



Evikon

OVERVIEW

Evikon MCI Ltd develops, manufactures and markets sensor-based electronic measurement instruments for industrial and building automation applications.

The company was founded in 1991 and since 1992 is strategically located at Tartu Science Park.

PRODUCTS

Evikon brand today is a diverse range of application-oriented devices – sensor assemblies, transmitters with analog and digital outputs, data-loggers, industrial panel meters and controllers – for measurement or control of main process and environment variables:

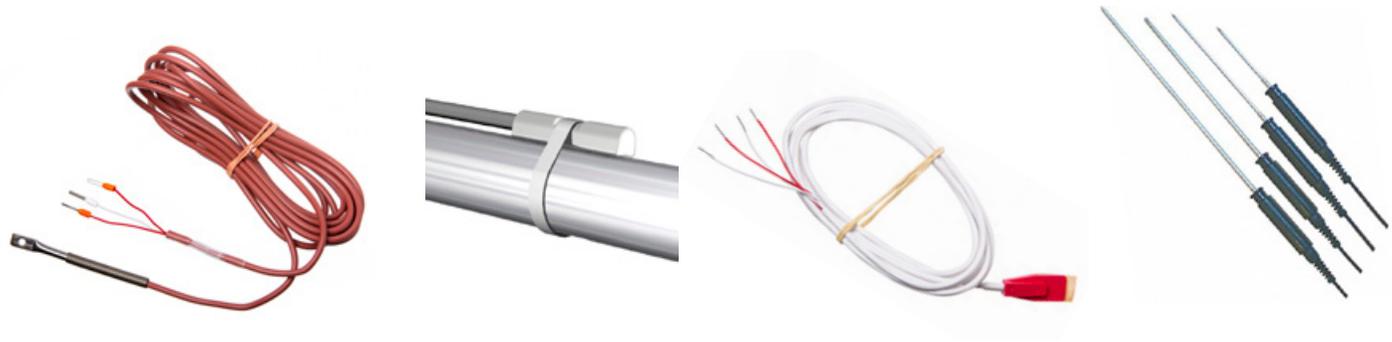
- Temperature
- Pressure
- Level
- Humidity
- Toxic and explosive gases

TEMPERATURE SENSORS



	ET201	ET211	ET203	ET204
Cable	●	●	●	●
Stem	●	●		
RTD	●	●	●	●
Thermocouple				
Insertion sensor	●			
Screw-in connection		●		
Push-in connection	●			
Surface sensor			●	
Pipe surface sensor				
Self-adhesive sensor				
Air temperature sensor				●
Transmitter possibility	●	●	●	●

TEMPERATURE SENSORS



	ET241	ET243	ET244	ET140
Cable	●	●	●	●
Stem				●
RTD	●	●	●	●
Thermocouple				
Insertion sensor				●
Screw-in connection				
Push-in connection				
Surface sensor	●			
Pipe surface sensor		●		
Self adhesive sensor			●	
Air temperature sensor				
Transmitter possibility	●	●	●	●

TEMPERATURE SENSORS

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	ET501	ET511	ET521	ET601	ET621	ET631
Cable						
Stem	●	●	●	●	●	●
RTD	●	●	●			
Thermocouple				●	●	●
Screw-in connection		●				
Push-in connection	●			●	●	●
Transmitter possibility	●	●	●	●	●	●
DIN B head	●	●	●	●	●	
BUZ/SUZ head					●	●
Integrated thermowell			●			
Replaceable insert			●			

AIR TEMPERATURE SENSORS

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	ET711	ET701	ET721	ET731	ET741
RTD	●	●	●	●	●
Wall mount	●	●	●		
Duct mount				●	
Pipe surface mount					●
Transmitter possibility	●	●	●	●	●
Protection class	IP20	IP65	IP65	IP65	IP65

MULTIPOINT TEMPERATURE MEASUREMENT CABLE



ET910	
Type of sensors	digital, 1-wire
Number of sensors in cable	3-63
Interval between sensors	1...3 m
Resolution	0,0625 °C
Accuracy	<0,5 °C
Protection class	IP67

HUMIDITY TRANSMITTERS

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● - yes ◐ - option

	E2227	E2218	E2228
Analog outputs	●	●	
Relay outputs			●
RS485 Modbus RTU	●	●	●
Protection class	IP20	IP65	IP65
Duct mount version		◐	◐
Remote probe version		◐	◐
Power supply 90...230 V			◐
LCD indicator		◐	◐

