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# Transmitter IR29

Innovative infrared transmitter for combustible gases



- First intrinsically safe IR transmitter for explosion protection
- ATEX II 1G Ex ia IIC T4 Ga C<sub>0158</sub> can also be used in Ex zone 0
- Temperature, moisture and pressure compensation
- Patented IR technology (NDIR)
- The energised IR sensor head can be replaced in Ex areas
- Maintenance and service-friendly

# The first intrinsically safe IR transmitter for zone 0

## Measuring method

IR transmitters have become recognised as reliable gas warning systems for explosion protection. They are used to detect individual combustible gases or a wide range of gases. This involves sending an IR beam with a certain light intensity through a measuring space and then capturing it with a detector. Parts of this beam are absorbed by, amongst other things, hydrocarbon molecules. The reduced light intensity of the beam is registered by beam detectors and converted into a signal as the existing gas concentration % LEL.

## Advantages

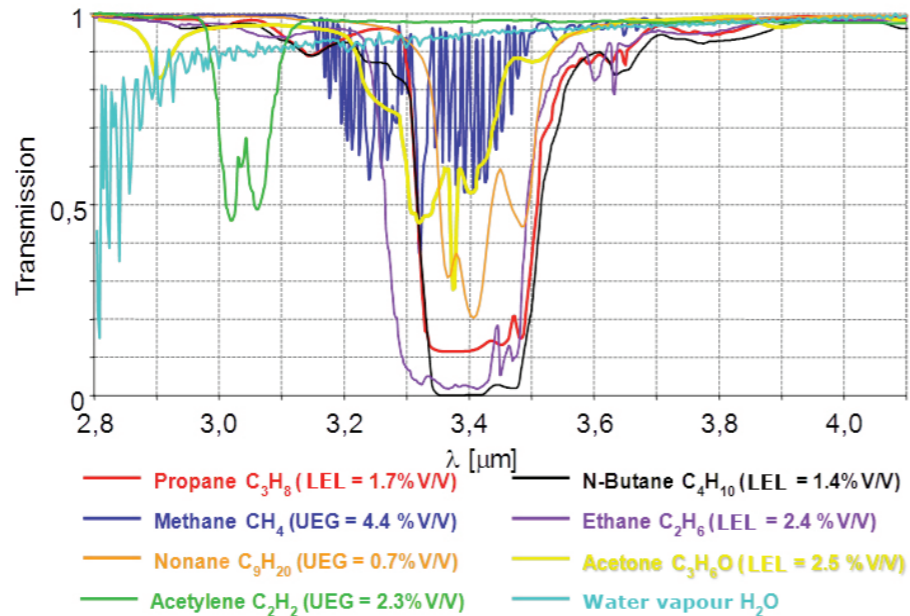
A special feature of our IR technology is its ability to also measure combustible gases above the bottom explosion limit (uniqueness). Moreover, the measurement does not require oxygen.

With this technology there is basically no risk of contaminating the sensor, e.g. through silicone vapours or hydrogen sulphide when using catalytic combustion sensors.

## Functioning

IR transmitters are usually used with 2 wavelengths, a so-called reference wavelength and just one measuring wavelength. Strict limits are applied to these systems. The absorption spectra of many hydrocarbons are located in the wavelength range of 3.3 µm and overlap to a large extent. This means that gases with overlapping spectra and just one measuring wavelength can no longer be clearly distinguished. Some hydrocarbons, e.g. the frequently used welding gas acetylene, are non-absorbing in the wavelength range of 3.3 µm, but absorb instead in neighbouring wavelength ranges.

In many practical applications, it is not essentially important which gas is responsible for the explosion risk. Therefore, early warnings through the broadband measurement of hydrocarbons in order to monitor the lower explosion limit (LEL) must be guaranteed. False alarms with un-



IR measuring ranges using the example of selected gases

critical concentrations of individual gases or solvents are thus absolutely unacceptable.

These requirements are unresolvable problems for systems with 2 wavelengths.

## Patented GfG technology

The internationally patented technology of the IR29 has been developed to solve the said problems. The gold-plated mirror optics of the sensor contains 2 radiators and up to 4 detector elements with different optical filters. The precisely calculated, microstructured and pure gold coated mirror optics of the IR29 are supplied for the first time without beam splitters. This helps to cut signal losses by 50 % and to completely avoid the physically-related disadvantages of a beam splitter. The measured values from two additional wavelengths (4 wavelengths in total) ensure improved detection of individual gases and thus enhanced selectivity. The result in the prevention of false alarms. Only a 4-wavelength system always guarantees early warnings and the simultaneous prevention of false alarms.

