

X-STREAM

X2FD - Flameproof Gas Analyzer

- Up to four component gas analyzer featuring NDIR/UV/VIS photometer, paramagnetic and electrochemical O₂, thermal conductivity and moisture sensors
- Enhanced performance with IntrinzX technology
- Wall mountable NEMA 4X/IP66 painted cast aluminum housing enabling extended ambient temperature range of -20 to +50 °C (-4 to +122 °F)
- Plantweb connectivity and WinControl data acquisition



X-STREAM X2FD - Flameproof Gas Analyzer

XTR WinControl



Features

The X-STREAM flameproof analyzer provides powerful analytical technology in a wall mountable NEMA 4X/IP66 cast aluminum housing. Worldwide approvals enable operation in Class I, Zone 1, Group IIB+H₂ and Class I Division 2 BCD hazardous areas.

Flexibility

The X-STREAM platform enables the combination of up to four channels of non-dispersive infrared, ultraviolet, visible photometers (NDIR/UV/VIS), thermal conductivity (TCD), trace moisture (tH₂O), paramagnetic and electrochemical oxygen (pO₂/eO₂) detectors and sensors.

Performance

With the X-STREAM photometer technology, the analyzer provides a measuring accuracy that allows improving your process while also reducing the total cost of ownership by:

- Large dynamic ranges
- Very low temperature dependency
- Outstanding long-term stability
- Simplified calibration

Communication

X-STREAM analyzers provide four status signal relay outputs (according to NAMUR NE 107), MODBUS TCP protocol over Ethernet and RTU over serial (RS232/485) communication.

The X-STREAM X2 analyzer provides:

- One to four analog outputs
- Optional digital inputs and relay outputs
- Serial interface with Modbus communication
- Easy integration into DeltaV systems
A pre-engineered DeltaV module features easy integration of X-STREAM X2 into your DeltaV environment via ModbusRTU over serial interface. ProfibusDP is also supported when using a ModbusRTU-ProfibusDP gateway.
- Data acquisition with XTR WinControl
This optional PC software supports online and offline data processing as well as data export to external devices. Calculator channels enable extended processing capabilities for measurement data. The configurable user interface enables visualization of sampling points by including a plant image as background for measured values.

Ease of Use

The instrument has a LCD or VFD alphanumeric display and is operated manually by six keys. Clear text messages (available in five languages) and front panel LEDs provide information about the measurement and analyzer status.

Options in a Flameproof Enclosure

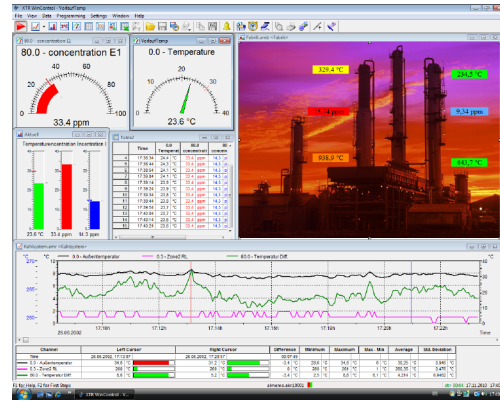
- Sample gas pump
- Flow measurement and alarm
- Valve block
- Pressure sensor
- Digital Input/Output cards

Worldwide Approvals

Worldwide type approvals (incl. ATEX, CSA-C/US and IECEx) allow global installation of X-STREAM flameproof analyzers in Zone 1 and Division 2 hazardous areas without the need for pressurization systems. The X2FD is only available for non-flammable sample gas.

Applications

- Refining petrochemical and chemical process analysis and control
- Ammonia and fertilizer production
- Gas purity and air separation units

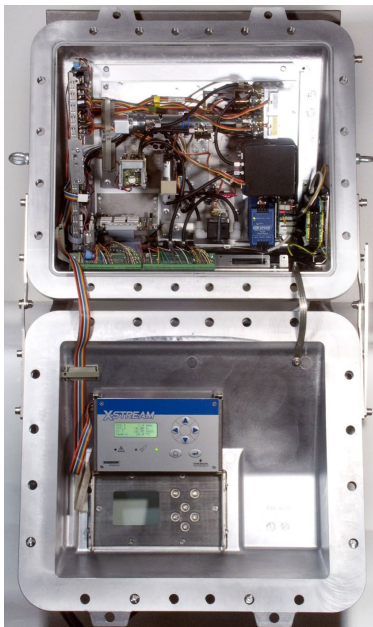


XTR WinControl: Data acquisition with configurable layout.