LUMBER MOISTURE TRANSMITTER

	E2353
4-20 mA output	●
0-10 V output	●
RS485 Modbus RTU	●
Protection class	IP65



DIFFERENTIAL/BAROMETRIC PRESSURE



● - yes ◐ - option

	E2407	E2418	E2408
Analog outputs	●	●	●
Relay outputs			●
RS485 Modbus RTU	●	●	●
Power supply 90...230 V			◐
Protection class	IP20	IP65	IP65
Differential pressure		●	●
Barometric pressure	●	●	●

LEVEL SENSORS

● - yes ◐ - option



	E2706	E2713	E2716	E2718
SPDT switch		●		
0-10 V	●			●
4-20 mA			●	●
RS485 Modbus RTU				●
CAN J1939	●			
Stem	●	●	●	●
Cable		●		
Temperature sensor			◐	◐

DATA LOGGERS



	E2208L	E2228L	E2230
Temperature	●	●	●
Humidity	●	●	●
CO ₂		●	●
Display			●
WIFI			●

GAS DETECTORS

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● - yes ◐ - option

	E2608	E2610	E2611	E2613	E2615	E2618
Analog outputs	●		●		●	●
Relay outputs	●	●	●	●		
RS485 Modbus RTU	●		●			●
Acoustic alarm		●	●			
Visual alarm		●				
Enclosure protection class	IP65	IP20	IP20	IP20 or IP65	IP20 or IP65	IP65
Enclosure material	ABS	ABS	ABS	ABS	ABS	ABS
Duct mount version	◐					◐
Remote probe version	◐					◐
Power supply 90...230 VAC	◐	◐	◐			
Detection of two gases						
ATEX Zones 2 and 22						
LCD indicator						◐
Extended RH/T range	◐		◐			◐
Self test button		●				

GAS DETECTORS

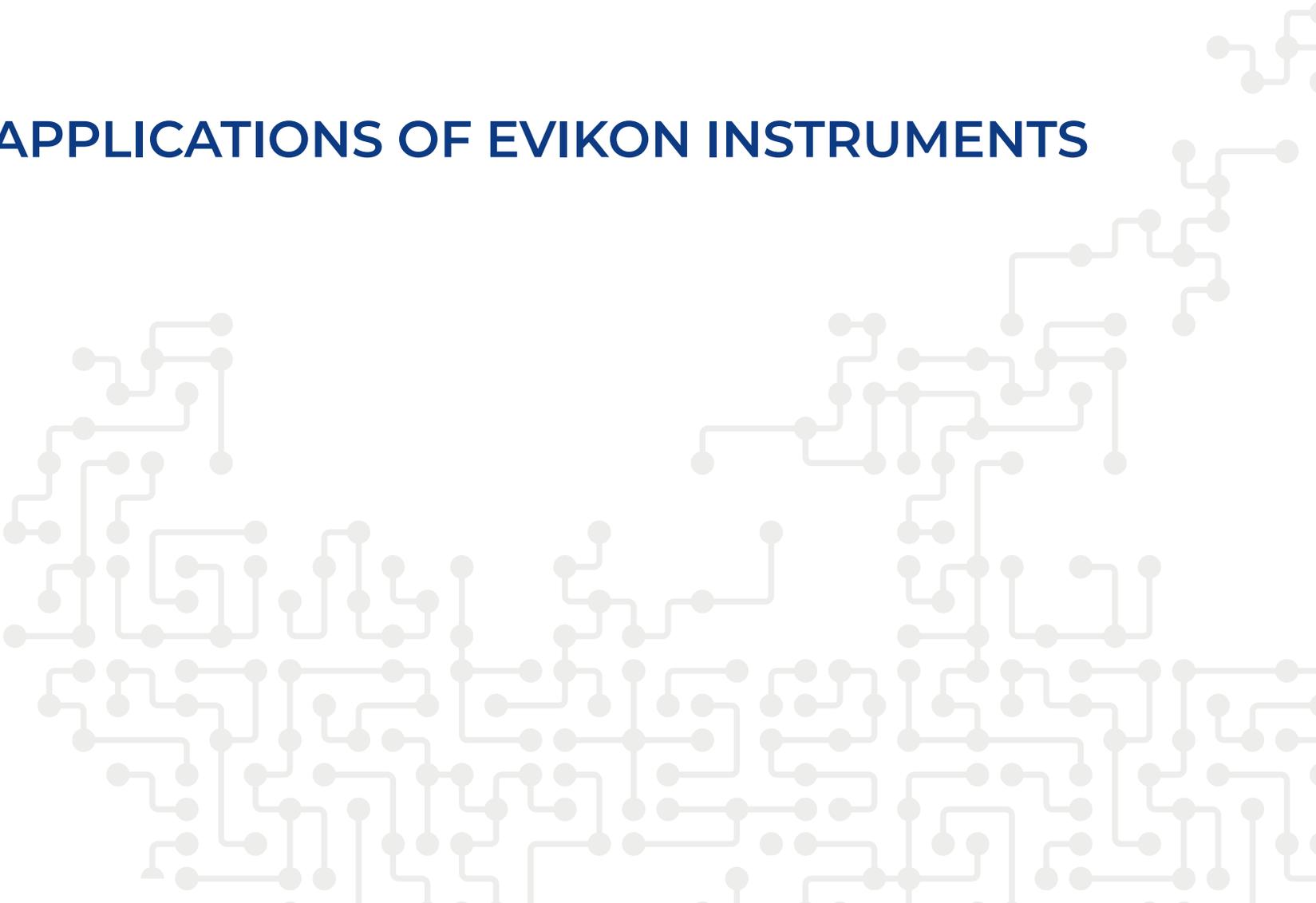
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● - yes ◐ - option

