X-STREAM Enhanced XEFD - Flameproof Gas Analyzer

- Up to five component gas analyzer featuring NDIR/UV/VIS photometer, paramagnetic and electrochemical $O_2$, thermal conductivity, and moisture sensors
- Enhanced performance with IntrinX technology
- Modern communication capabilities including web-browser accessibility
- Outstanding reliability with a three-year warranty

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+H2, 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 ($tH_2O$), paramagnetic and electrochemical oxygen ($pO_2/eO_2$) detectors.

Enhanced performance
With the X-STREAM photometer technology, the analyzer provides a measuring accuracy that improves 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
- Email notification or daily reports of alarms and events
- 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 (including 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. For flammable gases, the gas path is equipped with specially tested components ensuring leak rates clearly below the limits given in the respective norms.

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

Web browser showing measured concentrations and secondaries.

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

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

<table>
<thead>
<tr>
<th>Gas component</th>
<th>Principle</th>
<th>Special specs or conditions</th>
<th>Standard specs (Table 2–4)</th>
<th>Enhanced specs (Table 2 &amp; 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lowest range</td>
<td>Lowest range</td>
<td>Lowest range</td>
</tr>
</tbody>
</table>

1. Acetone CH₃COCH₃ UV 0–400 ppm 0–800 ppm 0–3%
2. Acetone CH₃COCH₃ IR 0–500 ppm 0–1000 ppm 0–3%
3. Ammonia NH₃ IR 0–5 ppm 0–50 ppm 0–100%
4. Argon Ar TCD 0–50% 0–100% 0–100%
5. Carbon dioxide CO₂ IR 0–5 ppm 0–50 ppm 0–100%
6. Carbon monoxide CO IR 0–5 ppm 0–50 ppm 0–100%
7. Chlorine Cl₂ UV 0–10 ppm 0–50 ppm 0–100%
8. Ethane C₂H₆ IR 0–1000 ppm 0–2000 ppm 0–100%
9. Ethanol C₂H₅OH IR 0–1000 ppm 0–2000 ppm 0–10%
10. Ethylene C₂H₄ IR 0–1000 ppm 0–2000 ppm 0–100%
11. Helium He TCD 0–10% 0–20% 0–100%
12. Hexane C₆H₁₄ IR 0–100 ppm 0–200 ppm 0–10%
13. Hydrogen H₂ TCD 0–1% 0–2% 0–100%
14. Hydrogen sulfide H₂S IR 0–100 ppm 0–200 ppm 0–100%
15. Methane CH₄ IR 0–100 ppm 0–200 ppm 0–100%
16. Methanol CH₃OH IR 0–1000 ppm 0–2000 ppm 0–100%
17. n-Butane C₄H₁₀ IR 0–10 ppm 0–200 ppm 0–100%
18. Nitrogen dioxide NO₂ UV 0–25 ppm 0–130 ppm 0–1%
19. Nitrogen monoxide NO IR 0–100 ppm 0–200 ppm 0–100%
20. Nitrous oxide N₂O IR 0–100 ppm 0–200 ppm 0–100%
21. Oxygen O₂ Electrochem. 0–5 % & 0–1 % 0–50 ppm 0–2%
22. Oxygen Trace O₂ Paramagn. 0–2% 0–25%
23. Oxygen, trace O₂ Electrochem. 0–10 ppm 0–200 ppm 0–5%
24. Propane C₃H₈ IR 0–1000 ppm 0–2000 ppm 0–100%
25. Propylene C₃H₆ IR 0–1000 ppm 0–2000 ppm 0–100%
26. Sulfur dioxide SO₂ UV 0–25 ppm 0–130 ppm 0–1%
27. Sulfur dioxide SO₂ IR 0–1% 0–2% 0–100%
28. Sulfur hexafluoride SF₆ IR 0–20 ppm 0–50 ppm 0–2%
29. Toluene C₇H₈ UV 0–300 ppm 0–600 ppm 0–5%
30. Vinyl chloride C₂H₅Cl IR 0–1000 ppm 0–2000 ppm 0–2%
31. Water vapor H₂O IR 0–1000 ppm 0–2000 ppm 0–8%
32. Water vapor, Trace H₂O 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% H₂ in N₂ available.
5. See Table 5.
6. Standard specs only.
## Standard and enhanced performance specifications

