



GAS DETECTOR ST650EX

PART.NO. 1226000-1226120

8226000-8226120

DETECTION OF COMBUSTIBLE GASES AND VAPOURS

SYSTEM CGD50, CGD500 TOUCH

GENERAL DESCRIPTION

- Detection of combustible gases and vapours
- All-round industrial gas detector
- ATEX / IECEx | cCSAus
- Touch screen experience, control without additional tools
- Self-diagnostics
- Reliable sensor technology

The **ST650EX** is an all-round gas detector which functions well under the most difficult circumstances. The heart of the detector is a replaceable gas sensor. This detector is available with various sensors, such as a catalytic flammable (CAT) gas sensor, Infrared (NDIR) a Thermal Conductivity sensor (TCD). And a Molecular Property Spectrometer (MPS). This last sensor can differentiate 14 different flammable gasses. And compensate for these in real time.

The **ST650EX** is available with or without a graphic display. The version with a graphic display, shows the measured value and various status notifications locally. The capacitive key control gives you an experience similar to a touchscreen and enables easy navigation through the user/calibration menu. The user menu is secured with a password; unauthorized users cannot access the gas detector. The control of the user/calibration menu does not require additional tools (for example magnets). Simple, easy and user friendly!

The user menu provides different features, such as a zero and span calibration, adjusting alarm set points (local alarm indication through notifications on the display and bright colored LED), showing set points, diagnostic information and simulation of the output signal (4-20mA) for loop testing without gas.

HEIGHTS AREAS / REMOTE APPLICATIONS:

A remote application allows the user to mount the sensor separately from the transmitter. Remote sensors are ideal for applications where the gases present ascend, i.e. gases lighter than air. High located detection areas are often difficult to reach for example during maintenance. When using a remote sensor, the sensor itself will be mounted high and the transmitter will be mounted within close reach. This makes maintenance quick and easy and therefore cost effective. Cable lengths up to 150 meters are supported between the transmitter and the remote sensor (depending on the type).

APPLICATIONS:

- + Chemical industry
- + Refineries
- + Water industry
- + Boiler rooms
- + Storage of packed dangerous substances
- + Food industry
- + Gasturbines
- + Automotive

WE OFFER MORE THAN A PRODUCT!

- + Tailored advice
- + Project advice
- + Technical support
- + Training and education
- + Commissioning
- + Onsite service / maintenance / calibration

New MPS Sensor



The latest sensor technology of gas detection – One decision you don't have to worry about

Next Generation Gas Sensor

- One detector for multiple gases
- One calibration every 5 years
- One complete solution

The latest innovation in gas detection which makes re-calibration, unwanted alarms and sensor poisoning a thing of the past. Available for the building and industrial market; the sensor accurately measures over 14 gases at the same time, without the need for corrections. This makes for an incredibly safe, stable and accurate detector that saves lives, resources and property.

- + Flammable Gas detection
- + Detects multiple gases (14 gases)
- + True LEL
- + Hydrogen detection
- + No calibration needed (in clean air)
- + Long lifetime (5+ years)
- + No sensor poisoning
- + Stable during rapid environmental transients

Gas	Formula	Detection Range	Accuracy (0-50 %LEL)*
Butane	C ₄ H ₁₀	0-100 %LEL	±5 %LEL
Ethane	C ₂ H ₆	0-100 %LEL	±5 %LEL
Hydrogen	H ₂	0-100 %LEL	±7 %LEL
Isobutane	HC(CH ₃) ₃	0-100 %LEL	±9 %LEL
Isobutylene	C ₄ H ₈	0-100 %LEL	±5 %LEL
Isopropanol	C ₃ H ₈ O	0-100 %LEL	+20 %LEL
Methane	CH ₄	0-100 %LEL	±3 %LEL
Methyl ethyl ketone	C ₄ H ₈ O	0-100 %LEL	+16 %LEL
Octane	C ₈ H ₁₈	0-100 %LEL	±15 %LEL
Pentane	C ₅ H ₁₂	0-100 %LEL	±6 %LEL
Propane	C ₃ H ₈	0-100 %LEL	±8 %LEL
Propylene	C ₃ H ₆	0-100 %LEL	±5 %LEL
Toluene	C ₇ H ₈	0-100 %LEL	±13 %LEL
Xylene	C ₈ H ₁₀	0-100 %LEL	±13 %LEL

