



## INFRARED GAS SENSOR MIPEX-02-B-C-D.1 A (RX)



### Features

- ☑ Ultra-low power consumption – less than 1.5 mW.
- ☑ Fully digital.
- ☑ Smart sensor with embedded microcontroller returns linearized, temperature-compensated output data (-40...+60 °C).
- ☑ Response time (T90) without dust filter less than 15 seconds.
- ☑ Industry standard size (∅20.3×16.6 mm).
- ☑ Provides intrinsically safe explosion protection level “ia”.
- ☑ Does not require metal-ceramic filters (sinters).

### Description

MIPEX-02 is intended for automatic continuous measurement of hydrocarbons or carbon dioxide concentration in atmosphere of hazardous areas.

Sensor operating principle is based on NDIR technology, i.e. on selective absorption of LED produced infrared radiation by gas molecules.

Differential dual wavelength method allows eliminating of water vapor, optical elements contamination and other non-selective hindrances influence.

Communication interface – UART.

## Technical specification

General specification		
<b>Gas sampling method:</b>	Diffusion	
<b>Operating principle:</b>	Non-Dispersive Infra-Red (NDIR)	
<b>Target gas</b>	CH <sub>4</sub>	
	CH <sub>4</sub> /CH <sub>4</sub> +C <sub>2</sub> H <sub>6</sub>	
	C <sub>3</sub> H <sub>8</sub>	
	CO <sub>2</sub>	
<b>Operating, storage and transportation conditions:</b>	<b>Relative humidity, %</b>	up to 98
	<b>Atmospheric pressure, kPa</b>	80...120
	<b>Temperature**, °C</b>	-55...+60
<b>Warm-up time, sec</b>	120	
<b>Overall dimensions, mm</b>	ø20.3×16.6	
<b>Weight, g</b>	5.5	
<b>Housing material</b>	Plastic Lexan™	

Measurement specification	
<b>Measurement range, % vol.</b>	0...1.5 (CO <sub>2</sub> or C <sub>3</sub> H <sub>8</sub> sensors)
	0...2.5 (CH <sub>4</sub> or C <sub>3</sub> H <sub>8</sub> sensors)
	0...5 (CH <sub>4</sub> or CO <sub>2</sub> sensors)
	0...100 (CH <sub>4</sub> sensors)
<b>Readings variability (+20...+25 °C)*</b>	± 0.1% vol. or ± 5% of readings (whichever is greater) for CH <sub>4</sub>
	± 0.05% vol. or ± 5% of readings (whichever is greater) for C <sub>3</sub> H <sub>8</sub> / CO <sub>2</sub>
<b>Response time (T90), sec</b>	≤ 15
<b>Response time (T90) with dust filter applied, sec</b>	≤ 30

Electrical specification	
<b>Operating supply voltage, VDC (min...max)</b>	+3.0...+5.0
<b>Communication interface</b>	UART
<b>Average current, µA</b>	≤ 1100

\* Variability in the whole operating temperature range for any sensor modification is presented below.

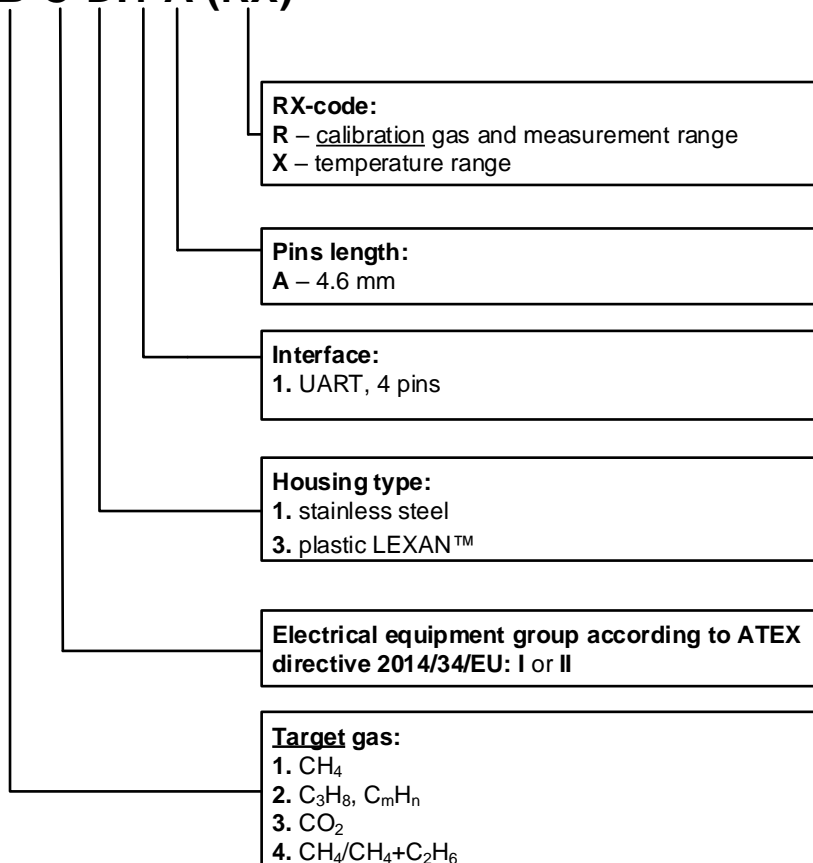
\*\* Term “operating temperature” refers to ambient temperature, at which sensor operates and its intrinsic safety is ensured, but sensor readings variability stated in table below is provided only in temperature range determined by RX-code (see Ordering info).