Process-approved Sensors

Solvent-resistant, corrosion-resistant, and infallible containment solutions are available.

- LEL detection
- Metallurgical manufacturing, hardening, and heat treatment processes
- Emission monitoring



Interior view, showing 1 NDIR bench, 1 NDUV bench, 1 paramagnetic O₂ cell, thermostatic control (cover removed), analog and relay outputs, digital inputs, and serial interface.



The alphanumeric display of the X-STREAM X2 provides measurement and status information with plain text on either an LCD or VFD, supported by LEDs.

The user interface remains operable with door open (see left image).

Specifications

Lowest and Highest Ranges Available for Different Gases (Excerpt)

In total, the X-STREAM family of process gas analyzers can detect more than 60 gases. The following table is an excerpt, showing the most commonly used gases. Contact your Emerson representative for information on configurations or gases that are not listed.

Table 1 Gas Components and Measuring Ranges, Examples

Gas component		Principle	Special Specs or Conditions	Standard Specs (Table 2 – 4)	
			Lowest Range	Lowest Range	Highest Range
Acetone ¹	CH ₃ COCH ₃	UV		0–400 ppm	0–3%
Acetone ¹	CH ₃ COCH ₃	IR		0–500 ppm	0–3%
Ammonia	NH ₃	IR		0–100 ppm	0–100%
Argon	Ar	TCD		0–50%	0–100%
Carbon dioxide	CO ₂	IR	0–5 ppm ⁵	0–50 ppm	0–100%
Carbon monoxide	CO	IR	0–10 ppm ⁵	0–50 ppm	0–100%
Chlorine	Cl ₂	UV		0–300 ppm	0–100%
Ethane	C ₂ H ₆	IR		0–1 000 ppm	0–100%
Ethanol ¹	C ₂ H ₅ OH	IR		0–1 000 ppm	0–10%
Ethylene	C ₂ H ₄	IR		0–400 ppm	0–100%
Helium	He	TCD		0–10%	0–100%
Hexane ¹	C ₆ H ₁₄	IR		0–100 ppm	0–10 %
Hydrogen ⁴	H ₂	TCD		0–1%	0–100%
Hydrogen Sulfide	H ₂ S	UV		0–2%	0–10%
Hydrogen Sulfide	H ₂ S	IR		0–10%	0–100%
Methane	CH ₄	IR		0–100 ppm	0–100%
Methanol ¹	CH ₃ OH	IR		0–1 000 ppm	0–10%
n-Butane	C ₄ H ₁₀	IR		0–800 ppm	0–100%
Nitrogen dioxide ¹	NO ₂	UV	0–25 ppm ³	0–100 ppm	0–10%
Nitrogen monoxide	NO	IR	0–100 ppm ³	0–250 ppm	0–100%
Nitrous oxide	N ₂ O	IR		0–100 ppm	0–100%
Oxygen	O ₂	Electrochem.		0–5%	0–25% ²
Oxygen	O ₂	Paramagn.		0–1%	0–25%
Propane	C ₃ H ₈	IR		0–1 000 ppm	0–100%
Propylene	C ₃ H ₆	IR		0–400 ppm	0–100%
Sulfur dioxide	SO ₂	UV	0–25 ppm ³	0–130 ppm	0–1%
Sulfur dioxide	SO ₂	IR		0–1%	0–100%
Sulfur hexafluoride	SF ₆	IR	0–5 ppm ³	0–20 ppm	0–2%
Toluene ¹	C ₇ H ₈	UV		0–300 ppm	0–5%
Vinyl chloride	C ₂ H ₃ Cl	IR		0–1 000 ppm	0–2%
Water vapor ¹	H ₂ O	IR		0–1 000 ppm	0–8%
Water vapor, trace ¹	H ₂ O	Capacitive		0–100 ppm	0–3 000 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% H₂ in N₂ available.

