

# X-STREAM Enhanced XEFD - Flameproof Gas Analyzer

- Up to five component gas analyzer featuring NDIR/UV/VIS photometer, paramagnetic and electrochemical O<sub>2</sub>, thermal conductivity, and moisture sensors
- Enhanced performance with IntrinzX technology
- Modern communication capabilities including web-browser accessibility
- Outstanding reliability with a three-year warranty



X-STREAM Enhanced XEFD - Flameproof Gas Analyzer



## Features

The X-STREAM Enhanced 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+H<sub>2</sub> and Class I Division 2 BCD hazardous areas.

## Analytical Flexibility

The X-STREAM platform enables the combination of up to five channels of non-dispersive infrared, ultraviolet, visible photometers (NDIR/UV/VIS), thermal conductivity (TCD), trace moisture (tH<sub>2</sub>O), paramagnetic and electrochemical oxygen (pO<sub>2</sub>/eO<sub>2</sub>) detectors.

## Enhanced 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

## Three-Year Warranty

All important parts and the complete analyzer are run through a variety of test procedures, including long-term stability and temperature behavior. This enables us to provide a three-year warranty for the analyzer, excluding sample-wetted parts and externally connected electronics.

## Modern Communication

The X-STREAM Enhanced offers a unique web-browser interface that features:

- World wide access through the Internet without installation of additional software
- E-mail notification of alarms and events or with daily reports
- Complete remote configuration

X-STREAM Enhanced analyzers provide four status signal relay outputs (according to NAMUR NE 107), MODBUS TCP protocol over Ethernet and RTU over serial (RS232/485) communication. Onboard SD card and USB ports enable storage of:

- Data, calibration and event logger files
- Analyzer configuration file

A pre-engineered DeltaV module features easy integration into your DeltaV environment via ModbusRTU over serial interface. ProfibusDP is also supported by a ModbusRTU-ProfibusDP gateway.

## Tools

The X-STREAM Enhanced analyzer software provides several tools to make complex process systems easier and avoid additional expenses for third-party equipment:

- Programmable logic controller (PLC) for control of sample handling and sample lines
- Calculator for virtual measurements
- Analog inputs for integrating external measurements into the powerful X-STREAM Enhanced environment

## Ease of Use

The instrument has an graphic display and is operated manually by six keys. Clear text messages (available in several languages) and industry-standard symbols provide information about the measurement and the analyzer status.

## Options in a Flameproof Enclosure

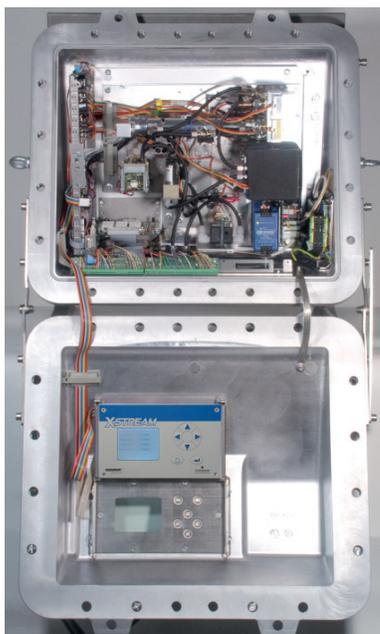
- Sample gas pump
- Flow measurement with alarm
- Valve block
- Pressure sensor
- Digital input/output cards
- Analog input card

## 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.

## Applications

- Refining petrochemical and chemical process analysis and control
- Hydrogen, ammonia and fertilizer production
- Gas purity and air separation units
- Natural gas production and distribution
- Metallurgical manufacturing, hardening and heat treatment processes
- Biogas and landfill
- Safety measurements for flammable mixtures
- Hydrogen cooling of gas turbines



Interior view, showing one NDIR bench, one NDUV bench, one paramagnetic O<sub>2</sub> cell, thermostatic control (cover removed), analog and relay outputs, digital inputs, and a serial interface.