Calibration gas	Readings variability within a temperature range	Additional variability due to pressure	Additional variability due to humidity
CH <sub>4</sub>	± 0.1% vol. or ± 5% of readings (whichever is greater) within the range of +20...+25 °C;	± 0.2% vol. or ± 30% of readings (whichever is greater) at 100 kPa (test: 80 kPa, 100 kPa, 120 kPa)	± 0.2% vol. or ± 15% of readings (whichever is greater) at 40 °C (test: 20% RH, 50% RH, 90% RH)
	± 0.2% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.4% vol. or ± 20% of readings (whichever is greater) within the range of -40...-10 °C and +40...+60 °C.		
C <sub>3</sub> H <sub>8</sub>	± 0.05% vol. or ± 5% of readings (whichever is greater) within the range of +20...+25 °C;	± 0.1% vol. or ± 30% of readings (whichever is greater) at 100 kPa (test: 80 kPa, 100 kPa, 120 kPa)	± 0.1% vol. or ± 15% of readings (whichever is greater) at 40 °C (test: 20% RH, 50% RH, 90% RH)
	± 0.1% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.2% vol. or ± 20% of readings (whichever is greater) within the range of -40...-10 °C and +40...+60 °C.		
CO <sub>2</sub>	± 0.05% vol. or ± 5% of readings (whichever is greater) within the range of +20...+25 °C;	± 0.1% vol. or ± 40% of readings (whichever is greater) at 100 kPa (tested at 80 kPa, 100 kPa, 120 kPa)	± 0.1% vol. or ± 15% of readings (whichever is greater) at 40 °C (tested at 20% RH, 50% RH, 90% RH)
	± 0.1% vol. or ± 10% of readings (whichever is greater) within the range of -10...+20 °C and +25...+40 °C;		
	± 0.2% vol. or ± 20% of readings (whichever is greater) within the range of -20...-10 °C and +40...+50 °C.		

## Ordering info

Part number structure:

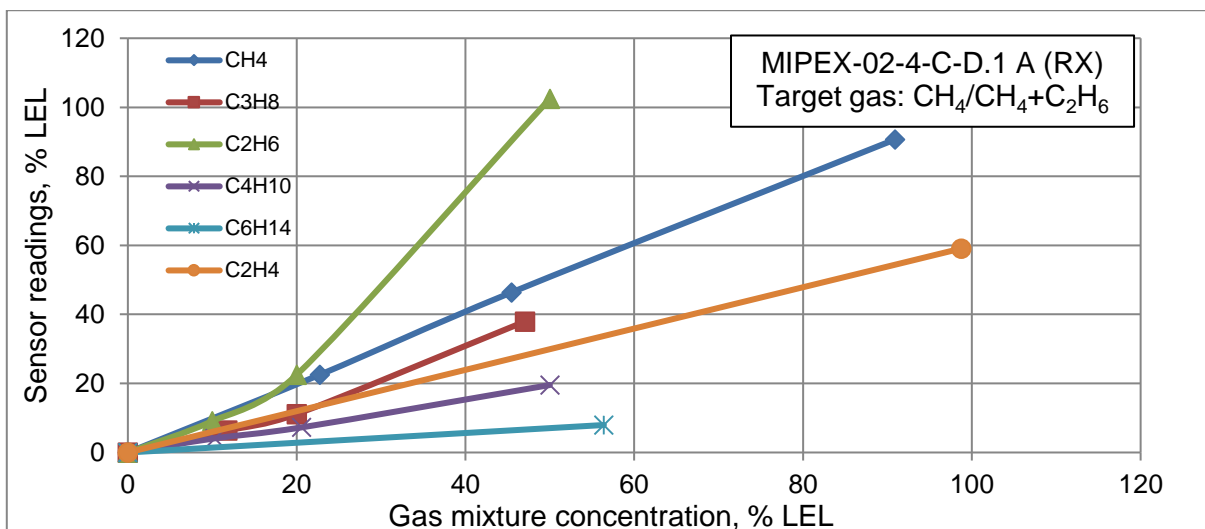
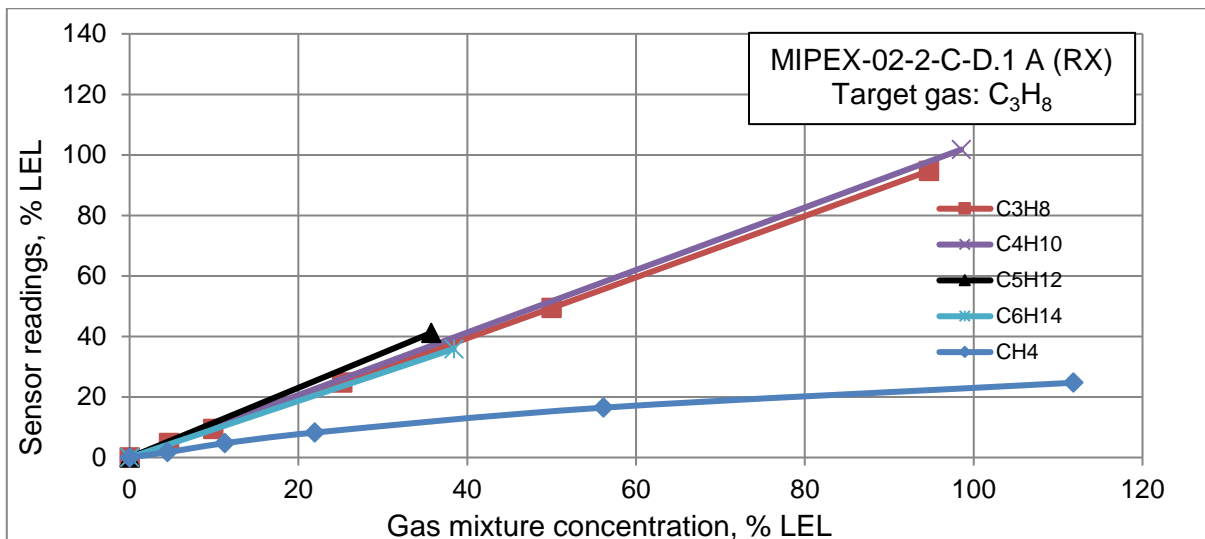
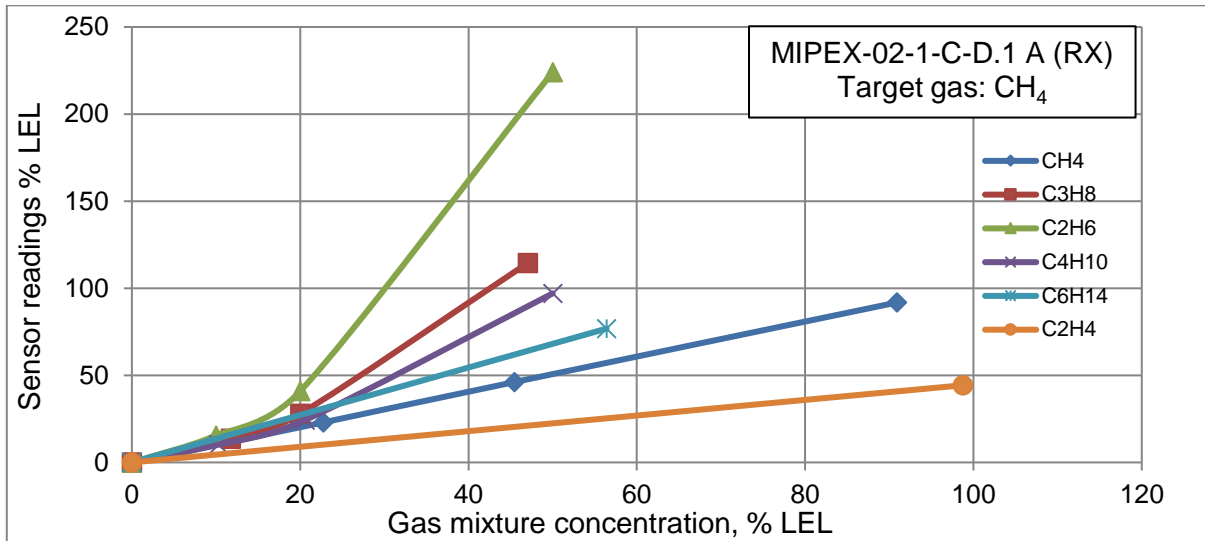
### MIPEX-02-B-C-D.1 A (RX)