	E2630	E2632	E2638	E2648	E2658	E2660
Analog outputs			●	●	●	●
Relay outputs	●	●	◐	◐	◐	◐
Acoustic alarm	●	●	◐			
RS485 Modbus RTU			●	●	●	●
Visual alarm	●	●	◐			
Enclosure protection class	IP65	IP65	IP65	IP66	IP66	IP65
Enclosure material	ABS	ABS	ABS	AI	AI	ABS
Duct mount version						
Remote probe version			◐	◐		◐
Power supply 90...230 VAC	◐	◐	◐	◐	◐	◐
Detection of two gases		●				●
ATEX Zones 2 and 22					●	
LCD indicator			◐			
Extended RH/T range			◐	◐	◐	◐
Self test button	●	●	◐			

TYPICAL APPLICATIONS OF EVIKON INSTRUMENTS



- HOTELS
- SCHOOLS & KINDERGARTENS
- HOSPITALS
- LIBRARIES & MUSEUMS
- SHOPPING MALLS
- OFFICES

To maintain comfortable and healthy environment for clients and workers, it is important to monitor the air quality and HVAC systems conditions.

The basic characteristics of air quality are carbon dioxide CO₂ level, air humidity and temperature.

Monitoring of the differential pressure in ventilators, fans and air filters helps to increase the efficiency of the HVAC systems and reduce losses.

Parameter	Typical ranges	Recommended devices
Carbon dioxide CO ₂	0...10 000 ppm	E2228L E2230
Humidity/Temperature	0...100 %RH, -40...+85°C 0...95 %RH	E2208L, E2228L E2227 E2230
Air Temperature	-20...+50°C -30...+60°C	ET700 and E200 series; E2230
Differential Pressure (for ventilation systems)	-50...+50 Pa to -500...+500 Pa; 0...+250 Pa to -10...+10 kPa	E2408 E2418

- INDOOR PARKINGS
- VEHICLE SERVICE CENTERS

Safe environment and economical ventilation in garages and indoor parkings is ensured by monitoring the level of toxic vehicle exhaust fumes and ventilating based on their concentration. Carbon monoxide CO detection is crucial for gasoline, natural gas and propane powered vehicles.

Nitrogen dioxide NO₂ levels should be measured for vehicles with diesel engines.

Maintaining the right humidity levels is important to ensure healthy and comfortable environment. Carbon dioxide CO₂ concentration may be monitored as a general air quality indicator.

Parameter	Typical ranges	Recommended devices
Carbon Monoxide CO	0...1000 ppm	E2618-CO E2638-CO E2648-CO
Nitrogen Dioxide NO ₂	0...20 ppm 0...100 ppm	E2618-NO2 E2638-NO2 E2648-NO2
Carbon Dioxide CO ₂	0...10 000 ppm	E2618-CO2 E2638-CO2 E2648-CO2
CO+NO2 CO+CO2	see above	E2660(R)
Absolute Humidity		E2218 E2228



- COLD STORAGE FACILITIES
- ICE RINKS
- FOOD STORES
- INDUSTRIAL REFRIGERATION
- TRANSPORT REFRIGERATION

Hydrofluorocarbons HFC, hydrofluoroolefins HFO, ammonia NH₃ and carbon dioxide CO₂ are used as refrigerants in industrial, commercial (retail), transport refrigeration and in ice rinks. Fluorinated hydrocarbons (HFC, HFO) are also used in air conditioning systems.