⁵ See Table 5.

Standard Performance Specifications

Table 2 NDIR/UV/VIS, TCD – Standard Measurement Performance Specifications

	NDIR/UV/VIS	Thermal conductivity (TCD)
Detection limit (4σ) ^{1 4}	≤ 1 %	≤ 1 %
Linearity ^{1 4}	≤ 1 %	≤ 1 %
Zero-point drift ^{1 4}	≤ 2 % per week	≤ 2 % per week
Span (sensitivity) drift ^{1 4}	≤ 0.5 % per week	≤ 1 % per week
Repeatability ^{1 4}	≤ 1 %	≤ 1 %
Response time (t_{90}) ³	4 s ≤ t_{90} ≤ 7 s ⁵	15 s ≤ t_{90} ≤ 30 s ⁶
Permissible gas flow	0.2–1.5 l/min.	0.2–1.5 l/min. ¹²
Influence of gas flow ^{1 4}	≤ 0.5 %	≤ 1 % ¹²
Maximum gas pressure ^{8 9}	≤ 1 500 hPa abs. (≤ 7 psig)	≤ 1 500 hPa abs. (≤ 7 psig)
Influence of pressure ²		
– At constant temperature	≤ 0.10 % per hPa	≤ 0.10 % per hPa
– With pressure compensation ⁷	≤ 0.01 % per hPa	≤ 0.01 % per hPa
Permissible ambient temperature ¹⁰	0 (-20) to +50 °C (32 (-4) to 122 °F)	0 (-20) to +50 °C (32 (-4) to 122 °F)
Influence of temperature ^{1 14} (at constant pressure)		
– On zero point	≤ 1 % per 10 K	≤ 1 % per 10 K
– On span (sensitivity)	≤ 5 % (0 to 50 °C / 32 to 122 °F)	≤ 1 % per 10 K
Thermostat control ^{6 13}	none / 60 °C (140 °F) ⁵	none / 60 °C (140 °F) ¹¹
Warm-up time ⁶	15 to 50 minutes ⁵	approx. 50 minutes

Note! 1 psi = 68.95 hPa

¹ Related to full scale.

² Related to measuring value.

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

⁴ Constant pressure and temperature.

⁵ Dependent on integrated photometer bench.

⁶ Depending on measuring range.

⁷ Pressure sensor is required.

⁸ Special conditions for > 1 100 hPa abs.

⁹ Limited to atmospheric if internal sample pump.

¹⁰ Temperatures below 0 °C (-4 °F) with thermostat control only.

¹¹ Thermost. controlled sensor: 75 °C (167 °F).

¹² Flow variation within ± 0.1 l/min.

¹³ Optional thermostat controlled box with temperature 60 °C (140 °F).

¹⁴ Temperature variation: ≤ 10 K per hour.

Table 3 Trace Moisture – Standard Measurement Performance Specifications

	Trace moisture (tH ₂ O)
Measurement range	-100 to -10 °C dew point (0–100...3000 ppm)
Measurement accuracy	±2 °C dew point
Repeatability	0.5 °C dew point
Response time (t_{95})	5 min (dry to wet)
Operating humidity	0 to 100 % relative humidity (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. 1 500 hPa abs / 7 psig ²
Flow rate	Depending on sequential measurement system, see analyzer specification ¹ 0.2 to 1.5 l/min

Note: 1 psi = 68.95 hPa

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

² Special conditions for > 1 100 hPa abs.

Table 4 Oxygen – Standard Measurement Performance 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% ¹¹	≤ 2%
Maximum gas pressure ^{7 8}	≤ 1 500 hPa abs. (≤ 7 psig) ¹⁴	≤ 1 500 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 ⁹	0(-20) to 50 °C (32 (4) to 122 °F)	5 to 45 °C (41 to 113 °F)
Influence of temperature ^{1 13} (at constant pressure)		
– On zero point	≤ 1% per 10 K	≤ 1% per 10 K
– On span (sensitivity)	≤ 1% per 10 K	≤ 1% per 10 K
Thermostat control	60 °C (140 °F) ¹²	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 Reserved for future use.