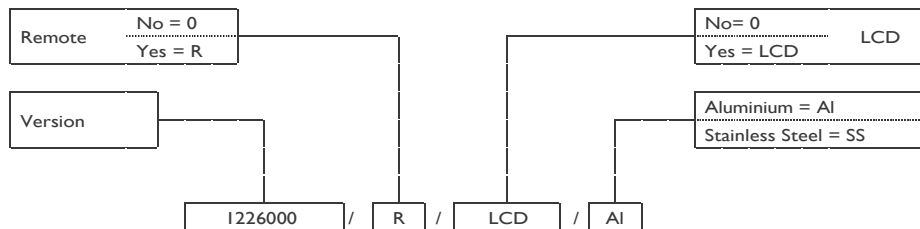
*according to IEC60079-20-1

WORLD WIDE MODELS ORDERING INFORMATION

GAS DETECTOR ATEX / IECEx								
TYPE	SENSORTYPE	APPLICATION	RANGE	PART NO.				
				STANDARD	REMOTE	LCD	ALU or RVS	
ST650EX-CAT 3N	Catalytic	Standard	0-100 %LEL CH ₄	1226000/0	.../R	.../LCD	.../AI	.../SS
		Isobutane (R600a)	0-100%LEL C ₄ H ₁₀	1226110/0				
		Hydrogen	0-100%LEL H ₂	1226111/0				
		Propane (R290)	0-100%LEL C ₃ H ₈	1226120/0				
		Hexane	0-100%LEL C ₆ H ₁₄	1226005/0				
		Custom Calibration	0-100%LEL*	1226100/0				
ST650EX-CAT HT Remote	Catalytic	High Temp.	0-100 %LEL CH ₄	n/a	N/A	.../LCD	.../AI	.../SS
ST650EX-CAT 18A	Catalytic	Acetylene	0-100 %LEL C ₂ H ₂	1226018/0	.../R	.../LCD	.../AI	.../SS
ST650EX-CAT 25	Catalytic	Custom Calibration	0-100%LEL*	1226001/0	.../R	.../LCD	.../AI	.../SS
		VCM***	0-100 %LEL	1226003/0				
ST650EX-CAT 41	Catalytic	Ammonia	0-10 %LEL NH ₃	1226002/0	.../R	.../LCD	.../AI	.../SS
		Kerosene	0-100 %LEL Kerosene	1226010/0				
		Gasoline	0-100 %LEL Gasoline	1226011/0				
		Diesel	0-100 %LEL Diesel	1226012/0				
ST650EX-TCD 6	TCD	Methane	0-100 Vol.% CH ₄	1226008/0	.../R	.../LCD	.../AI	.../SS
		Hydrogen	0-20 Vol.% H ₂	1226009/0				
ST650EX-NDIR	NDIR	Methane	0-100 %LEL CH ₄	1226020/0	.../R	.../LCD	.../AI	.../SS
		Propane	0-100 %LEL C ₃ H ₈	1226021/0				
		Ethanol	0-100 %LEL C ₂ H ₅ OH	1226022/0				
		Hexane	0-100 %LEL C ₆ H ₁₄	1226023/0				
		Methanol	0-100 %LEL CH ₃ OH	1226024/0				
		Xylene	0-100 %LEL C ₈ H ₁₀	1226025/0				
		n- butane (R600)	0-100 %LEL C ₄ H ₁₀	1226026/0				
		Methane	0-100 Vol.% CH ₄	1226050/0				
Propane (R290)	0-100 Vol.% C ₃ H ₈	1226051/0						
ST650EX-MPS	MPS	Flamable ¹	0-100 %LEL	1226080/0	.../R	.../LCD	.../AI	.../SS

¹: Calibrated with Methane ,True LEL for: Butane, Ethane, Hydrogen, Isobutane, Isobutylene, Isopropanol, Methyl ethyl ketone, Octane, Pentane, Propane, Propylene, Toluene, Xylene.
 Note: Catalytic bead sensors are *not suitable* for areas with reduced oxygen and for environments containing silicones or leaded vapours, **NDIR or MPS sensors are more applicable**.
 *VCM is a pellistor inhibitor. Exposure to VCM will certainly shorten sensors lifetime and give drifting issue.