Web browser showing measured concentrations and secondaries.

## Process-approved Sensors

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



The enlarged graphic display of the X-STREAM Enhanced provides measurement and status information with plain text and symbols.

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 example of 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)	Enhanced Specs (Table 2 & 4)	
			Lowest Range	Lowest Range	Lowest Range	Highest Range
Acetone <sup>1</sup>	CH <sub>3</sub> COCH <sub>3</sub>	UV		0-400 ppm	0-800 ppm	0-3 %
Acetone <sup>1</sup>	CH <sub>3</sub> COCH <sub>3</sub>	IR		0-500 ppm	0-1000 ppm	0-3 %
Acetylene	C <sub>2</sub> H <sub>2</sub>	IR		0-3 %	0-6 %	0-100 %
Ammonia	NH <sub>3</sub>	IR		0-100 ppm	0-200 ppm	0-100 %
Argon	Ar	TCD		0-50 %	0-100 %	0-100 %
Carbon dioxide	CO <sub>2</sub>	IR	0-5 ppm <sup>5</sup>	0-50 ppm	0-100 ppm	0-100 %
Carbon monoxide	CO	IR	0-10 ppm <sup>5</sup>	0-50 ppm	0-100 ppm	0-100 %
Chlorine	Cl <sub>2</sub>	UV		0-300 ppm	0-600 ppm	0-100 %
Ethane	C <sub>2</sub> H <sub>6</sub>	IR		0-1000 ppm	0-2000 ppm	0-100 %
Ethanol <sup>1</sup>	C <sub>2</sub> H <sub>5</sub> OH	IR		0-1000 ppm	0-2000 ppm	0-10 %
Ethylene	C <sub>2</sub> H <sub>4</sub>	IR		0-400 ppm	0-800 ppm	0-100 %
Helium	He	TCD		0-10 %	0-20 %	0-100 %
Hexane <sup>1</sup>	C <sub>6</sub> H <sub>14</sub>	IR		0-100 ppm	0-200 ppm	0-10 %
Hydrogen <sup>4</sup>	H <sub>2</sub>	TCD		0-1 %	0-2 %	0-100 %
Hydrogen Sulfide	H <sub>2</sub> S	UV		0-2 %	0-4 %	0-10 %
Hydrogen Sulfide	H <sub>2</sub> S	IR		0-10 %	0-20 %	0-100 %
Methane	CH <sub>4</sub>	IR		0-100 ppm	0-200 ppm	0-100 %
Methanol <sup>1</sup>	CH <sub>3</sub> OH	IR		0-1000 ppm	0-2000 ppm	0-10 %
n-Butane	C <sub>4</sub> H <sub>10</sub>	IR		0-800 ppm	0-1600 ppm	0-100 %
Nitrogen dioxide <sup>1</sup>	NO <sub>2</sub>	UV	0-25 ppm <sup>3</sup>	0-100 ppm	0-200 ppm	0-10 %
Nitrogen monoxide	NO	IR	0-100 ppm <sup>3</sup>	0-250 ppm	0-500 ppm	0-100 %
Nitrous oxide	N <sub>2</sub> O	IR		0-100 ppm	0-200 ppm	0-100 %
Oxygen	O <sub>2</sub>	Electrochem.		0-5 %	-	0-25 % <sup>2,6</sup>
Oxygen	O <sub>2</sub>	Paramagn.		0-1 %	0-2 %	0-100 %
Oxygen, Trace	O <sub>2</sub>	Electrochem.		0-10 ppm	-	0-10 000 ppm <sup>6</sup>
Propane	C <sub>3</sub> H <sub>8</sub>	IR		0-1000 ppm	0-2000 ppm	0-100 %
Propylene	C <sub>3</sub> H <sub>6</sub>	IR		0-400 ppm	0-800 ppm	0-100 %
Sulfur dioxide	SO <sub>2</sub>	UV	0-25 ppm <sup>3</sup>	0-130 ppm	0-200 ppm	0-1 %
Sulfur dioxide	SO <sub>2</sub>	IR		0-1 %	0-2 %	0-100 %
Sulfur hexafluoride	SF <sub>6</sub>	IR	0-5 ppm <sup>3</sup>	0-20 ppm	0-50 ppm	0-2 %
Toluene <sup>1</sup>	C <sub>7</sub> H <sub>8</sub>	UV		0-300 ppm	0-600 ppm	0-5 %
Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	IR		0-1000 ppm	0-2000 ppm	0-2 %
Water vapor <sup>1</sup>	H <sub>2</sub> O	IR		0-1000 ppm	0-2000 ppm	0-8 %
Water vapor, Trace <sup>1</sup>	H <sub>2</sub> O	Capacitive		0-100 ppm	-	0-3000 ppm <sup>6</sup>