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

<table>
<thead>
<tr>
<th></th>
<th>NDIR/UV/VIS</th>
<th>Thermal Conductivity (TCD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard spec</td>
<td>Enhanced spec</td>
</tr>
<tr>
<td>Detection limit (4σ)</td>
<td>≤ 1%</td>
<td>≤ 0.5%</td>
</tr>
<tr>
<td>Linearity</td>
<td>≤ 2% per week</td>
<td>≤ 1% per week</td>
</tr>
<tr>
<td>Zero-point drift</td>
<td>≤ 0.5% per week</td>
<td>≤ 1% per month</td>
</tr>
<tr>
<td>Span (sensitivity)</td>
<td>4 s ≤ t₉₀ ≤ 7 s</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ 0.5%</td>
<td>≤ 1% per month</td>
</tr>
<tr>
<td>Influence of pressure</td>
<td>≤ 0.01% per hPa</td>
<td>≤ 0.10% per hPa</td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>0 (-20) to +50 °C (32 (-4) to 122 °F)</td>
<td>0 (-20) to +50 °C (32 (-4) to 122 °F)</td>
</tr>
<tr>
<td>Influence of temperature</td>
<td>≤ 1% per 10 K</td>
<td>≤ 0.5% per 10 K</td>
</tr>
<tr>
<td>Thermostat control</td>
<td>none</td>
<td>60 °C (140 °F)</td>
</tr>
<tr>
<td>Warm-up time</td>
<td>15 to 50 minutes</td>
<td></td>
</tr>
</tbody>
</table>

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. Depending on integrated photometer bench
6. Depending on measuring range
7. Pressure sensor is required
8. Special conditions for > 100 hPa abs.
9. Limited to atmospheric if internal sample pump
10. Temperatures below 0 °C (-4 °F) with thermostat control only
11. Optional thermostat controlled box with temperature 60 °C (140 °F)
12. Temperature variation: ± 10 K per hour

### Table 3 Trace Moisture – Standard Measurement Performance Specifications

<table>
<thead>
<tr>
<th>Trace moisture (tH₂O)</th>
<th>Measurement range</th>
<th>Measurement accuracy</th>
<th>Repeatability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-100 to -10 °C dew point (0–100…3,000 ppm)</td>
<td>± 2 °C dew point</td>
<td>0.5 °C dew point</td>
</tr>
<tr>
<td>Response time (tₚₜₙ)</td>
<td>5 min (dry to wet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating humidity</td>
<td>0 to 100 % relative humidity (r.h.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature coefficient</td>
<td>Temperature compensated across operating temperature range</td>
<td>Depending on sequential measurement system, see analyzer specification</td>
<td></td>
</tr>
<tr>
<td>Operating pressure</td>
<td>Depending on sequential measurement system, see analyzer specification</td>
<td>max. 1500 hPa abs / 7 psig</td>
<td></td>
</tr>
<tr>
<td>Flow rate</td>
<td>Depending on sequential measurement system, see analyzer specification</td>
<td>0.2 to 1.5 l/min</td>
<td></td>
</tr>
</tbody>
</table>

1. If installed in series to another measurement system, e.g., IR channel
2. Special conditions for > 1,100 hPa abs.

Note: 1 psi = 68.95 hPa
### Table 4 Oxygen – Standard and Enhanced Measurement Performance Specifications

