaded components may become hot, and thus become a source of ignition! An indicator for overload may be discoloration.

Parts found a potential risk of hot spots, arc or sparcs must be replaced!

The user/owner has to take responsibility to modify the maintenance interval regarding the conditions at site (influence of gases or ambient atmosphere on material in contact with sample/ calibration gas or which are relevant for explosion protection [e.g. enclosure sealing]).

4.3 Gas Paths

Detailled information about maintenance, replacement of components and performing a gas paths leakage test are available in the X-STREAM X2 series general instruction manual.

4.4 Checking Modified or Repaired Analyzers

Modifications on non-incendive X-STREAM gas analyzers which influence the integrity of protection type or analyzer temperature are permissible only, if the modified analyzer are inspected by a licensed test laboratory, or if an authorized expert has evaluated the modifications.

In case of repair influencing the protection type, the repaired parts should be drawn to suitable check routines and must be controlled. These inspections need not necessarily to be carried out by EMERSON Process Management, but can also be performed by local trained service personnel.

Local regulations may require to apply additional markings to repaired equipment in hazardous areas!

4.4.1 Enclosure Leakage Test

4.4.1.1 Preparation

Required Tools:

- Pressure gauge with a measuring range of 50 to 100 mbar (0.7 to 1.5 psig; resolution of 0.1 mbar/ 0.0015 psig).
- Flow meter with a measuring range of 5 to 10 l/min; resolution of 0.1 l/min.
- Span gas: Instrumental air or nitrogen; pressure reduced to 1.500 mbar (22 psig).
- Pressure regulator to reduce pressure to 25 mbar (0.4 psig)
- Equipment for flow control
- 1 plug to shut off the gas outlet (size: 6 mm / ¼“)

To run the test procedure, the following preparations have to be encountered:

- Disconnect from power, or de-energize the analyzer.
- Disconnect containment system fittings from external gas pipes.
- Disconnect one containment system gas fitting inside the analyzer and close the other fitting.

  Note:

  Now it need to be possible to pressurize the housing supplying an external gas (e.g. compressed air) to the gas inlet.
- Supply compressed air from an external source as described in Section 4.3.1.2 on the following page.

The compressed air must be dry and free from dust, oil and corrosive components!

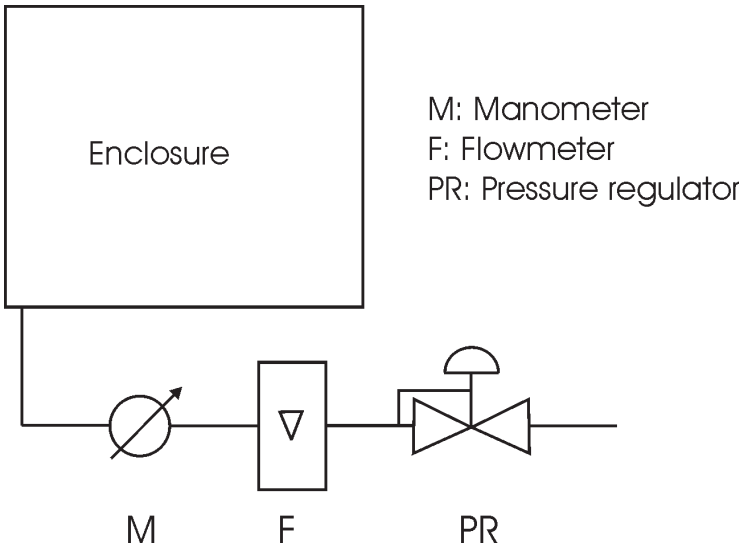


Fig. 4-1: *Assembly for Check Routines*

4.4.1.2 Run Leakage Test

The housing needs to be controlled on leakages with a pressure of 25 mbar (0.4 psig). The following steps have to be provided:

- Modify like described on Section 4.3.1.1.
- Supply a pressure of 25 mbar to the analyzer housing and take care of the flow meter display.

The test is passed, if the measured value does not exceed the following max. value:

Permissible flow: 3 l/min max.

4.4.1.3 Startup After Test Procedure

All modifications described in Section 4.3.1.1 have to be cancelled.

Especially the gas fittings‘ tight assemblies need to be checked.

4.5 Replacement of Parts

⚠ WARNING

EXPLOSION HAZARD BY REPLACEMENT OF PARTS

Replacement of parts important for explosion protection found defective is permitted only by using original parts!

Violation voids the approvals and may cause explosions!

