

# Technical Data CarboSen ST

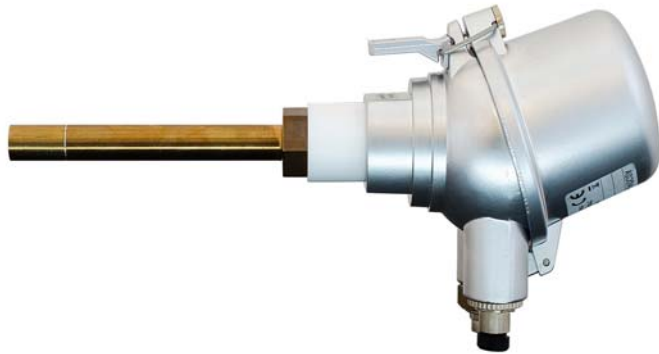


Fig. 1 CarboSen ST

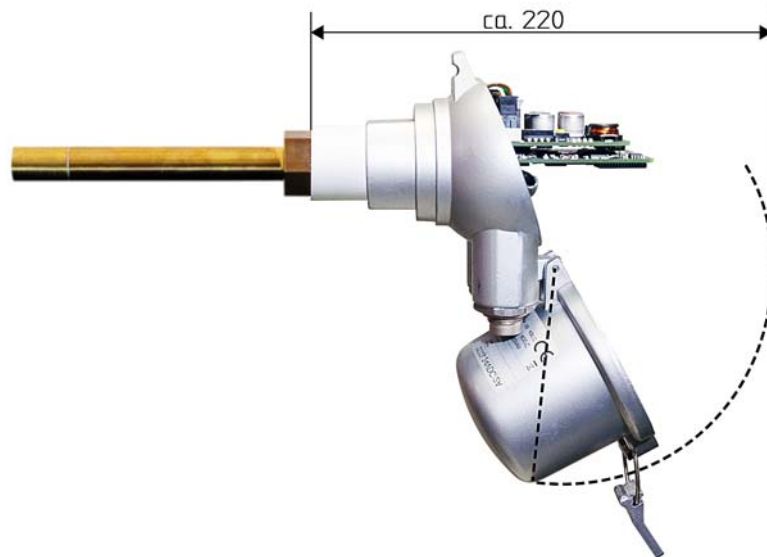


Fig. 2 CarboSen ST with open housing

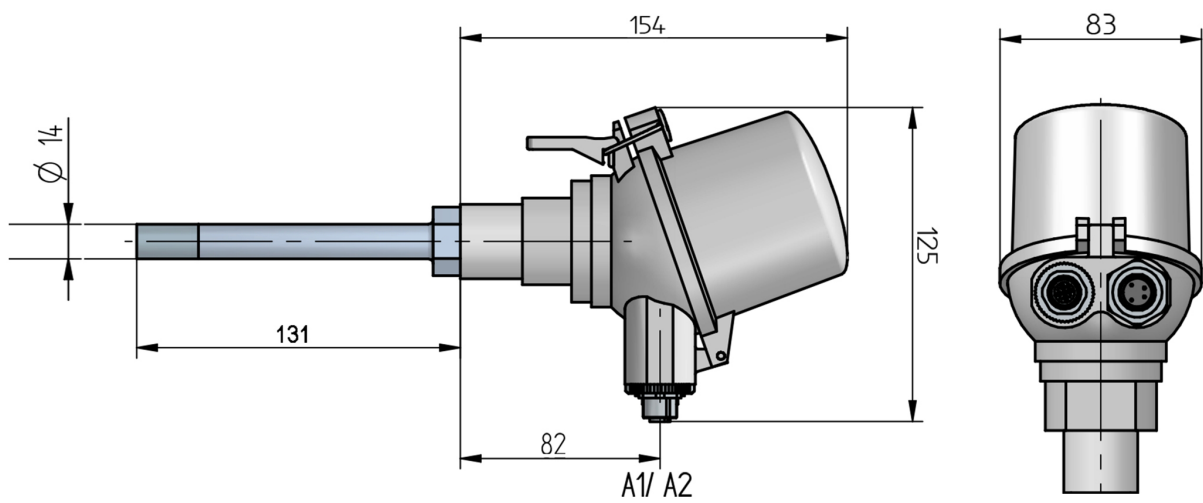


Fig. 3 Dimensions CarboSen ST

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## Plug A1

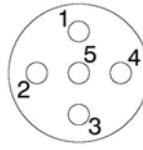
Circular connector, 4-pin



- Pin 1 power supply voltage 0 V
- Pin 2 power supply voltage 24 VDC
- Pin 3 analogue output –
- Pin 4 analogue output +