<table>
<thead>
<tr>
<th>Property</th>
<th>Paramagnetic ((pO_2))</th>
<th>Electrochemical ((eO_2))</th>
<th>Trace ((tO_2))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection limit (4 (\sigma))</td>
<td>(\leq 1%)</td>
<td>(\leq 1%)</td>
<td>(\leq 1%)</td>
</tr>
<tr>
<td>Linearit (1)</td>
<td>(\leq 1%)</td>
<td>(\leq 2%) per week</td>
<td>(\leq 1%)</td>
</tr>
<tr>
<td>Zero-point drift (1)</td>
<td>(\leq 1%)</td>
<td>(\leq 0.5%) per week</td>
<td>(\leq 1%)</td>
</tr>
<tr>
<td>Span (sensitivity) drift (1)</td>
<td>(\leq 1%)</td>
<td>(\leq 0.5%) per week</td>
<td>(\leq 1%)</td>
</tr>
<tr>
<td>Response time (t_{90}) (3)</td>
<td>(&lt; 5) s</td>
<td>approx. 12 s</td>
<td>20 to 80 s</td>
</tr>
<tr>
<td>Permissible gas flow</td>
<td>0.2–1.5 l/min.</td>
<td>0.2–1.5 l/min.</td>
<td>0.2–1.5 l/min.</td>
</tr>
<tr>
<td>Influence of gas flow (1) (4)</td>
<td>(\leq 2% (11)</td>
<td>(\leq 2%)</td>
<td>(\leq 2%)</td>
</tr>
<tr>
<td>Maximum gas pressure (7) (8)</td>
<td>(\leq 1500) hPa abs. ((\leq 7) psig) (14)</td>
<td>(\leq 1500) hPa abs. ((\leq 7) psig) (14)</td>
<td>(\leq 1500) hPa abs. ((\leq 7) psig) (14)</td>
</tr>
<tr>
<td>Influence of pressure (2)</td>
<td>(\leq 0.1%) per hPa</td>
<td>(\leq 0.01%) per hPa</td>
<td>(\leq 0.1%) per hPa</td>
</tr>
<tr>
<td>Permissible ambient temperature (9)</td>
<td>(0(-20) to +50) (^\circ)C (32 (\text{-}) 122 (^\circ)F)</td>
<td>5 to +45 (^\circ)C (41 to 113 (^\circ)F)</td>
<td>5 to +45 (^\circ)C (41 to 113 (^\circ)F)</td>
</tr>
<tr>
<td>Influence of temperature (\text{at constant pressure}) (13)</td>
<td>(\leq 1% per 10) K</td>
<td>(\leq 0.5% per 10) K</td>
<td>(\leq 1% per 10) K</td>
</tr>
<tr>
<td>On zero point</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>On span (sensitivity)</td>
<td>approx. 50 minutes</td>
<td></td>
<td>Approx. 50 minutes</td>
</tr>
</tbody>
</table>

**Note:** 1 psi = 68.95 hPa

1. Related to full scale
2. Related to measuring value
3. From gas analyzer inlet at gas flow of 1.0 l/min (electronic damping = 0 s)
4. Constant pressure and temperature
5. Range 0–10...200 ppm: \(\leq 5\% (5\text{ to }45\) °C / 41 to 113 °F)
6. Pressure sensor is required
7. Special conditions for \(> 1100\) hPa abs.
8. Limited to atmospheric if internal sample pump
9. Temperatures below 0 °C (4 °F) with thermostat control only
10. Thermostat 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: \(\leq 10\) K per hour
14. 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/LU/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.
### Table 5  Special Performance Specifications for Gas Purity Measurements