Parts, important for the safety of non-incendive X-STREAM gas analyzers:

Optional internal gas sampling pump	Type: 113.095.100.0 Supplier: ASF Thomas, WISA Spare part #: 90002983
Relays (soldered on circuit boards, not to be replaced by the user. These components must not be exchanged individually!)	Several types and manufacturers
All internal connections and screw terminals	Several types and manufacturers
Fuses	Data: T 6,3 A; 250V Type: 215 (5x20 mm) Supplier: Wickmann / Littlefuse Spare part #: ETC00192
Power terminals and fuse holder	Type: UK 5 - HESI Supplier: Phoenix Spare part #: ETC00941
Cable glands	Type: HSK-M-EMV-Ex Supplier: Hummel Elektrotechnik ⟨Ex⟩ II 2G 1D Ex e II tD A20 Spare part #: ETC00788
Cable glands sealing plug	Type: HSK-V-Ex Supplier: Hummel Elektrotechnik ⟨Ex⟩ II 2G 1D Ex e II tD A20 IP68 Spare part #: ETC00791
Hexagon socket screw for unused cable entries	Type: V-Ms-FPM-Ex M20x1,5 Supplier: Hummel Elektrotechnik ⟨Ex⟩ II 2G 1D Ex e II tD A20 IP68 Spare part #: ETC00790

4.6 Perform a Calibration

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

Note!

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

Also, a span calibration must always be preceded by a zero calibration!

Zero calibration

To perform a zero calibration supply either nitrogen (N_2) or another suitable zero gas [conditioned ambient air or industrial air (NOT for oxygen measurement!)] to the gas path. The concentration of the component of interest is specified as set point and during zero calibration, the actual value is assigned this concentration

Span calibration

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

Note!

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

4.6 Perform a Calibration

⚠ CAUTION

OPERATION AT LOW TEMPERATURES

When operating an instrument at temperatures below 0 °C (32 °F), do NOT apply gas nor operate the 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 (tO_2) 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 (tH_2O)!

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

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

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

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

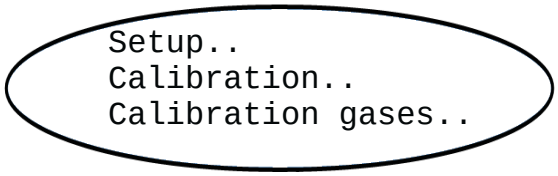
Supply all calibration gases with the same flow and pressure as the sample gas (recommended: approx. 1 l/min), and utilizing the correct gas fitting.

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

4.6 Perform a Calibration

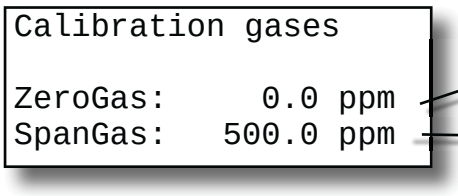
4.6.1 Preparing Calibrations

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



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

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



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

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

Note!

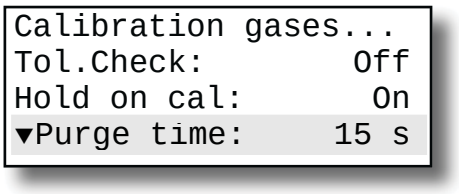
The units for the calibration gases are taken from the related entry in the display setup menu.

Multi-channel unit:

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

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

4.6 Perform a Calibration



Example:

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

Situation:

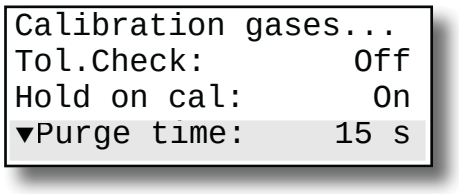
Due to a fault zero gas is supplied to carry out a span calibration, instead of span gas.

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.

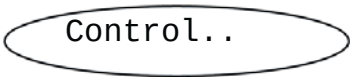
The 3rd option (**AutoOff**) has the same functionality as **10%** except that the maintenance request is reset after 2-3 minutes.

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**.

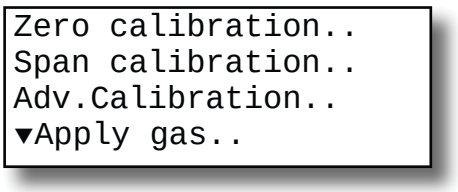
Note!

*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..*

4.6.2 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:

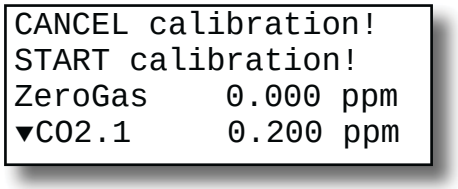
4.6.2.1 Manual Zero Calibration

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

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

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

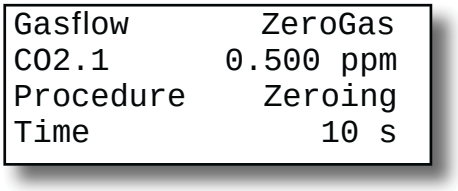
Ensure the warm-up time after switching on has elapsed! Warm-up time is 15 to 50 minutes depending on installed measuring system and configuration!