EXAMPLE



Article no. example: ST650EX-3 remote version, with LCD, aluminium housing: **1226000/R/LCD/AI**

NORTH AMERICAN MODELS ORDERING INFORMATION

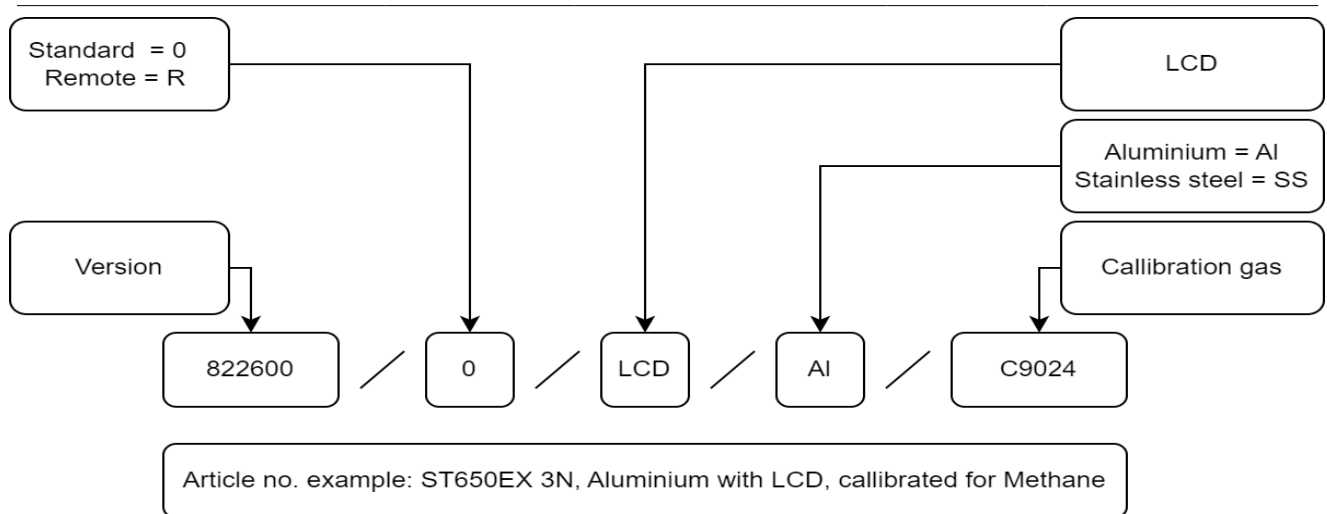
GAS DETECTOR cCSAus								
TYPE	SENSOR TYPE	GAS TYPE	RANGE	GAS TYPE	PART NO.			
					STANDARD ¹	Remote	ALU or RVS	
ST650EX-CAT 3N	Catalytic	Methane	0-100 %LEL CH ₄	C9024	8226000/LCD	+/R	.../Al	.../SS
		Isobutane (R600a)	0-100%LEL C ₄ H ₁₀	C9019				
		Hydrogen	0-100%LEL H ₂	C9018				
		Propane (R290)	0-100%LEL C ₃ H ₈	C9034				
		Hexane	0-100%LEL C ₆ H ₁₄	C9031				
		Other gas types	0-100%LEL	On request				
ST650EX-CAT 18A	Catalytic	Acetylene	0-100 %LEL C ₂ H ₂	C9001	8226018/LCD	+/R	.../Al	.../SS
ST650EX-CAT 25	Catalytic	VCM*	0-100 %LEL	C9041	8226001/LCD	+/R	.../Al	.../SS
ST650EX-CAT 41	Catalytic	Ammonia	0-10 %LEL NH ₃	C9301	8226002/0/LCD	+/R	.../Al	.../SS
		Kerosene	0-100 %LEL Kerosene	C9021				
		Gasoline	0-100 %LEL Gasoline	C9017				
		Diesel	0-100 %LEL Diesel	C9009				
ST650EX-TCD 6	TCD	Methane	0-100 Vol.% CH ₄	C9024/B	8226008/LCD	+/R	.../Al	.../SS
		Hydrogen	0-20 Vol.% H ₂	C9018/C				
ST650EX-NDIR	NDIR	Methane	0-100 %LEL CH ₄	C9024	8226020/LCD	+/R	.../Al	.../SS
		Propane (R290)	0-100 %LEL C ₃ H ₈	C9034				
		Ethanol	0-100 %LEL C ₂ H ₅ OH	C9011				
		Hexane	0-100 %LEL C ₆ H ₁₄	C9031				
		Methanol	0-100 %LEL CH ₃ OH	C9025				
		Xylene	0-100 %LEL C ₈ H ₁₀	C9102				
		n- butane (R600)	0-100 %LEL C ₄ H ₁₀	C9005				
		Propane (R290)	0-100 Vol.% C ₃ H ₈	C9034/B				
ST650EX-MPS	MPS	Flamable ²	0-100 %LEL	C9024	8226080/LCD	+/R	.../Al	.../SS