Refrigerant leakage may damage the facilities and lead to losses of stored goods. Moreover, the monitoring of ammonia level is a safety measure, since ammonia is toxic and corrosive.

Parameter	Typical ranges	Recommended devices
Ammonia NH ₃	0...1000 ppm	E2608-NH3 E2618-NH3 E2638-NH3
Carbon Dioxide CO ₂	0...10 000 ppm 0...50 000 ppm	E2608-CO2 E2618-CO2 E2638-CO2
Fluorinated refrigerants (HFC, HFO)	0...50% LEL; 0...1000 ppm	E2608-HFC E2618-HFC E2638-HFC
Temperature	-50...+250°C	ET200, ET700 Series



- HOTELS
- OTHER PUBLIC SPACES

Hydrofluorocarbons HFC and hydrofluoroolefins HFO are used as refrigerants in air conditioning systems.

HFOs are becoming more popular due to their low GWP (Global Warming Potential). On the other hand, they are more flammable than HFC refrigerants (classified as A2L group). Leakages should be monitored to prevent ignition and avoid damage to air conditioning devices.

Parameter	Typical ranges	Recommended devices
Fluorinated refrigerants (HFC, HFO)	0...50% LEL	E2613-HFC



● POULTRY AND CATTLE FARMS

Methane CH_4 (one of the major greenhouse gases) is a result of enteric fermentation in ruminant animals such as cattle, sheep, goats, etc. It is also emitted from manure during storage or treatment.

Ammonia NH_3 is produced by microbial degradation of uric acid in animal waste; it is also used in the fertilizers manufacturing. High ammonia levels reduce egg production, feed efficiency, and growth.

Relative humidity contributes to the formation of NH_3 in farms.

Parameter	Typical ranges	Recommended devices
Methane CH_4	0...100% LEL	E2608-CH4 E2618-CH4 E2638-CH4
Ammonia NH_3	0...1000 ppm	E2608-NH3 E2618-NH3 E2638-NH3
Humidity/Temperature	0...100% RH, -40...+85°C	E2218, E2228



● FRUIT RIPENING

Ethylene C_2H_4 is used to accelerate the ripening of the fruits. Maintaining a required level of ethylene in ripening rooms helps to control the ripening process. High relative humidity in ripening rooms helps to extend shelf life.

Since ripening fruits produce carbon dioxide CO_2 which slows the process, it is necessary to keep the CO_2 level below 5000 ppm to speed up ripening.

Parameter	Typical ranges	Recommended devices
Ethylene C_2H_4	0...10 ppm 0...200 ppm 0...1500 ppm	E2608-C2H4 E2618-C2H4 E2638-C2H4
Carbon Dioxide CO_2	0..10 000 ppm 0...50000 ppm	E2608-CO2 E2618-CO2 E2638-CO2
Humidity/Temperature	0...100% RH/ -40...+85°C	E2218, E2228



● FRUIT STORAGE

To extend fruits' shelf life, it is important to maintain temperature and humidity in the storage at an optimal level. As fruits produce ethylene C_2H_4 which accelerates ripening, C_2H_4 levels should be kept low to prevent fruits from overripening.

It is reported that carbon dioxide CO_2 at high concentrations may be used to slow down the ripening and prolongate the shelf life of the fruits during storage and transportation.

Parameter	Typical ranges	Recommended devices
Ethylene C_2H_4	0...10 ppm	E2608-C2H4 E2618-C2H4 E2638-C2H4
Carbon Dioxide CO_2	0..10% 0...20% 0...100%	E2608-CO2 E2618-CO2 E2638-CO2
Humidity/Temperature	0...100% RH/ -40...+85°C	E2218, E2228



● GRAIN STORAGES

Proper temperature and humidity conditions in grain silos are crucial to prevent grain spoilage and self-ignition.

The changes in humidity and temperature may be a sign of the activity of moulds, bacteria, insects, or mites. Constant monitoring of humidity and temperature allows to prevent spoilage or stop it at early stages.