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

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

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



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

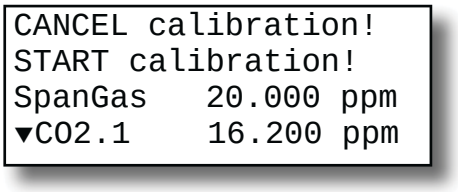
the CONTROL.. menu, which allows you to start a span calibration. The procedure and screens look similiar to those of a zero calibration:

4.6.2.2 Manual Span Calibration

Select SPAN CALIBRATION...

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

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

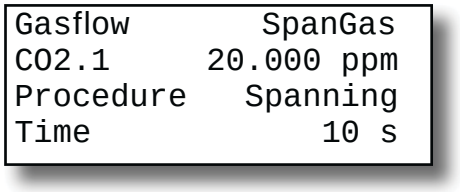


The first line gives you the choice to immediately cancel the procedure.

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

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

4.6 Perform a Calibration



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 field housings, intended for outside and wall mounted use, weigh between 26 kg (57 lb) and 45 kg (99 lb) depending on options installed.

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 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 (N_2) to avoid danger from escaping toxic, flammable, explosive or hazardous gases.

When the instrument has reached the end of its useful life, do not dispose of it together with general domestic waste!

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 the X-STREAM X2 instruction manual for information on dismounting and disposal of analyzers.

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
- fill out the Declaration of Decontamination (☞ A-21) 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 CSA Certificate of Compliance

Certificate of Compliance

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

Project: 2607135 **Date Issued:** March 13, 2013

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

James Lim

Issued by: James Lim

PRODUCTS

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

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.1 CSA Certificate of Compliance

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

Project: 2607135 **Date Issued:** March 13, 2013

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.1 CSA Certificate of Compliance

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

Project: 2607135 **Date Issued:** March 13, 2013

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.1 CSA Certificate of Compliance

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

Project: 2607135 **Date Issued:** March 13, 2013

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 or 4

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.1 CSA Certificate of Compliance

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

Project: 2607135 **Date Issued:** March 13, 2013

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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, 15 or 16

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 = Bench 5: any combination of 2 or 3 alpha-numeric characters

m = Bench 5 - Special Linearization or Calibration: 0, 1, 2, 3, A, B, C or D

A.1 CSA Certificate of Compliance

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

Project: 2607135 **Date Issued:** March 13, 2013

n = Enclosure: 1, 2, 3, or 4

o = 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")

p = Analog Outputs: 1, 2, 3 or 4 or 5

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

r = Communication Interface: 0, A, B or C

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

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

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

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

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

x = 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

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A.1 CSA Certificate of Compliance

Certificate:	1714037 (LR 105173)	**Master Contract:**	185562
Project:	2607135	**Date Issued:**	March 13, 2013