1: North American models come standard with LCD module

2: Calibrated with Methane ,True LEL for: Butane, Ethane, Hydrogen, Isobutane, Isobutylene, Isopropanol, Methyl ethyl ketone, Octane, Pentane, Propane, Propylene, Toluene, Xylene.

Note: Catalytic bead sensors are *not suitable* for areas with reduced oxygen and for environments containing silicones or leaded vapours, **NDIR or MPS sensors are more applicable**.

*VCM is a pellistor inhibitor. Exposure to VCM will certainly shorten sensors lifetime and give drifting issue.



DIFFERENCES IN SENSOR TYPES	CATALYTIC	TCD	NDIR	MPS
Measuring range	up to 100 %LEL	up to 100 Vol.%	up to 100 %LEL & 100 Vol.%	up to 100 %LEL
Resistance to silicone poisoning	No	limited	√	√
Detects Hydrogen	up to 100 %LEL	up to 100 Vol.%	No	up to 100 %LEL
Affected by hazardous chemical environments	Yes	limited	No	No
Detection in anaerobic / inert conditions	No	√	√	Limited
Sensor burn-out at high concentrations	Yes	No	No	No
Sensor lifetime	long	long	ultra-long	ultra-long
True LEL	No	No	No	Yes













Standard version



LCD version



Remote / LCD version

ACCESSORIES			
TYPE	IMAGE	PART NO.	DESCRIPTION
Signal cable*		4002427	Mesh shielded cable, 3+1x0,75 mm ² (flexible cores), per meter
Duct mounting set JIS		Duct kit for JIS ducts, Stainless Steel.	
		5101101-00A	100A (Ø 200mm)
		5101102-00A	125A (Ø 235mm)
		5101103-00A	150A (Ø 265mm)
		5101104-00A	200A (Ø 320mm)
5101105-00A	250A (Ø 385mm)		
Duct mounting set DIN		Duct kit for DIN ducts, Stainless Steel.	
		5101731-00A	DIN 100 (Ø 220mm)
		5101732-00A	DIN 125 (Ø 250mm)
		5101733-00A	DIN 150 (Ø 285mm)
		5101734-00A	DIN 200 (Ø 340mm)
5101735-00A	DIN 250 (Ø 385mm)		
Duct mounting set		4002722, 4002723	Duct mounting set for mounting in ventilation ducts. (250x200x1,5 mm). 4002722 for brass 4002723 for Stainless steels
Splash guard		4002712	Environmental sensor protection, incl. splash water
Inline flow adapter		4002720	Inline flow adapter for sample applications, connection 2x6mm, SS
Protective hood		4002714	Protective hood SS, for optimal sensor protection in "wet" production areas, dim. 315x300x138 mm
Isolation set EMC/RFI		4002440	Isolation plate EMC/RFI, 160 x 160 x 7,5mm.
Protective bracket		4002713	SS bracket, extra protection for use in e.g. warehouses
Conical collector hood		4000657	Conical hood for ascending gases

*Please check local cable requirements and regulations.