Parameter	Typical ranges	Recommended devices
Humidity	0...100% RH, -40...+85°C (up to 125°C with heavy duty remote probe)	E2218, E2228
Temperature	-40...+85°C	ET910



● GREENHOUSES

Carbon dioxide level, air temperature and humidity are crucial factors for plant growing. Carbon dioxide is one of the key ingredients for photosynthesis.

Both too low and too high CO₂ concentrations impact the crop negatively.

Parameter	Typical ranges	Recommended devices
Carbon Dioxide CO ₂	0...10 000 ppm 0...50 000 ppm	E2608-CO2 E2618-CO2 E2638-CO2
Temperature /Humidity	0...100% RH, -40...+85°C	E2218, E2228



● FISH FARMS

Water level and temperature monitoring is important for fish culture along with water quality.

Parameter	Typical ranges	Recommended devices
Level	100...3000 mm	E2713 E2718
Temperature	-50...250°C	ET200 Series

BOILER HOUSES

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Highly toxic carbon monoxide CO is produced from the partial oxidation of carbon-containing compounds; it forms when there is not enough oxygen to produce carbon dioxide CO₂, e.g. when operating a stove or an internal combustion engine in an enclosed space. Fuel leakages (methane, LPG) must be detected early to reduce explosion hazard.

As oxygen is consumed for burning, it is recommended to monitor its level in the breathing air to avoid deficiency and ensure healthy environment for the personnel. Temperature control in the furnaces is important for efficient burning. Differential pressure is measured in pipes to monitor and regulate pumps, water flow in pipes, etc.

Parameter	Typical ranges	Recommended devices
Carbon Monoxide CO	0...1000 ppm	E2610-CO, E2630-CO
Methane CH ₄	0...100 %LEL	E2610-LEL, E2630-LEL
LPG	0...100 %LEL	E2610-LEL, E2630-LEL
LPG+CO CH ₄ +CO	see above	E2632 Series
Oxygen O ₂ Deficiency	0...25% vol	E2608-O2 E2618-O2 E2638-O2 E2648-O2
Temperature	-50...+500°C up to 1600°C	ET500 Series ET600 Series
Differential Pressure (burner control)	-50...+50 Pa to -500...+500 Pa; 0...+250 Pa to -10...+10 kPa	E2408, E2418

TIMBER DRYING KILNS

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Timber moisture content (MC), air humidity and temperature in the kiln are the key factors for the efficient drying of wood.

To ensure uniform drying without cracking, these characteristics should be monitored at several different locations simultaneously.

Parameter	Typical ranges	Recommended devices
Timber Moisture	7...20% MC at -40...+125°C	E2353
Temperature /Air Humidity	0...100 % RH, -40...+85°C (up to 125°C with heavy duty remote probe)	E2218, E2228

BATTERY CHARGING ROOMS

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- DATA CENTERS
- TELECOMMUNICATIONS
- POWER PLANTS

Safety of battery back-up installations for various electronic systems has to be monitored. As lead acid batteries are charged, hydrogen gas is produced, which may accumulate and reach hazardous combustible levels in closed spaces.

Parameter	Typical ranges	Recommended devices
Hydrogen H ₂	0...100 % LEL	E2608-LEL E2610-LEL E2618-LEL E2630-LEL E2638-LEL E2648-LEL E2658-LEL

● PROCESSING AND STORAGE

Carbon dioxide CO₂, sulfur dioxide SO₂ and ozone O₃ are used for preserving food. Carbon dioxide is a byproduct of fermentation and is also used for carbonation.

Optimal RH and temperature levels are needed for food processing and storing. Level measurement is necessary for liquids processing.

Parameter	Typical ranges	Recommended devices
Sulfur Dioxide SO ₂	0...50 ppm 0...2000 ppm	E2608-SO2 E2618-SO2 E2638-SO2
Ozone O ₃	0...5 ppm	E2608-O3 E2618-O3 E2638-O3
Carbon Dioxide CO ₂	0...10 000 ppm 0...50 000 ppm	E2608-CO2 E2618-CO2 E2638-CO2
Air Temperature and Humidity	0...100 %RH, -40...+85°C (up to 125°C with heavy duty remote probe)	E2218 E2228
Temperature	-50...200°C -50...250/500°C up to 1600°C	ET140 ET500 Series ET600 Series
Level	100...3000 mm	E2713 E2718

METALLURGY



- METAL TREATMENT
- CUTTING AND WELDING

Toxic and combustible carbon monoxide CO is an intermediate during metal reduction from ores.