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

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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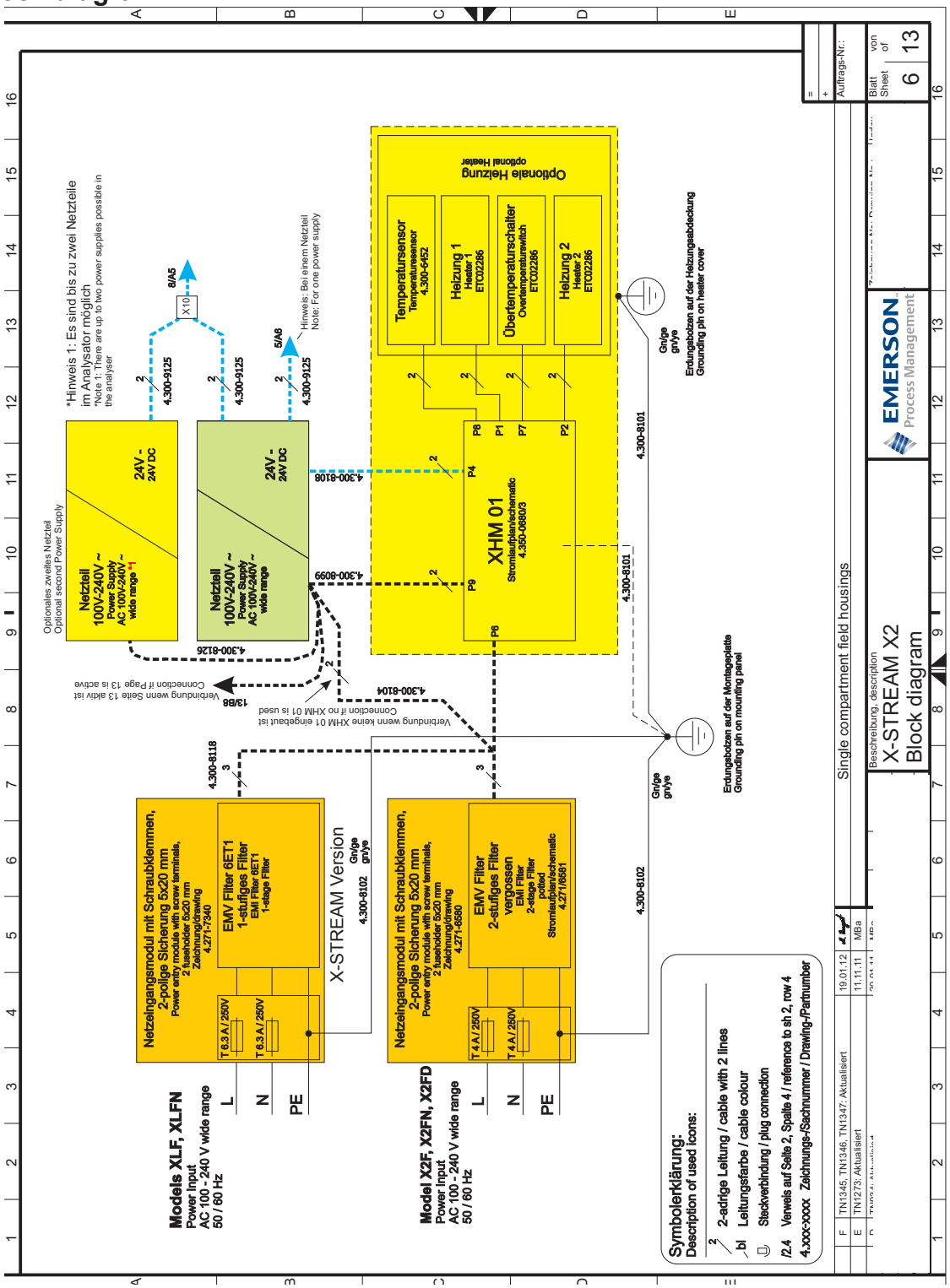
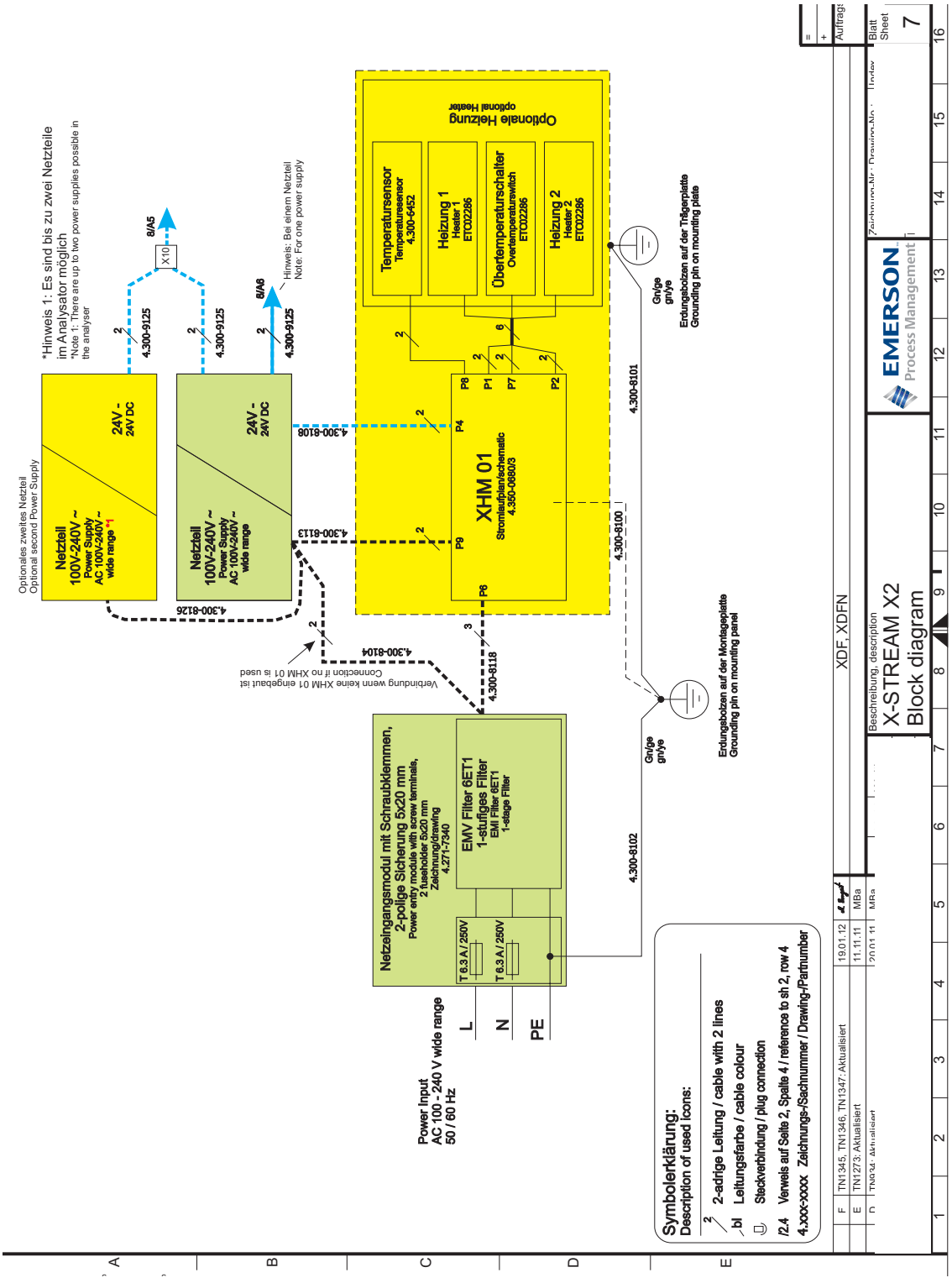
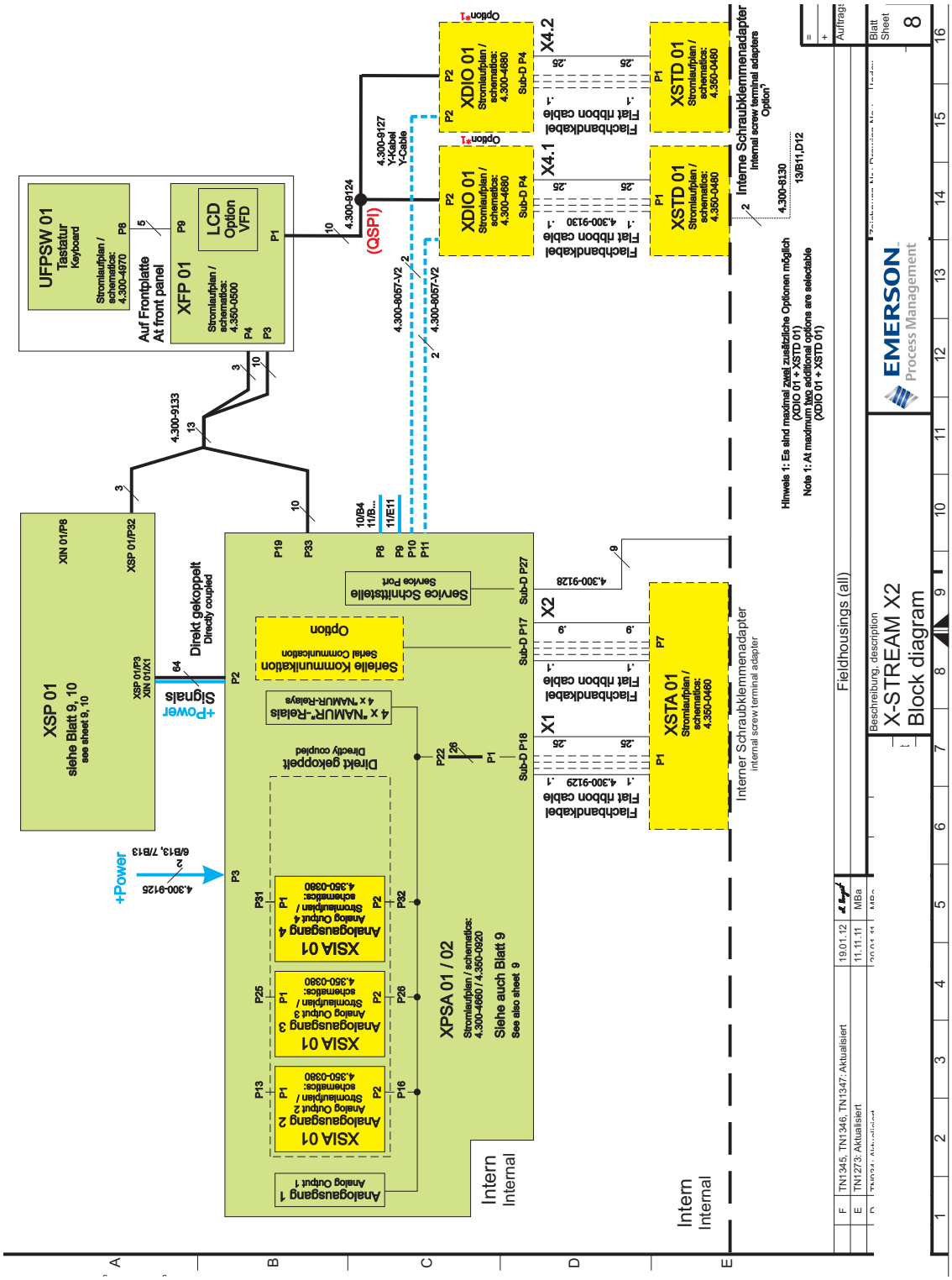
A.2 Block diagram