<sup>1</sup> Dew point below ambient temperature

<sup>2</sup> Higher concentrations decrease sensor lifetime

<sup>3</sup> Daily zero calibration: Required for ranges below lowest standard specs range

<sup>4</sup> Special "refinery" application with 0-1% H<sub>2</sub> in N<sub>2</sub> available

<sup>5</sup> see Table 5

<sup>6</sup> Standard specs only

## Standard and Enhanced Performance Specifications

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

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

Note! 1 psi = 68.95 hPa

<sup>1</sup> Related to full scale

<sup>2</sup> Related to measuring value

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

<sup>4</sup> Constant pressure and temperature

<sup>5</sup> Dependent on integrated photometer bench

<sup>6</sup> Depending on measuring range

<sup>7</sup> Pressure sensor is required

<sup>8</sup> Special conditions for > 1100 hPa abs.

<sup>9</sup> Limited to atmospheric if internal sample pump

<sup>10</sup> Temperatures below 0 °C (-4 °F) with thermostat control only

<sup>11</sup> Thermost. controlled sensor: 75 °C (167 °F)

<sup>12</sup> Flow variation within ± 0.1 l/min

<sup>13</sup> Optional thermostat controlled box with temperature 60 °C (140 °F)

<sup>14</sup> Temperature variation: ≤ 10 K per hour

Table 3 Trace Moisture – Standard Measurement Performance Specifications

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

<sup>1</sup> If installed in series to another measurement system, e. g. IR channel

<sup>2</sup> Special conditions for > 1100 hPa abs.

Note! 1 psi = 68.95 hPa

**Table 4 Oxygen – Standard and Enhanced Measurement Performance Specifications**

	Oxygen Sensors			
	Paramagnetic (pO <sub>2</sub> )		Electrochemical (eO <sub>2</sub> )	Trace (tO <sub>2</sub> )
	Standard Spec	Enhanced Spec		
Detection limit (4 σ) <sup>1 4</sup>	≤ 1 %	≤ 0.5 %	≤ 1 %	≤ 1 %
Linearity <sup>1 4</sup>	≤ 1 %		≤ 1 %	≤ 1 %
Zero-point drift <sup>1 4</sup>	≤ 2 % per week	≤ 1 % per week	≤ 2 % per week	≤ 1 % per week
Span (sensitivity) drift <sup>1 4</sup>	≤ 1 % per week	≤ 0.5 % per week	≤ 1 % per week	≤ 1 % per week
Repeatability <sup>1 4</sup>	≤ 0.5 %		≤ 1 %	≤ 1 %
Response time (t <sub>90</sub> ) <sup>3</sup>	< 5 s		approx. 12 s	20 to 80 s
Permissible gas flow	0.2–1.5 l/min		0.2–1.5 l/min.	0.2–1.5 l/min.
Influence of gas flow <sup>1 4</sup>	≤ 2 % <sup>11</sup>		≤ 2 %	≤ 2 %
Maximum gas pressure <sup>7 8</sup>	≤ 1500 hPa abs. (≤ 7 psig) <sup>14</sup>		≤ 1500 hPa abs. (≤ 7 psig)	≤ 1500 hPa abs. (≤ 7 psig)
Influence of pressure <sup>2</sup>				
– At constant temperature	≤ 0.10 % per hPa		≤ 0.10 % per hPa	≤ 0.10 % per hPa
– With pressure compensation <sup>6</sup>	≤ 0.01 % per hPa		≤ 0.01 % per hPa	≤ 0.01 % per hPa
Permissible ambient temperature <sup>9</sup>	0(-20) to +50 °C (32 (4) to 122 °F)		5 to +45 °C (41 to 113 °F)	5 to +45 °C (41 to 113 °F)
Influence of temperature <sup>1 13</sup> (at constant pressure)				
– On zero point	≤ 1 % per 10 K   ≤ 0.5 % per 10 K		≤ 1 % per 10 K	≤ 1 % per 10 K <sup>5</sup>
– On span (sensitivity)	≤ 1 % per 10 K		≤ 1 % per 10 K	≤ 1 % per 10 K <sup>5</sup>
Thermostat control	60 °C (140 °F) <sup>12</sup>		none	none <sup>10</sup>
Warm-up time	Approx. 50 minutes		-	Approx. 50 minutes