Term **target gas** refers to LED and photodiode spectral range, which is adjusted for best detection of a certain gas, while term **calibration gas** refers to gas mixture used for sensor calibration.

Part number	Target gas	Calibration gas	Meas. range, % vol.	Temp. range, °C	RX-code			
MIPEX-02-1-I-D.1 A (00)	CH <sub>4</sub>	CH <sub>4</sub>	0...2.5	-10...+40	00			
MIPEX-02-1-I-D.1 A (10)			0...5		10			
MIPEX-02-1-I-D.1 A (20)			0...100		20			
MIPEX-02-1-II-D.1 A (01)			CH <sub>4</sub>	0...2.5	-40...+60	01		
MIPEX-02-1-II-D.1 A (11)				0...5		11		
MIPEX-02-1-II-D.1 A (21)				0...100		21		
MIPEX-02-1-II-D.1 A (02)		CH <sub>4</sub>	CH <sub>4</sub>	0...2.5	-20...+50	02		
MIPEX-02-1-II-D.1 A (12)				0...5		12		
MIPEX-02-1-II-D.1 A (22)				0...100		22		
MIPEX-02-1-II-D.1 A (61)				C <sub>3</sub> H <sub>8</sub>	C <sub>3</sub> H <sub>8</sub>	0...1.5	-40...+60	61
MIPEX-02-1-II-D.1 A (71)						0...2.5		71
MIPEX-02-1-II-D.1 A (62)						0...1.5	-20...+50	62
MIPEX-02-1-II-D.1 A (72)		0...2.5	72					
MIPEX-02-2-II-D.1 A (61)		C <sub>3</sub> H <sub>8</sub>	C <sub>3</sub> H <sub>8</sub>	0...1.5	-40...+60	61		
MIPEX-02-2-II-D.1 A (71)	0...2.5			71				
MIPEX-02-2-II-D.1 A (62)	0...1.5			-20...+50	62			
MIPEX-02-2-II-D.1 A (72)	0...2.5				72			
MIPEX-02-3-I-D.1 A (30)	CO <sub>2</sub>	CO <sub>2</sub>	0...1.5	-10...+40	30			
MIPEX-02-3-II-D.1 A (32)				-20...+50	32			
MIPEX-02-3-I-D.1 A (40)			0...5	-10...+40	40			
MIPEX-02-3-II-D.1 A (42)				-20...+50	42			
MIPEX-02-4-I-D.1 A (00)	CH <sub>4</sub> /CH <sub>4</sub> +C <sub>2</sub> H <sub>6</sub>	CH <sub>4</sub>	0...2.5	-10...+40	00			
MIPEX-02-4-I-D.1 A (10)			0...5		10			
MIPEX-02-4-I-D.1 A (20)			0...100		20			
MIPEX-02-4-II-D.1 A (01)			0...2.5	-40...+60	01			
MIPEX-02-4-II-D.1 A (11)			0...5		11			
MIPEX-02-4-II-D.1 A (21)			0...100		21			
MIPEX-02-4-II-D.1 A (02)			0...2.5	-20...+50	02			
MIPEX-02-4-II-D.1 A (12)			0...5		12			
MIPEX-02-4-II-D.1 A (22)			0...100		22			

## Typical sensor cross-sensitivity to hydrocarbons and accuracy



## Current consumption

Average current consumption is not more than 330  $\mu$ A at request rate less than 1 Hz.

## Intrinsic safety

Sensor complies with the international standards listed below.

### IEC/EN 60079-0, IEC/EN 60079-11:

- Explosion protection level – “ia”;
- Hazardous area class (Electrical equipment group) – “I” and “IIC”;
- Intrinsic safety parameters:  $P_i = 0.25$  W,  $U_i = 5.0$  V,  $I_i = 450$  mA,  $C_i = 38.8$   $\mu$ F,  $L_i = 0$  mH.

Sensor is suitable for use within end equipment with temperature classes T1-T5 at maximum ambient temperature of +60 °C.