Acetylene C₂H₂ is used for cutting, welding, and heat treating of metals and other materials.

Carbon di- and monoxide, nitrogen oxides, ozone may be generated during welding. Carbon dioxide and inert gases used for shielding may displace oxygen in breathing air, leading to asphyxiation.

Oxygen level should be monitored in breathing air to avoid deficiency.

Thermocouples are used to measure a wide range of temperatures in industrial furnaces.

Parameter	Typical ranges	Recommended devices
Acetylene C ₂ H ₂	0...100% LEL	E2608-C2H4 E2618-C2H4 E2638-C2H4 E2648-C2H4 E2658-C2H4
Carbon Dioxide CO ₂	0...10 000 ppm 0...50 000 ppm	E2608-CO2 E2618-CO2 E2638-CO2 E2648-CO2 E2658-CO2
Carbon Monoxide CO	0...1000 ppm	E2608-CO E2618-CO E2638-CO E2648-CO E2658-CO
Nitrogen Dioxide NO ₂	0...20 ppm 0...100 ppm	E2608-NO2 E2618-NO2 E2638-NO2 E2648-NO2 E2658-NO2
Oxygen O ₂	0...25% vol	E2608-O2 E2618-O2 E2638-O2 E2648-O2 E2658-O2
Ozone O ₃	0...5 ppm	E2608-O3 E2618-O3 E2638-O3 E2648-O3 E2658-O3
Temperature	up to 1600°C	ET301, ET600 Series Thermocouples



Chemical, pharmaceutical and polymer industry handle a variety of toxic and combustible gases. Monitoring of leakages is necessary to ensure safety and avoid losses. Among the most produced and consumed gases are ammonia NH_3 , ethylene C_2H_4 , and ethylene oxide $\text{C}_2\text{H}_4\text{O}$.

Temperature monitoring is important to prevent accidents and maintain the high quality of products.

Parameter	Typical ranges	Recommended devices
Ammonia NH_3	0...1000 ppm	E2608-NH3 E2618-NH3 E2638-NH3 E2648-NH3 E2658-NH3
Ethylene C_2H_4	0...10 ppm 0...200 ppm 0...1500 ppm	E2608-C2H4 E2618-C2H4 E2638-C2H4 E2648-C2H4 E2658-C2H4
Ethylene Oxide $\text{C}_2\text{H}_4\text{O}$	0...20 ppm 0...100 ppm	E2608-ETO E2618-ETO E2638-ETO E2648-ETO E2658-ETO
Humidity	0...100 %RH, -40...+85°C (up to 125 °C with heavy duty remote probe)	E2218, E2228
Temperature	up to 260°C up to 500°C up to 1600°C	ET140 ET500 Series ET600 Series

WATER TREATMENT AND WATER SUPPLY



- SEWAGE TREATMENT
- WATER DISTRIBUTION STATIONS

Wastewater treatment creates and uses a range of inert, toxic and combustible gases, which can accumulate in enclosed spaces and endanger plant personnel.

Parameter	Typical ranges	Recommended devices
Ammonia NH ₃	0...1000 ppm	E2608-NH3 E2618-NH3 E2638-NH3 E2648-NH3
Chlorine Cl ₂	0...10 ppm	E2608-CL2 E2618-CL2 E2638-CL2 E2648-CL2
Hydrogen Sulfide H ₂ S	0...100 ppm 0...2000 ppm	E2608-H2S E2618-H2S E2638-H2S E2648-H2S
Methane CH ₄	0...100 % LEL	E2608-CH4 E2618-CH4 E2638-CH4 E2648-CH4
Oxygen O ₂ Deficiency	0...25% vol	E2608-O2 E2618-O2 E2638-O2 E2648-O2
Ozone O ₃	0...5 ppm	E2608-O3 E2618-O3 E2638-O3 E2648-O3
Sulfur Dioxide SO ₂	0...50 ppm 0...2000 ppm	E2608-SO2 E2618-SO2 E2638-SO2 E2648-SO2
Level	100...3000 mm	E2713 E2718
Temperature	-50...200°C	ET140

FUEL LEVEL

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Monitoring of fuel levels during transportation and in stationary tanks is important to ensure the safety and prevent losses.