Note! 1 psi = 68.95 hPa

<sup>1</sup> Related to full scale

<sup>2</sup> Related to measuring value

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

<sup>4</sup> Constant pressure and temperature

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

<sup>6</sup> Pressure sensor is required

<sup>7</sup> Special conditions for > 1100 hPa abs.

<sup>8</sup> Limited to atmospheric if internal sample pump

<sup>9</sup> Temperatures below 0 °C (-4 °F) with thermostat control only

<sup>10</sup> Thermost. controlled sensor: 35 °C (95 °F)

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

<sup>12</sup> Optional thermostat controlled sensor with temperature 60 °C (140 °F)

<sup>13</sup> Temperature variation: ≤ 10 K per hour

<sup>14</sup> No sudden pressure surge allowed

**Note 1!**

Not all data listed are applicable to all analyzer versions (e.g. 60 °C thermostat 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.

**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 & ULCO<sub>2</sub>)

Table 5 Special Performance Specifications for Gas Purity Measurements

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

Note! 1 psi = 68.95 hPa

<sup>1</sup> Related to full scale

<sup>2</sup> Constant pressure and temperature

<sup>3</sup> Within 24 h; daily zero calibration requested

<sup>4</sup> Within 24 h; daily span calibration recommended

<sup>5</sup> Related to measuring value

<sup>6</sup> Temperature variation: ≤ 10 K per hour

<sup>7</sup> From gas analyzer inlet at gas flow of 1.0 l/min

<sup>8</sup> Barometric pressure sensor is required

<sup>9</sup> Whichever value is higher

<sup>10</sup> Limited to atmospheric if internal sample pump; special conditions for > 1100 hPa abs.