### UL913, CAN/CSA-C22.2 No. 157-92:

- Class I, Division 1, Group A, B, C, D.
- Intrinsic safety parameters:  $P_{max} = 0.25$  W,  $U_{max} = 5.0$  V,  $I_{max} = 450$  mA,  $C_i = 38.8$   $\mu$ F,  $L_i = 0$  mH.

## Handling precautions

Maximum allowable pressure on the central part of sensor reflecting cover or to sensor side surface – 20 kPa, on sensor upper edge – 2 MPa.

Sensor is not intended to measure hydrocarbons contained in fluids.

Sensor may accumulate an electrostatic charge on its housing. Thus, there is risk of electrostatic discharge. Clean only using a damp cloth.

Keep sensor out of contact with aggressive substances e.g. acidic environments, which can react with metals, as well as solvents, which may affect polymeric materials.

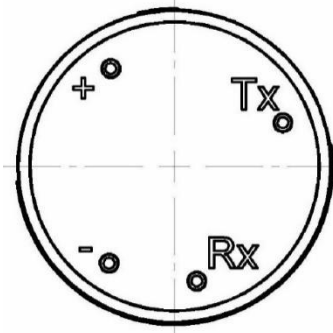
Gas holes of sensor should be protected against ingress of dust and sprayed materials.

Covering diffusion holes of sensor increases its response time  $t(90)$ .

Sensor must be mounted using sockets only, as soldering the pins may damage sensor.

There is no risk of pollution and negative impact on human health. Sensor does not contain any harmful substances that may be released during its normal operation.

### Sensor pinout (bottom side)



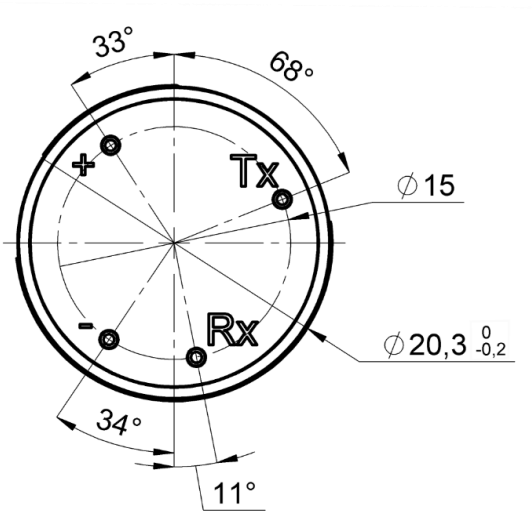
Pin	Purpose
Tx	UART, TxD output
Rx	UART, RxD input
+	V <sub>DD</sub>
-	GND



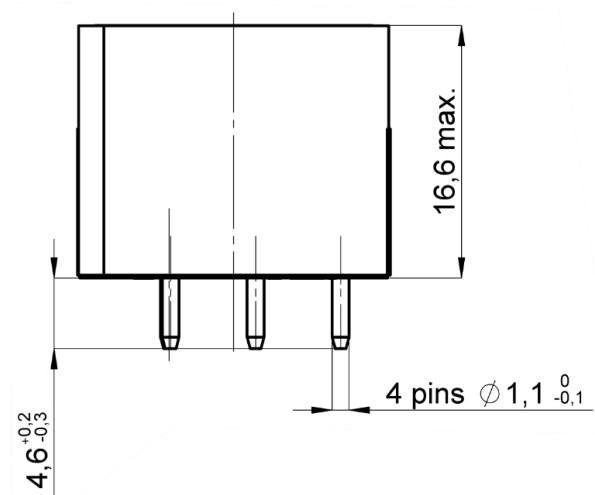
## Outline

All dimensions are in millimeters.

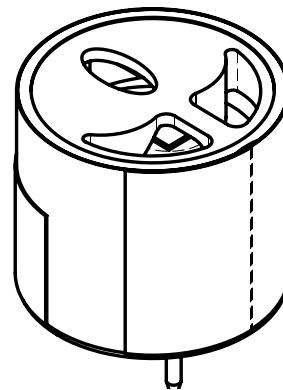
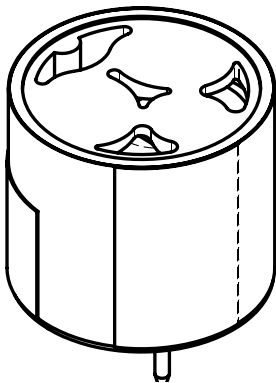
### Bottom view



### Side view



### Upper view



## Contacts

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