● STORAGE

Parameter	Typical ranges	Recommended devices
Level	50...3000 mm	E2713
	100...3000 mm	E2718

● TRANSPORTATION

Parameter	Typical ranges	Recommended devices
Level	up to 2400 mm	E2706

PROPERTIES OF SELECTED GASES



Gas	Hazards	Exposure and/or flammability limits
Acetylene C ₂ H ₂	Highly flammable. Gas/air mixtures are explosive. Asphyxiant. Non-toxic, but, when generated from calcium carbide, it can contain toxic impurities such as traces of phosphine and arsine.	NIOSH REL C 2662 mg/m ³ /2500 ppm LEL 2.5%, UEL 100%
Ammonia NH ₃	Not highly flammable, but containers of ammonia may explode when exposed to high heat. Ammonia has alkaline properties and is corrosive. Highly toxic. Irritant to skin, eyes and respiratory tract. Inhalation causes breathing difficulties (wheezing). At high concentrations may lead to pulmonary edema.	2000/39/EC Directive TWA 14 mg/m ³ /20 ppm STEL 36 mg/m ³ /50 ppm LEL 15.0%, UEL 28.0%
Carbon dioxide CO ₂	Non-flammable. Dusts of various metals (Mg, Zr, Ti, Al, Cr, Mn) are ignitable and explosive when suspended in carbon dioxide. In concentrations up to 1% (10 000 ppm), it will make some people feel drowsy and give the lungs a stuffy feeling. Concentrations of 7% to 10% (70 000 to 100 000 ppm) may cause suffocation, even in the presence of sufficient oxygen, manifesting as dizziness, headache, visual and hearing dysfunction, and unconsciousness within a few minutes to an hour.	Indoor air quality in nonresidential buildings CO₂ level Description < 450 ppm High quality (fresh air) 450-600 ppm Medium quality 600-1000 ppm Moderate quality > 1000 ppm Low quality 2006/15/EC Directive TWA: 9000 mg/m ³ /5000 ppm STEL not established
Carbon monoxide CO	Flammable. Highly toxic. Mild poisoning causes lightheadedness, confusion, headache, dizziness, and flu-like effects. Larger exposures can lead to toxicity of the CNS and heart, and death. After acute poisoning, long-term problems may occur. CO also have negative effects on a baby if exposed during pregnancy. Chronic exposure to low levels can lead to depression, confusion, and memory loss.	NIOSH TWA 40 mg/m ³ /35 ppm IDLH 1380 mg/m ³ /1200 ppm LEL 12.5% UEL 74%
Chlorine Cl ₂	Non-flammable, but as a strong oxidizer may react explosively with many common chemicals. Highly toxic. Potent irritant of the eyes, mucous membrane, skin and respiratory system. Death can occur within minutes after exposure of 400 to 1000 ppm. Chronic exposure of 1 ppm can cause a moderate, but permanent, reduction in pulmonary function.	2006/15/EC Directive TWA: not established STEL 1.5 mg/m ³ /0.5 ppm NIOSH IDLH: 10 ppm
Ethylene C ₂ H ₄	Extremely flammable. Gas/air mixtures are explosive. Moderately toxic. Excessive exposure by inhalation may cause headache, dizziness, anaesthesia, drowsiness, unconsciousness, or other central nervous system effects.	ACGIH TWA 200 ppm STEL not established LEL 2.7% UEL 36.0%