## Plug A2

Circular connector, 5-pin



- Pin 1 shield
- Pin 2 24 VDC output +
- Pin 3 CAN-GND (LSB)/0 V
- Pin 4 CAN-H (LSB)
- Pin 5 CAN-L (LSB)

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Dimension inclusive sensor electronics (W x H x D)	285 x 125 x 83 mm (open 351 x 125 x 83 mm) 11.22 x 9.84 x 3.27" in (open 13.82 x 9.84 x 3.27" in)
Dimension sensor head housing (W x H x D)	154 x 125 x 83 mm (open 351 x 125 x 83 mm) 6.06 x 9.84 x 3.27" in (open 13.82 x 9.84 x 3.27" in)
Total weight	730 g / 1.61 lb
Weight without probe	545 g / 1.20 lb
Material	head housing: die-casting aluminium temperature decoupling: PTFE
Lifetime	10 years
Colour	aluminium nature
Control elements	programming unit for CarboSen ST via plug A2
Display	LED (green, yellow, red) when the head housing is open
Power supply voltage	13 - 30 VDC (ideal 24 VDC/2 A) via plug A1
Power consumption	approx. 8 W (without accessories)
Time for stand-by	in case of initial start-up/sensor exchange approx 10 min (installation routine) otherwise after 120 s (heating ramp)
Analogue output	factory-tested settings: sensor voltage [mV] -100 ... +900 mV → 4 ... 20 mA (0 mA = fault) min. load 300 Ω via plug A1
Resolution	sensor voltage [mV]: -100 ... +900 mV → 4 ... 20 mA 0.1 mV correspond 1.6 µA CO <sub>e</sub> concentration [ppm]: CarboSen1.000ST: 0 ... 1,000 ppm → 4 ... 20 mA (1 ppm correspond 16 µA) CarboSen10.000ST: 0 ... 10,000 ppm → 4 ... 20 mA (1 ppm correspond 1.6 µA)

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Probe CarboSen 150 mm for ST	
Weight	185 g / 0.41 lb (without Smart Transmitter)
Material	1.4571
Lifetime	> 3 years (in case of light fuel oil and natural gas)
Measurement range	CarboSen1.000: 0 ... 1,000 ppm CarboSen10.000: 0 ... 10,000 ppm
Measurement accuracy	CarboSen1,000: ±25 % of the measured value - not better than ±20 ppm CarboSen10,000: ±30 % of the measured value - not better than ±40 ppm - after previous calibration with operating conditions, - with almost constant fuel composition - after external compensation of the oxygen cross-sensitivity
Sensor signal	-750 ... +50 mV (signal is inverted within the device)
Response time $t_{60}$	< 3 s
Relaxation time (measurement readiness after over- load)	< 9 s
Offset to environment	< 5 ppm
Hysteresis	-
Linearity	-
Repeating precision	-
Ambient pressure dependency	-
Differential pressure dependency	-
Drift	-
Cross sensitivity	to CO <sub>2</sub> : - none to O <sub>2</sub> : - present
Influence of humidity	insignificant
Influence of installation position	none, if installed according to operating instructions
Influence of main voltage	none, if installed according to operating instructions
Influence of leakage	none, if installed according to operating instructions
Influence of the measuring gas	-
Power supply voltage for heating	12 V PWM with sign change
Sensor temperature	approx. 630 °C / 1,166 °F with temperature factor $t_f = 2.6$
Heating power consumption	approx. 3.5 W with temperature factor $t_f = 2.6$ (max. 6 W)
Heating current	approx. 350 mA with temperature factor $t_f = 2.6$
Heating resistance	approx. $9.5 \pm 1 \Omega$ with temperature factor $t_f = 1.0$ (room temperature) approx. $25 \Omega$ with temperature factor $t_f = 2.6$
Internal sensor resistance	approx. $300 \pm 150 \Omega$ with temperature factor $t_f = 2.6$
Measuring principle	mixed potential-solid electrolyte sensor
Heating-up time	> 30 s