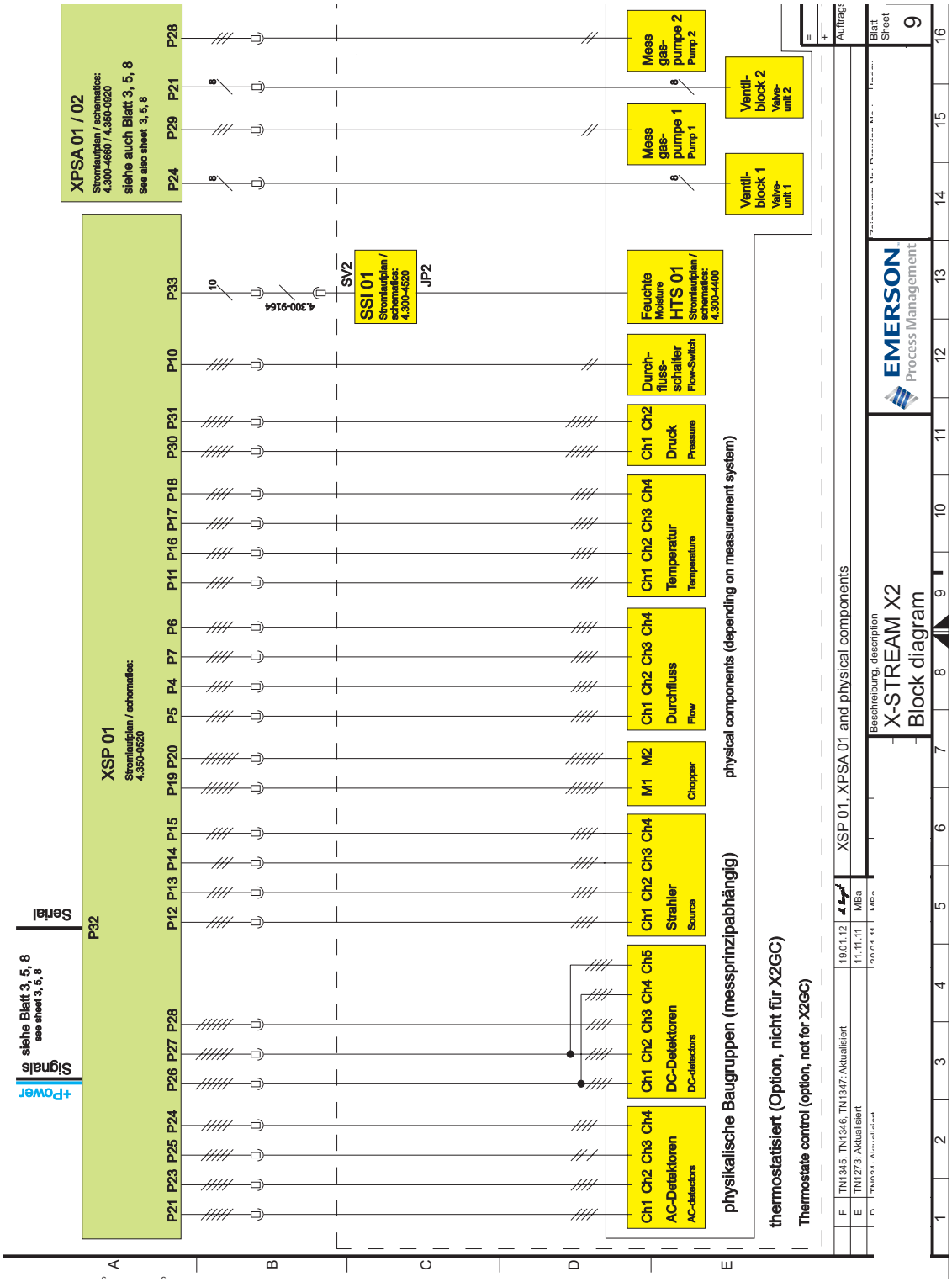
A.2 Block Diagram



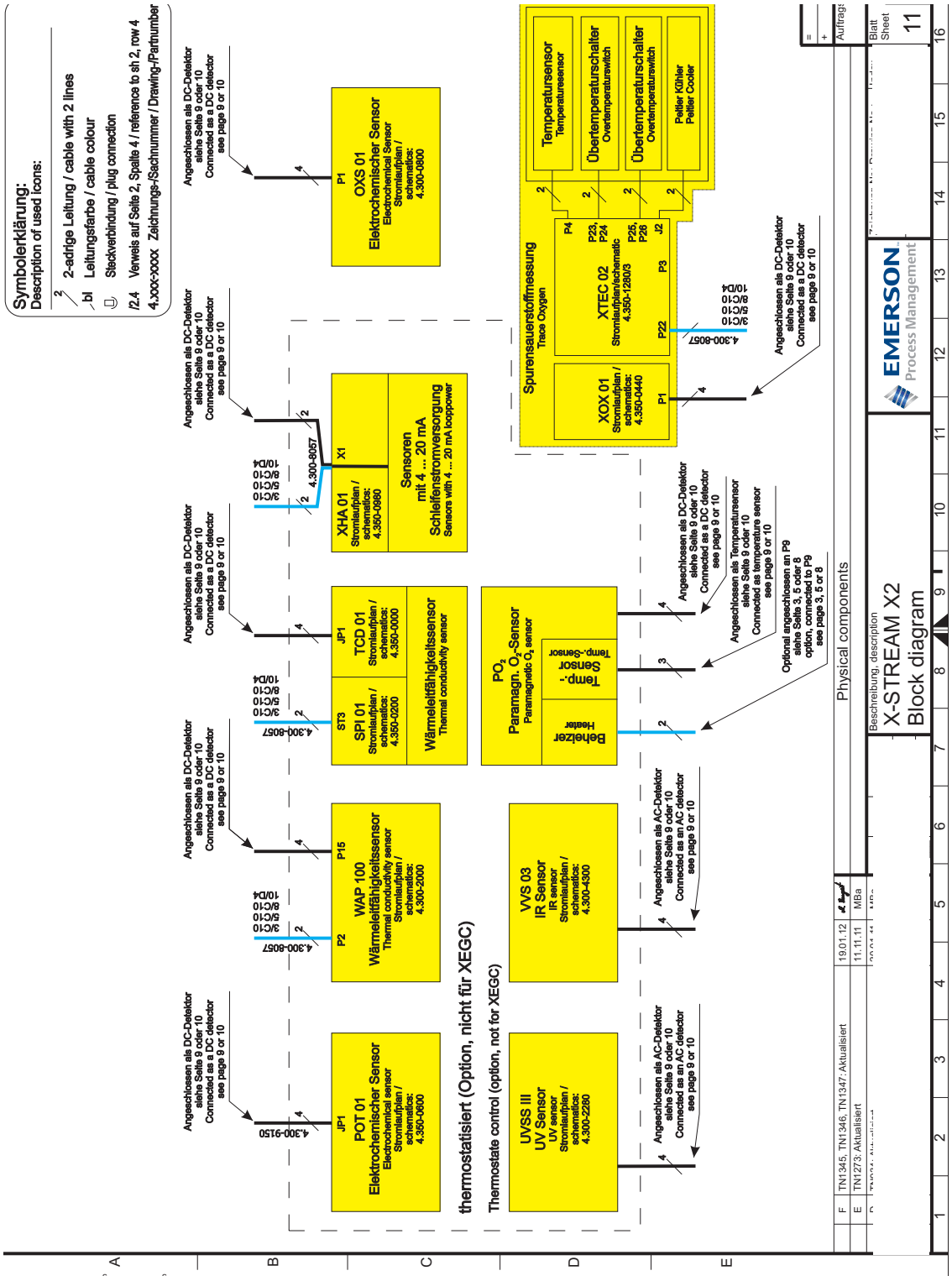
A.2 Block Diagram



A.2 Block Diagram



A.2 Block Diagram



A.3 Declaration of Decontamination

Because of legal regulations and for the safety of Emerson Process Management employees and operating equipment, we need this **"Declaration of Decontamination"**, signed by an authorized person, prior to processing your order. Ensure to include it with the shipping documents, or (recommended) attach it to the outside of the packaging.

Instrument details	Analyzer model	
	Serial no.	
Process details	Temperature	
	Pressure	

Please check where applicable, include safety data sheet and, if necessary, special handling instructions!

The medium was used for	Medium and concentration	CAS No.	 toxic	 harmful	 corrosive	 flammable	 other[1]	 harmless
Process								
Process cleaning								
Cleaning of returned parts								

[1] e.g. explosive, radioactive, environmentally hazardous, of biological risk, etc.