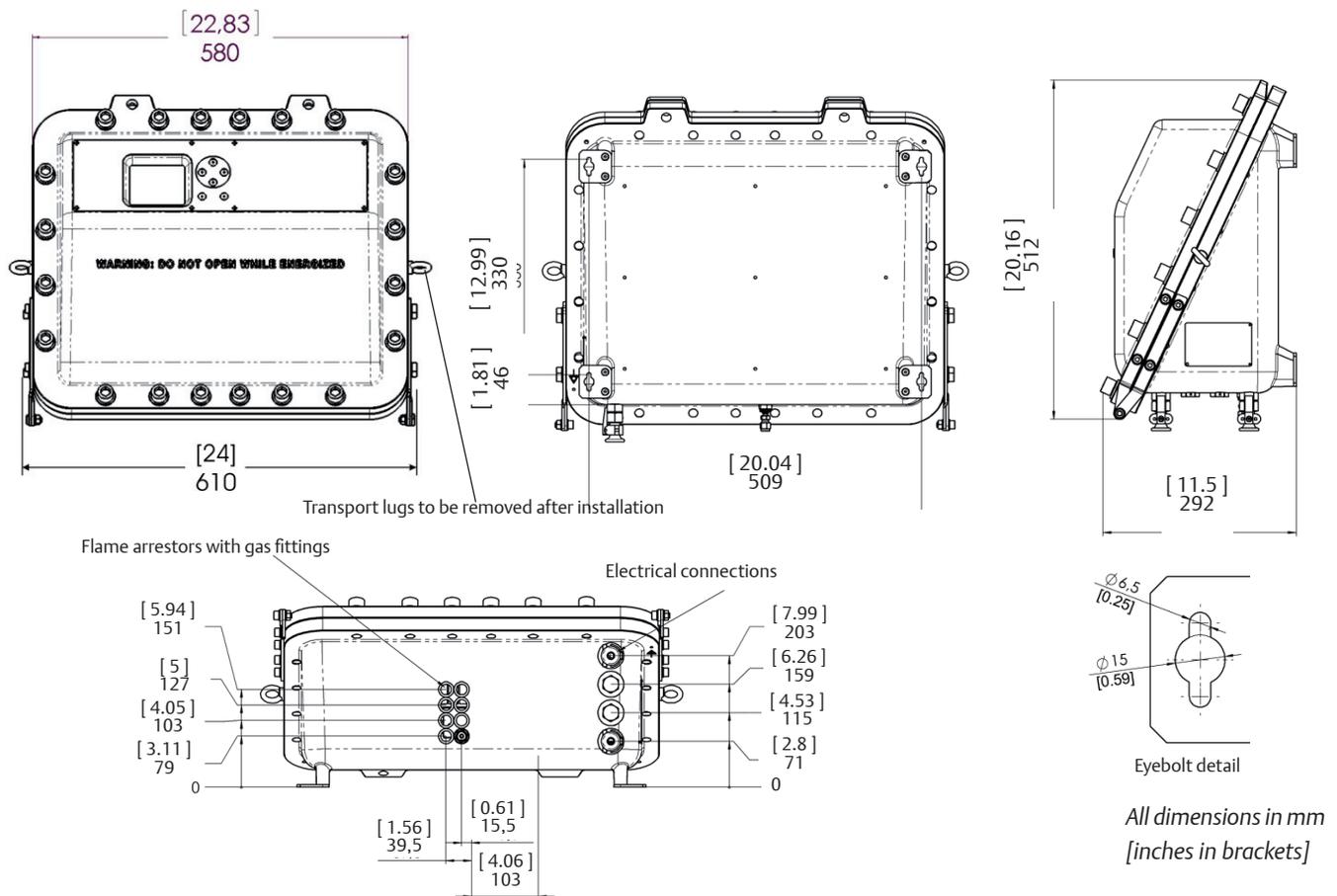
## General Specifications

Compliances	ATEX, IECEx 	CSA-C/US 	GOST 	KGS 	C-TICK 	NAMUR
Gas connections	Stainless steel: 6/4 mm or 1/4"; for more options c.f.					
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" NPT) / blanking elements					
Electrical connections	Screw terminals, RJ45, USB					
Enclosure protection	Type 4X; IP 66 acc. EN 60529 for outdoor installation, protected against direct sunlight					
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:	1-5, individually optically isolated 4(0)-20 mA ( $R_b \leq 500 \Omega$ )
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:	Ethernet with Modbus TCP RS 485 / 232C with Modbus RTU 2 USB ports
Digital I/O (optional):	7/14 digital inputs (for remote control); max. 30V DC, 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
Analog signal inputs (optional):	2 analog inputs 0-1(10) V ( $R_{in} = 100 \text{ k}\Omega$ ) or 4(0)-20 mA ( $R_{in} = 50 \Omega$ )

## Dimensions



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