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## Conditions of Use

Mounting/measuring gas extraction	directly in the exhaust gas channel/in situ
Leakage	$qL^* \leq 100 \text{ cm}^3/\text{h}$
Mounting position	up to 85° against vertical
Permissible fuels	residue-free, gaseous hydrocarbons, light fuel oil***
Permissible measuring gas humidity	100 % relativ humidity, condensing**
Permissible measuring gas temperature	at sensor head: -20 ... +400 °C / -4 ... +752 °F
Permissible measuring gas speed	< 2 m/s / 6.56 ft/s (measured at measuring gas temperature of 25 °C / 77 °F). In case of smaller measuring gas temperatures it might be necessary to protect the probe from the incident flow.

\* According to DIN V 18160-1:2006-01, leakage towards environment through housing and fastening

\*\* Protect from drops/splash water/water

\*\*\* Direct measurement in combustion gases is not possible.

## Environmental Conditions

<b>Operation</b>	permissible temperature range	at temperature decoupling	-20 ... +220 °C / -4 ... +428 °F
		on head housing	-20 ... +100 °C / -4 ... +212 °F
		inside head housing	-20 ... +60 °C (temporary by 70 °C) / -4 ... +140 °F (temporary by 158 °F)
<b>Transport</b>	permissible temperature range		-40 ... +60 °C / -40 ... +140 °F
<b>Storage</b>	permissible temperature range		-20 ... +40 °C / -4 ... +104 °F
<b>Degree of protection</b>	DIN EN 60529	IP67 (in mounting condition)	

## NOTICE

The limits of the technical data must be strictly adhered to.

## Order Information

### CarboSen ST 'Smart Transmitter' with integrated Transmitter CT1, length 150 mm / 5.91" in

For detection of oxidisable components (CO<sub>e</sub>) in flue gas, flue gas temperature -20 °C to +400 °C / -4 ... +752 °F, 100 % relativ humidity, condensing

Description/Type	Order no.
CarboSen 1.000 ST with Transmitter CT1 in Aluminium housing, 150 mm / 5.91" in, recommended detection range up to 1,000 ppm CO <sub>e</sub> Additional necessary: Connecting cable CarboSenST 24 V & analog output; Order no. 658R1050	658R0010
CarboSen 10.000 ST with Transmitter CT1 in Aluminium housing, 150 mm / 5.91" in, recommended detection range up to 10.000 ppm CO <sub>e</sub> Additional necessary: Connecting cable CarboSenST 24 V & analog output; Order no. 658R1050	658R0011

A10 'Installation Fitting'	Auswahl
Without	00
For screwing M18 x 1.5, steel, incl. galvanized steel sealing ring	03

## Technical Data CarboSen ST

### Connecting cable 'A1' for CarboSen ST

Obligatory for connecting CarboSen ST to a supply voltage, or for pickup the analogue output.

Description/Type	Order no.
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 2 m / 6.6 ft	658R1050 – 2M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 3 m / 9.8 ft	658R1050 – 3M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 5 m / 16.4 ft	658R1050 – 5M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 10 m / 30.81 ft	658R1050 – 10M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 15 m / 49.21 ft	658R1050 – 15M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 20 m / 65.62 ft	658R1050 – 20M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 30 m / 98.43 ft	658R1050 – 30M
Connecting cable 'A1' CarboSenST, 4-pins, 24 V supply & analogue output, length 50 m / 164.04 ft	658R1050 – 50M

### Connecting cable 'A2' für CarboSen ST

Obligatory for connecting CarboSen ST to a supply voltage, or for pickup the analogue output.

Description/Type	Order no.
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 2 m / 6.6 ft	658R1055 – 2M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 3 m / 9.8 ft	658R1055 – 3M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 5 m / 16.4 ft	658R1055 – 5M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 10 m / 30.81 ft	658R1055 – 10M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 15 m / 49.21 ft	658R1055 – 15M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 20 m / 65.62 ft	658R1055 – 20M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 30 m / 98.43 ft	658R1055 – 30M
Connecting cable 'A2' CarboSenST, 5-pins, LSB module, length 50 m / 164.04 ft	658R1055 – 50M

### Spare Part

Description/Type	Order no.
Probe installation fitting for screwing M18x1.5, steel, incl. galvanised steel sealing ring	658R0322



The information in this publication is subject to technical changes.



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