Declaration and Sender Data

We hereby declare that the retumed parts have been carefully cleaned. To the best of our knowledge they are free from any residues in dangerous quantities.

Company

Address

Location, Date

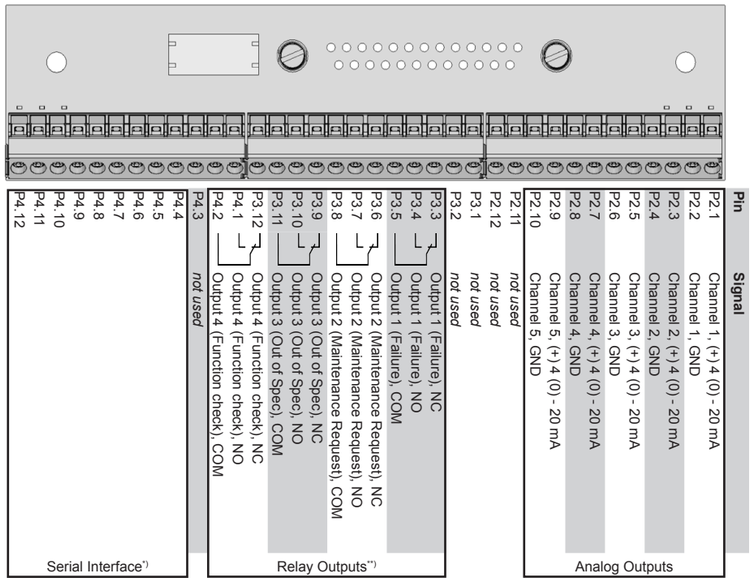
Contact Person / Function

Phone

Signature

A.7 Assignment of Plugs and Terminals

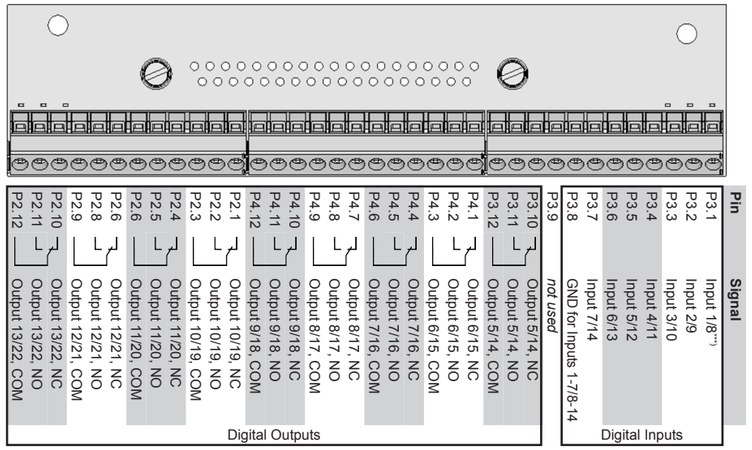
XSTA: Standard strip with standard and optional signals



*) See table below

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

XSTD: Optional strips with
7 Dig Inputs and 9 Dig Outputs each

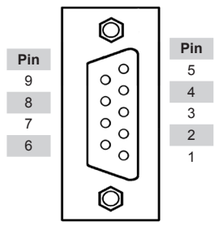


***) 1st /2nd no. identifies inputs/outputs on the 1st /2nd expansion board

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*

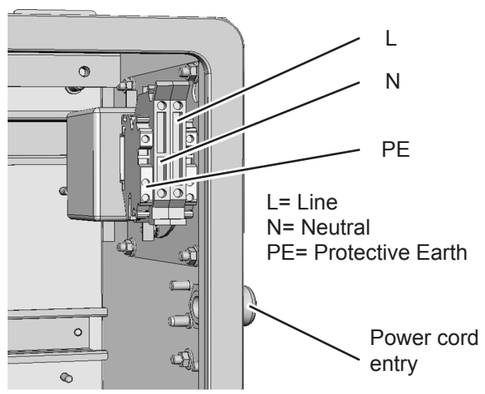
Signal Terminals Strips



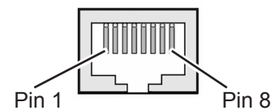
Pin no.	RS 232
1	Common
2	RXD
3	TXD
4	*not used*
5	Common
6	*not used*
7	*not used*
8	*not used*
9	*not used*

Service Port Connector - Serial RS 232 interface

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

Instruction Manual
HASX2NE-IM-EX
12/2014

X-STREAM Non-Incendive

Emerson Process Management GmbH & Co. OHG

X-STREAM Non-Incendive

Instruction Manual
HASX2NE-IM-EX
12/2014

http://twitter.com/raihome

http://www.analyticexpert.com

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