⁶ Pressure sensor is required.

⁷ Special conditions for > 1 100 hPa abs.

⁸ Limited to atmospheric if internal sample pump.

⁹ Temperatures below 0 °C (-4 °F) with thermostat control only.

¹⁰ Thermost. controlled sensor: 35 °C (95 °F).

¹¹ For ranges 0–5...100% and flow 0.5...1.5 l/min.

¹² Optional thermostat controlled sensor with temperature 60 °C (140 °F).

¹³ Temperature variation: ≤ 10 K per hour.

¹⁴ No sudden pressure surge allowed.

Note 1

Note all data listed are applicable to all analyzer versions (e.g., 60 °C thermostat controlled box is not available for electrochemical 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. To fix this issue, purge the housing with gas not containing the component of interest.

Note 3

Measurement principles or composition of sample gas may limit the available options for a specific analyzer configuration concerning, e. g. ,sample handling options or tubing materials.

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

Table 5 Special Performance Specifications for Gas Purity Measurements

	0–10...< 50 ppm CO	0–5...< 50 ppm CO ₂
Detection limit (4σ) ^{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	≤ 1 500 hPa abs. (≤ 7 psig)	
Influence of pressure ⁵	≤ 0.1 % per hPa	
– At constant temperature	≤ 0.01 % per hPa	
– With pressure compensation ⁸		
Permissible ambient temperature	15 to 35 °C (59 to 95 °F)	5 to 40 °C (41 to 104 °F)
Influence of temperature ⁶ (at constant pressure)		
– On zero point	< 2% per 10 K resp. < 0.2 ppm per 10 K ⁹	
– On span (sensitivity)	< 2% per 10 K resp. < 0.2 ppm per 10 K ⁹	
Thermostat control	none	60 °C (140 °F)

Note: 1 psi = 68.95 hPa

¹ Related to full scale.

² Constant pressure and temperature.

³ Within 24 h; daily zero calibration requested.

⁴ Within 24 h; daily span calibration recommended.

⁵ Related to measuring value.

⁶ Temperature variation: ≤ 10 K per hour.

⁷ From gas analyzer inlet at gas flow of 1.0 l/min.

⁸ Barometric pressure sensor is required.

⁹ Whichever value is higher.

¹⁰ Limited to atmospheric if internal sample pump; special conditions for > 1 100 hPa abs.