## New

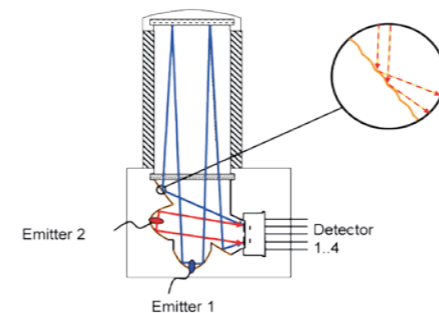
The IR29 is the first and only intrinsically safe IR gas transmitter with patented 4-beam 4-wavelength

technology.

The ignition protection class "intrinsically safe", which is so essential for industrial plants and the mining industry, is achieved by the additional use of the safety barrier SB1 and its internationally patented and innovative design.

## Complete safety even in zone 0

The IR29 is the first IR gas transmitter that can also be used in Ex zone 0 and which enables maintenance as well as replacement of the sensor head without additional expense when energised.



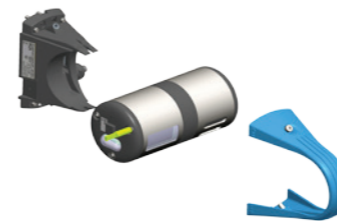
Patented 4-beam 4-wavelength technology

# Always be on the safe side with the IR29

## Universal application

The IR29 with its robust V4A stainless steel housing has been designed to withstand the harshest environmental conditions.

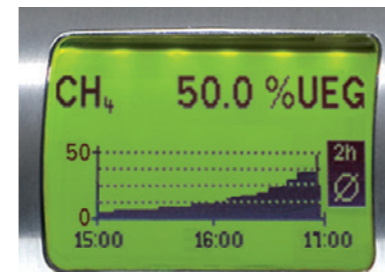
The application areas of the dust and water-protected structure range from production and storage areas to disposal sites, biogas plants, mines and oil rigs.



IR 29: Replacing the sensor head

## Internal data logger

A standard built-in data logger records all the measuring data, minimum / maximum values, average values and alarm events of the last 24 hours in a ring buffer. The recording can also be shown on the display as a 2 and 8 hour trend indicator. The histogram mode can be selected as a permanent display of the measured values. These values are continuously updated.



Histogram mode 2h

## Graphical display

Measured values are shown on the high-contrast graphical display. The display can be rotated 180° depending on the installation of the IR29.



For high visibility in any position: Display rotation 180°

## Self diagnosis

Processor-based signal processing enables the systematic compensation of temperature dependencies, ageing influences and soiling effects. Safety-relevant functions are monitored permanently via self-diagnosis procedures and a possibly required service is indicated automatically. Daily interfering factors, such as dust and dirt accumulation, are almost completely eliminated by the innovative design.

## Pressure sensor, moisture and temperature compensation

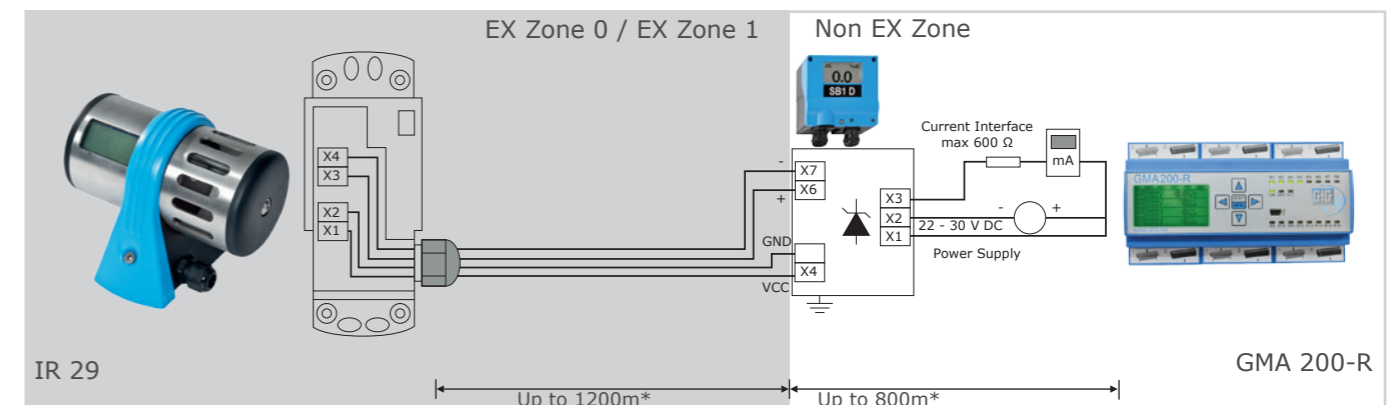
The measuring accuracy of IR sensors depends on partial pressure and thus also air pressure. Climatic fluctuations or barometric high pressure therefore influence the measuring result. Furthermore, the absorption spectrum of water almost completely covers that of hydrocarbon absorption in the 2.7 to 3.3 µm range. Air humidity therefore initially generates a measuring signal the same as the actual measuring gas. This cross-sensitivity is of particular importance in warm areas with high relative humidity. An increase in the absolute water absorption capacity of air is not linear with the temperature, i.e. three times as much water can be absorbed at 40 °C than at 20 °C. This influence can only be compensated if the current moisture content of the air is known. The IR29 can be optionally equipped with a pressure and moisture sensor for compensation.