Gas	Hazards	Exposure and/or flammability limits
Ethylene oxide C ₂ H ₄ O	Flammable. Gas/air mixtures are explosive. Highly toxic. Ethylene oxide is a slow poison with carcinogenic, mutagenic, irritating, and anaesthetic effect. Exposure routes are inhalation, ingestion, (liquid), skin and/or eye contact.	NIOSH REL Ca TWA <0.1 ppm (0.18 mg/m ³) C 5 ppm (9 mg/m ³) [10-min/day] LEL 3.6%, UEL 100.0%
Fluorinated refrigerants (HFC, HFO)	Hydrofluorocarbons HFC are non-flammable and non-toxic, but affect negatively the environment due to relatively high GWP (Global Warming Potential). Hydrofluoroolefins HFO have lower GWP, but are moderately flammable.	Depending on the composition
Hydrogen H ₂	Flammable, forms explosive mixtures with air. Slightly or non-toxic. Asphyxiant.	NIOSH TWA: 1900 mg/m ³ /800 ppm LEL 4.0%, UEL 75.0%
Hydrogen sulfide H ₂ S	Highly flammable, explosive gas. Corrosive. Highly toxic. Broad-spectrum poison, mostly affecting nervous system. At low concentrations causes eye irritation, a sore throat and cough, nausea, shortness of breath, and pulmonary edema. Long-term, low-level exposure results in fatigue, loss of appetite, headache, poor memory, irritability, and dizziness. Exposure to high levels can induce immediate collapse, with loss of breathing and a high probability of death.	2009/161/EU Directive TWA 7 mg/mm ³ / 5 ppm STEL 14 mg/mm ³ / 10 ppm NIOSH IDLH 140 mg/mm ³ / 100 ppm LEL 4.0%, UEL 44.0%
LPG	Liquefied petroleum gas is a mixture of hydrocarbon gases (mostly n- and isobutane and propane). LPG is flammable and forms explosive mixtures with air. Hydrocarbon gases are asphyxiants. Butane is toxic and may cause euphoria, drowsiness, unconsciousness, asphyxia, cardiac arrhythmia, fluctuations in blood pressure and temporary memory loss, when abused directly from a highly pressurized container.	Depending on mixture composition
Methane CH ₄	Highly flammable, mixtures with air are explosive. Methane is not acutely toxic, but it may reduce oxygen concentration in the air (asphyxiant).	Exposure limits not established LEL 5.0%, UEL 15.0%
Nitrogen dioxide NO ₂	Powerful oxidizer, can cause many organic substances (wood, paper, oil etc) to ignite. Corrosive. Highly toxic. Irritates the skin, eyes and respiratory tract. Exposure to levels above 100 ppm can cause death due to asphyxiation from fluid in the lungs. There are often no symptoms at the time of exposure other than transient cough, fatigue or nausea, but over hours inflammation in the lungs causes edema.	NIOSH ST REL 1.88 mg/m ³ / 1 ppm IDLH 37.6 mg/m ³ /20 ppm
Oxygen O ₂	Strong oxidant. May react with combustible and reducing materials (oils, solvents etc), causing fire and explosion hazard. Oxygen enriched atmospheres (>22% O ₂) present a significant fire and explosion risk. Oxygen deficiency in air may lead to loss of concentration, reduced coordination, fatigue. At very reduced levels fainting and death may occur. Breathing of oxygen at increased concentrations may lead to hyperoxia (seizures, respiratory problems, disorientation).	not established

Gas	Hazards	Exposure and/or flammability limits
Ozone O ₃	Powerful oxidizer, can cause flammable substances to ignite. Highly toxic. Ozone can harm lung function and irritate the respiratory system. Exposure to ozone (and the pollutants that produce it) is linked to premature death, asthma, bronchitis, heart attack, and other cardiopulmonary problems.	NIOSH TWA 0.2 mg/mm ³ / 0.1 ppm IDLH 9.8 mg/mm ³ / 5 ppm
Sulfur dioxide SO ₂	Non-flammable. Highly toxic. Inhaling sulfur dioxide is associated with increased respiratory symptoms and disease, difficulty in breathing, and premature death.	NIOSH REL TWA 5 mg/m ³ / 2 ppm STEL 13 mg/mm ³ / 5 ppm IDLH 100 ppm

Terms and abbreviations

LEL	Lower Explosive Limit. The lowest concentration (percentage) of a gas or a vapor in air capable of producing a flash of fire in the presence of an ignition source (arc, flame, heat).
UEL	Upper Explosive Limit. The highest concentration (percentage) of a gas or a vapor in air capable of producing a flash of fire in the presence of an ignition source (arc, flame, heat).
ACGIH	The American Conference of Governmental Industrial Hygienists
NIOSH	The National Institute for Occupational Safety and Health
OSHA	The Occupational Safety and Health Administration
REL/REL C	Recommended exposure limits. A ceiling REL is designated by "C" preceding the value; unless noted otherwise, the ceiling value should not be exceeded at any time. A short-term exposure limit (STEL) is designated by "ST" preceding the value; unless noted otherwise, the STEL is a 15-minute exposure that should not be exceeded at any time during a workday
TWA	Time-weighted average concentration for up to a 8-hour workday during a 40-hour workweek
STEL	15-minute TWA exposure that should not be exceeded at any time during a workday
IDLH	Immediately dangerous to life or health. Exposure that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment
	Conversion of ppm to mg/m ³ is calculated for 25°C and 1 atm.



EVIKON MCI OÜ

TEADUSPARGI 7, TARTU, 50411 ESTONIA

PHONE: +372 7336310

SALES@EVIKON.EU

WWW.EVIKON.EU