SPARE PARTS / CONSUMABLES

SPARE GAS SENSOR	PART NO.	RANGE	DESCRIPTION
Type CAT 3N	1212200/3N	0-100 %LEL CH ₄	Catalytic sensor (CAT), for standard HC applications
Type CAT 3S	1212201	0-100 %LEL CH ₄	Catalytic sensor (CAT), for wide HC applications (requires 6.xx SW)
Type CAT HT	9220032	0-100 %LEL CH ₄	Catalytic sensor (CAT), High temperature, applications up to 120°C ambient temperature
Type CAT 18A	1212206	0-100 %LEL C ₂ H ₂	Catalytic sensor (CAT), for Acetylene
Type CAT 25	1212203	0-100 %LEL C ₃ H ₈	Catalytic sensor (CAT), for combustible vapours containing halogens (VCM*)
Type CAT 41	1212204	0-100 %LEL Gasoline 0-100 %LEL Kerosene 0-10 %LEL NH ₃	Catalytic sensor (CAT), for Gasoline Catalytic sensor (CAT), for Kerosine Catalytic sensor (CAT), for Ammonia
Type TCD 6	1212205	0-100 Vol.% CH ₄ 0-20Vol.% H ₂	Thermal Conductivity sensor (TCD), for Methane Thermal Conductivity sensor (TCD), for Hydrogen
Type NDIR CH ₄	1219624	0-100 %LEL CH ₄	Infrared sensor (NDIR), for Methane
Type NDIR CH ₄	1219624/V	0-100 %LEL CH ₄	Infrared sensor (NDIR), for Methane(remote only)
Type NDIR C ₃ H ₈	1219625	0-100 %LEL C ₃ H ₈	Infrared sensor (NDIR), for Propane
Type NDIR C ₃ H ₈	1219625/V	0-100 %LEL C ₃ H ₈	Infrared sensor (NDIR), for Propane (remote only)
Type NDIR C ₂ H ₆		0-100 %LEL C ₂ H ₅ OH	Infrared sensor (NDIR), for Ethanol
Type NDIR C ₂ H ₅ OH		0-100 %LEL C ₆ H ₁₄	Infrared sensor (NDIR), for Hexane
Type NDIR C ₆ H ₁₄		0-100 %LEL CH ₃ OH	Infrared sensor (NDIR), for Methanol
Type NDIR C ₈ H ₁₀		0-100 %LEL C ₈ H ₁₀	Infrared sensor (NDIR), for Xylene
Type NDIR C ₂ H ₆	1219650	0-100 %LEL C ₂ H ₆	Infrared sensor (NDIR), for Ethane
Type NDIR C ₂ H ₆	1219650/V	0-100 %LEL C ₂ H ₆	Infrared sensor (NDIR), for Ethane (remote only)
Type NDIR CH ₄	1219626/V	0-100 Vol.% CH ₄	Infrared sensor (NDIR), for Methane
Type NDIR C ₃ H ₈	1219627/V	0-100 Vol.% C ₃ H ₈	Infrared sensor (NDIR), for Propane
Type MPS	1219700	0-100 %LEL	MPS sensor TrueLEL ¹

Note: Catalytic bead sensors are not suitable for environments containing silicones or leaded vapours, NDIR sensors are more applicable.

1. Calibrated with Methane, TrueLEL for: Butane, Ethane, Hydrogen, Isobutane, Isobutylene, Isopropanol, Methyl ethyl ketone, Octane, Pentane, Propane, Propylene, Toluene, Xylene.