## Maximum safety

The innovative display enables the realisation of completely safe warning concepts.

Local displays and signals directly at the device can be used to provide an early warning of potential risks. The display at the upstream safety barrier (e.g. SB1 D) enables the detection of risks outside the danger zone being monitored.

This allows immediate on-site action before really hazardous situations occur.

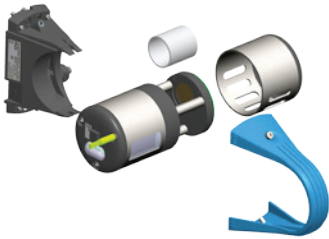


\* Maximum values reached on special conditions

### Dust protection

A gas permeable, water-repellent diaphragm protects the absorption space of the transmitter against dust. The additional impact protection made from robust V4A stainless steel prevents mechanical damage to the optical components.

The diaphragm can be cleaned or replaced in a matter of minutes.



IR29: Changing the diaphragm

### Remote controls

The transmitter IR29 does not feature control elements for setting or servicing tasks. This helps to prevent accidental or unauthorised manipulation.

Service work at the transmitter IR29 is carried out using the remote control RC 2.



IR29 with the remote control RC 2

## The Innovations summarised

- Suitability for zone 0
- The energised transmitter can be replaced in zone 0
- Patented 4-beam 4-wavelength technology
- Temperature, moisture and pressure compensation possible for the first time
- Graphical display
- Permanent local status and functional display

# Technical data

## Transmitter IR29

### Metrological characteristics:

#### Measuring gases

Hydrocarbons such as: methane, propane, butane, etc.

#### Measuring ranges

0 .. 100 % LEL

#### Measuring method

Non-dispersive IR sensor (NDIR)

#### Gas supply

Diffusion

#### Response time

$t_{90} \approx 35\text{-}50$  seconds

### Electrical characteristics:

#### Supply circuit

15 .. 30 V DC; 0.6 W

#### Signal circuit

0.6 W

#### Interfaces

4 .. 20 mA

#### Power consumption

I max. = 50 mA total  
for 24 V = 1.2 W

#### Operation:

##### Display

33 x 53 mm  
LCD graphical display  
Normal mode or  
histogram mode

### Service function

Connection of the remote control RC 2

#### Remote control wired RC 2

125 x 60 x 38 mm

Range: 10m

with display; with 3 buttons

Ex approval: II 2G EEx ia IIC T4

#### Non-wired IR remote control RC 3

60 x 45 x 13 mm

Range: 0.5 m

without display; with 3 buttons

Ex approval: II 2G Ex ia IIC T6

#### Data memory

Ring buffer and data

(not for intrinsically safe version)

Min., max. or dia. values for the last 2,  
8 or 24 hours

### Environmental conditions:

#### Temperature

Operation: -20 °C .. +55 °C

Storage: -25 °C .. +55 °C

#### Air humidity

0 .. 99 % RH

0 .. 95 % RH non-condensing

#### Ambient pressure

750 .. 1200 hPa, optionally  
compensated

### Housing: Housing material

V4A stainless steel (housing)  
Polycarbonate (display, front  
and end cap, foot and bracket)

### Dimensions

98 mm x 96 mm x 48 mm (L x W x H)

### Cable connection

Shielded measuring cable

4 x 0.75 mm<sup>2</sup> to 500 m

4 x 1.5 mm<sup>2</sup> from 500 m

M16\*11

### Protection class

IP67

IP56 with rotatable display

### Expected average sensor service life

>5 years

### Approvals:

#### ATEX certification

Ⓜ II 1G Ex ia IIC T4 Ga Ⓒ<sub>0158</sub>

### EC Type Examination Certificate:

BVS 11 ATEX E 164



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