<table>
<thead>
<tr>
<th>Specification</th>
<th>0–10...&lt; 50 ppm CO</th>
<th>0–5...&lt; 50 ppm CO&lt;sub&gt;2&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection limit (4σ)</td>
<td>&lt; 2%</td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>&lt; 1%</td>
<td></td>
</tr>
<tr>
<td>Zero-point drift</td>
<td>&lt; 2% resp. &lt; 0.2 ppm</td>
<td></td>
</tr>
<tr>
<td>Span (sensitivity) drift</td>
<td>&lt; 2% resp. &lt; 0.2 ppm</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>&lt; 2% resp. &lt; 0.2 ppm</td>
<td></td>
</tr>
<tr>
<td>Response time (t&lt;sub&gt;90&lt;/sub&gt;)</td>
<td>&lt; 10 s</td>
<td></td>
</tr>
<tr>
<td>Permissible gas flow</td>
<td>0.2–1.5 l/min.</td>
<td></td>
</tr>
<tr>
<td>Influence of gas flow</td>
<td>≤ 2%</td>
<td></td>
</tr>
<tr>
<td>Maximum gas pressure</td>
<td>≤ 1500 hPa abs. (≤ 7 psig)</td>
<td></td>
</tr>
<tr>
<td>Influence of pressure</td>
<td>≤ 0.1% per hPa</td>
<td></td>
</tr>
<tr>
<td>– At constant temperature</td>
<td>≤ 0.01% per hPa</td>
<td></td>
</tr>
<tr>
<td>– With pressure compensation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible ambient temperature</td>
<td>15 to 35 °C (59 to 95 °F)</td>
<td>5 to 40 °C (41 to 104 °F)</td>
</tr>
<tr>
<td>Influence of temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(at constant pressure)</td>
<td>&lt; 2% per 10 K resp. &lt; 0.2 ppm per 10 K</td>
<td></td>
</tr>
<tr>
<td>– On zero point</td>
<td>&lt; 2% per 10 K resp. &lt; 0.2 ppm per 10 K</td>
<td></td>
</tr>
<tr>
<td>– On span (sensitivity)</td>
<td>&lt; 2% per 10 K resp. &lt; 0.2 ppm per 10 K</td>
<td></td>
</tr>
<tr>
<td>Thermostat control</td>
<td>none</td>
<td>60 °C (140 °F)</td>
</tr>
</tbody>
</table>

Note: 1 psi = 68.95 hPa

### General specifications

<table>
<thead>
<tr>
<th>Compliances</th>
<th>ATEX, IECEx</th>
<th>CSA-C/US</th>
<th>EAC TC RU</th>
<th>KGS</th>
<th>C-TICK</th>
<th>NAMUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas connections</td>
<td>Stainless steel: 6/4 mm or 1/4 in.; for more options c.f.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sample pressure</td>
<td>max. 1,100 hPa (1.45 psig); with special option max. 1 500 hPa (7.25 psig)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>100–240 V~/~, 50/60 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated input current</td>
<td>3–1.5 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable inlets</td>
<td>ATEX, IECEx, GOST, KGS: Certified cable glands / blanking elements CSA: Certified adapters for conduits (1/4 in. NPT) / blanking elements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical connections</td>
<td>Screw terminals, RJ45, USB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enclosure protection</td>
<td>Type 4X; IP 66 acc. EN 60529 for outdoor installation, protected against direct sunlight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>-20 to +50 °C (-4 to +131 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humidity (non-condensing)</td>
<td>&lt; 90% r.h. @ 20 °C (68 °F)</td>
<td>&lt; 70% r.h. @ 40 °C (104 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Up to 63 kg (139 lb) depending on configuration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td>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</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Related to full scale
2 Constant pressure and temperature
3 Within 24 h; daily zero calibration requested
4 Within 24 h; daily span calibration recommended
5 Related to measuring value
6 Temperature variation: ≤ 10 K per hour
7 From gas analyzer inlet at gas flow of 1.0 l/min
8 Barometric pressure sensor is required
9 Whichever value is higher
10 Limited to atmospheric if internal sample pump; special conditions for > 1100 hPa abs.
Signal inputs and outputs, interfaces

| **Analog signal outputs:** | 1–5, individually optically isolated  
|                          | 4(0)–20 mA \(R_i \leq 500 \Omega\)  
|                          | 1 as standard, 2-5 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:** | 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. 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  
| **Analog signal inputs (optional):** | 2 analog inputs  
|                          | 0–1(10) V \(R_i = 100 \text{ k}\Omega\) or  
|                          | 4(0)–20 mA \(R_i = 50 \Omega\)  

Dimensions

**All dimensions in mm**

[inches in brackets]