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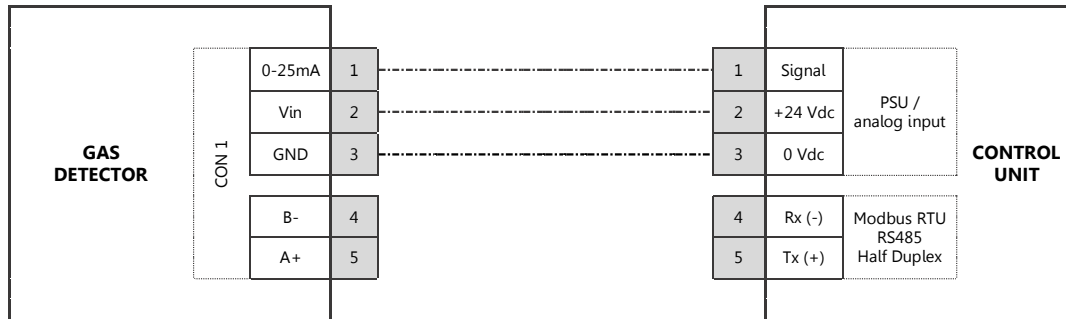
TEST GASES AND ACCESSORIES

TYPE	PART NO.	DESCRIPTION
BUGAS, 1,0 Vol.% CH ₄	9990501	Methane, 1,0 Vol.% in air; 110 gas liters
BUGAS, 2,2 Vol.% CH ₄	9990502	Methane, 2,2 Vol.% in air; 110 gas liters
BUGAS, 50 Vol.% CH ₄	9990533	Methane, 50 Vol.% in air; 110 gas liters (only applicable for Busens D, type 6 TCD)
BUGAS, 0,85 Vol.% C ₃ H ₈	9990547	Propane, 0,85 Vol.% in air; 110 gas liters
BUGAS, 50 Vol.% C ₃ H ₈	9990585	Propane, 50 Vol.% in nitrogen; 110 gas liters
BUGAS, 2,0 Vol.% H ₂	9990506	Hydrogen, 2,0 Vol.% in air; 110 gas liters
BUGAS, 20,9% O ₂ / N ₂	9990537	Synthetic air; 20,9% O ₂ / 79% N ₂ ; 110 gas liters
Calibration adapter	4002715	Stainless Steel calibration flow adapter
Gas hose	1225819	Flexible gas hose, Ø 4x6mm, suitable for non corrosive gasses 1 meter:
Gas hose	1910204	Flexibele gas hose, Ø 4x6mm, suitable for corrosive gasses 1 meter:
Flow regulator	9990600	Flow regulator Chrome/brass, fixed flow 0,5 l/min (for non corrosive gasses)
Flow regulator	9990601	Flow regulator Stainless Steel, fixed flow 0,5 l/min (for corrosive gasses)

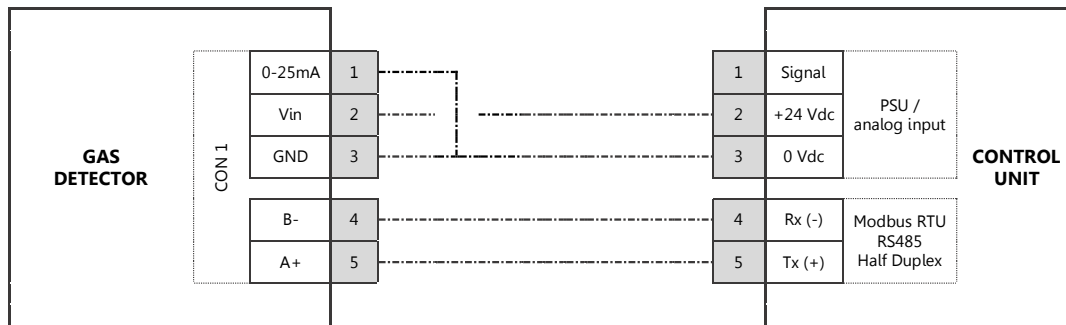
Consilium offers a wide range of test gases, if the required test gas is not listed, please contact us.