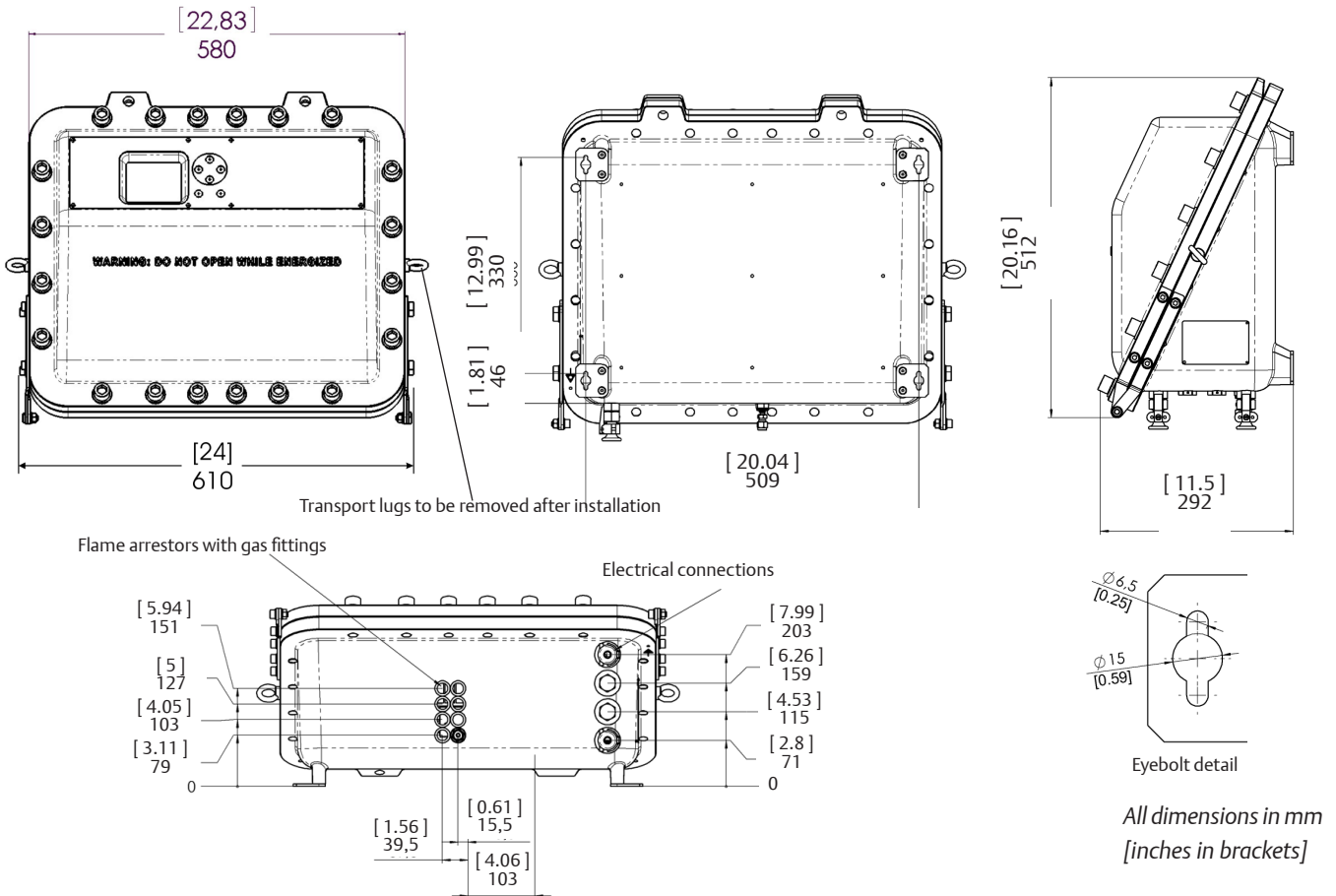
General Specifications

Compliances	ATEX, IECEx	CSA-C/US	EAC TC RU	KGS	C-TICK	NAMUR
Gas connections	Stainless steel: 6/4 mm or 1/4 in.; for more options c.f.					
Sample gas pressure	max. 1 100 hPa (1.45 psig); with special option max. 1 500 hPa (7.25 psig)					
Rated voltage	100–240 V~, 50/60 Hz					
Rated input current	3–1.5 A					
Cable inlets	ATEX, IECEx, GOST, KGS: Certified cable glands / blanking elements CSA: Certified adapters for conduits (3/4 in. NPT) / blanking elements					
Electrical connections	Screw terminals, RJ45					
Enclosure protection	Type 4X; IP 66 acc. EN 60529 for outdoor installation, protected against direct sunlight					
Ambient temperature range	-20 to +55 °C (-4 to +131 °F)					
Humidity (non-condensing)	< 90 % r.h. @ 20 °C (68 °F) < 70 % r.h. @ 40 °C (104 °F)					
Weight	Up to 63 kg (139 lbs) depending on configuration					
Options	Integrated flow measurement(s) with alarm(s), barometric pressure sensor, thermostatically controlled box for physical components (60 °C / 140 °F), case purge, sampling pump(s) and/or solenoid valve block(s) for autocalibration					

Signal In- & Outputs, Interfaces

Analog signal outputs:	1–4, individually optically isolated 4(0)–20 mA ($R_b \leq 500 \Omega$) 1 as standard, 2–4 as option
Relay outputs:	4 status relays acc. NAMUR NE 107 or e.g. concentration thresholds, valve status notification dry contacts: 1 A, 30 V
Communication interface:	RS 485 / 232C with Modbus RTU optional: Ethernet with Modbus TCP
Digital I/O (optional):	7/14 digital inputs (for remote control); max. 30 Vdc, 2.3 mA, common ground 9/18 additional relay outputs (e.g. concentration thresholds, valve status notification, flow alarm, range ID) dry contacts: 1 A, 30 V

Dimensions






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