CONNECTION DIAGRAM GAS DETECTOR

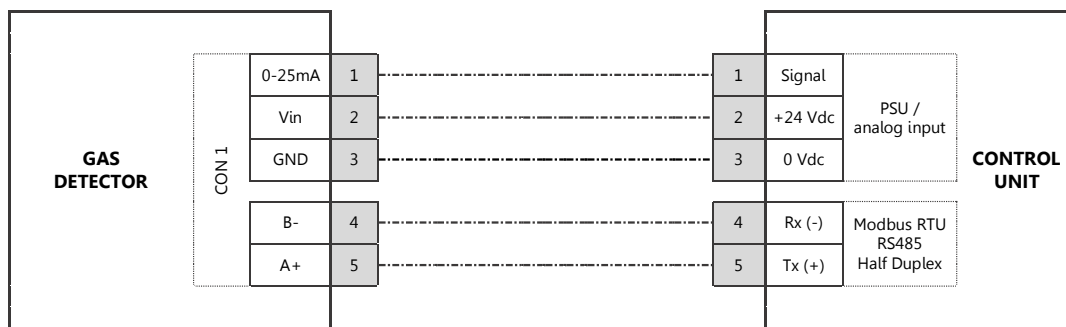
ST650EX used as 4-20mA transmitter (3 wires):



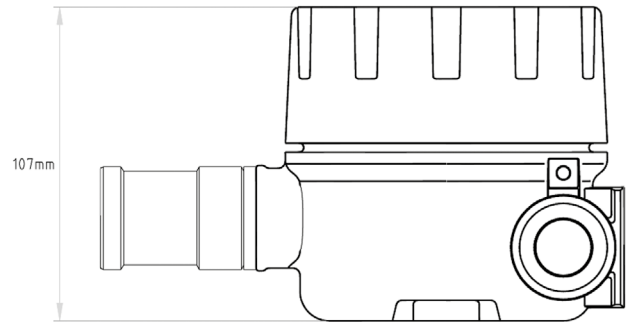
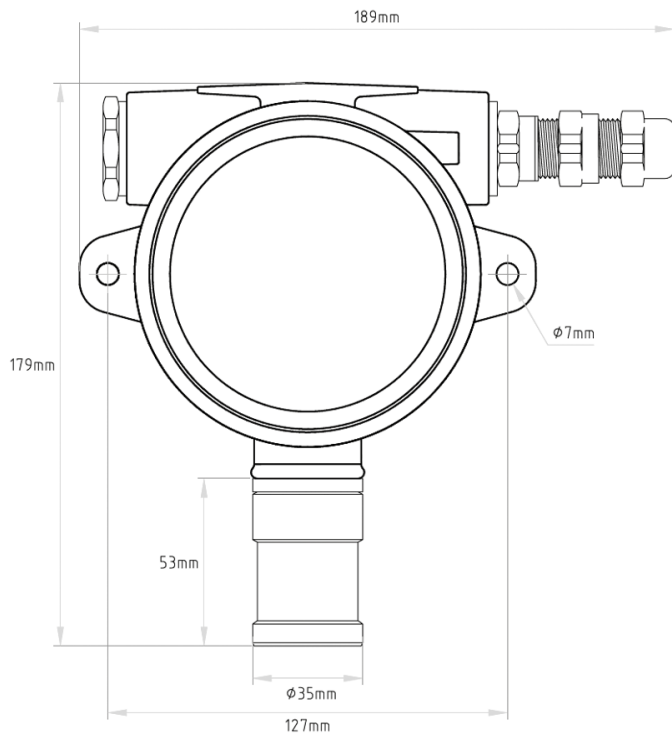
ST650EX used as MODBUS slave device:



ST650EX used as MODBUS slave device and 3 wire 4-20 mA transmitter:



DIMENSIONS



SPECIFICATIONS

PRODUCT	ST650EX									
Gas type	Combustible gases and vapours									
Calibration	Standard Methane, also available for Propane, Butane, Hydrogen, Methanol, Ethanol, Kerosene, Gasoline, Toluene, Hexane, Ammonia, Acetic acid and more... (calibration to be specified when ordered)									
Sensor type	Catalytic bead sensor (CAT), Non Dispersive InfraRed (NDIR), Thermal Conductivity Detector (TCD), Molecular Property Spectrometer (MPS).									
Display (optional)	Digital graphic display with backlight									
Status LED display	Green: OK, Red: Alarm, Yellow: SF (System Failure), Blue: User menu active									
Power supply	18 - 30 VDC (max. 120 mA)									
Outputs	Analogue: 4-20 mA (2 mA system failure, >20 mA overrange) Digital: RS485 Modbus RTU (half-duplex)									
Signal cable	3-wire mesh shielded, 0.75 ... 2.5 mm ² (excluding earth connection and Modbus)									
Cable gland	Standard Brass, optional SS (thread M20x1.5)									
Load impedance	max. 400 Ω at 24 VDC									
Operating temperature	-20°C to +60°C (CAT, TCD, MPS) -20 tot +120 °C (CAT remote HT) -20°C to +50°C (NDIR) (acc. EN 60079-29-1)									
Relative humidity	15-95 % (non-condensing) (Catalytic, TCD) 0-95 % (non-condensing) (NDIR) 0-100 % (non-condensing) (MPS)									
Pressure range	700 to 1300 hPa (Catalytic) 800 to 1200 hPa (NDIR, TCD, MPS) 800 to 1100 hPa (acc. EN 60079-29-1)									
Enclosure	Aluminum with coating, optional SS									
Dimensions	179 x 189 x 107 mm (HxWxD)									
Weight	Aluminum: 1,3kg Stainless Steel: 2,55kg, Aluminum LCD: 1,75kg Stainless Steel LCD: 3kg									
Ingress Protection	IP 66 (Sensor IP 6x)									
Enclosure gas sensor	SS 316									
CE marking (international models)	ATEX (Directive 2014/34/EU) Electromagnetic Compatibility (Directive 2014/30/EU)									
Approvals (international models)	<table border="0"> <thead> <tr> <th></th> <th>Compact/remote:</th> <th>Remote HT:</th> </tr> </thead> <tbody> <tr> <td>ATEX /UKEX</td> <td>II 2G Ex db IICT6 Gb II 2D Ex tb IICT85°C Db</td> <td>II 2G Ex db IICT3 Gb II 2D Ex tb IICT200°C Db</td> </tr> <tr> <td>IECEX</td> <td>Ex db IICT6 Gb Ex tb IICT85°C Db (Tamb: -20°C to +60°C)</td> <td>Ex db IICT3 Gb Ex tb IICT200°C Db (Tamb: -20°C to +120°C)</td> </tr> </tbody> </table>		Compact/remote:	Remote HT:	ATEX /UKEX	II 2G Ex db IICT6 Gb II 2D Ex tb IICT85°C Db	II 2G Ex db IICT3 Gb II 2D Ex tb IICT200°C Db	IECEX	Ex db IICT6 Gb Ex tb IICT85°C Db (Tamb: -20°C to +60°C)	Ex db IICT3 Gb Ex tb IICT200°C Db (Tamb: -20°C to +120°C)
	Compact/remote:	Remote HT:								
ATEX /UKEX	II 2G Ex db IICT6 Gb II 2D Ex tb IICT85°C Db	II 2G Ex db IICT3 Gb II 2D Ex tb IICT200°C Db								
IECEX	Ex db IICT6 Gb Ex tb IICT85°C Db (Tamb: -20°C to +60°C)	Ex db IICT3 Gb Ex tb IICT200°C Db (Tamb: -20°C to +120°C)								
Type examination (international models)	EN 60079-29-1:2016 + A1/A11:2022, EN 50270:2015, EN 50271:2018 IEC 60079-29-1:2016-07									
Approvals (North American models)	cCSAus Class I, Zone 1, AEx db IICT6 Gb Zone 21, AEx tb IICT85°C Db Class I, Division 1, GP A, B, C, D T6 Class II, Division 1, GP E, F, GT85°C 60079-29-1 (flammable)									
Compliance with: (North American models)	CSA C22.2 No. 60079-0:19, 60079-1:16, 60079-31:15, 25:17, 30:20 CAN/CSA C22.2 No. 60079-29-1:17, 61010-1-12 UL 61010-1, 60079-0:19, 60079-1:15, 60079-31, 60079-29-1 FM 3600:2022, 3615:2022, 3616:2022									
Manufacturer	Consilium Safety Netherlands B.V.									

