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S700

MODULAR GAS ANALYZER

TAILOR-MADE GAS ANALYSIS FOR PROCESS
AND EMISSION MONITORING

Extractive gas analyzers

SICK

Sensor Intelligence.



With the modular gas analyzer S700, a customer-specific and tailor-made measuring device can be put together for almost every application. 6 analyzer modules for the measurement of many more than 60 gases and 3 housing variants offer comprehensive and individually custom combination options.

Application and principle of operation

The modular gas analyzer S700 is used according to the 13th, 17th and 27th Federal Control of Pollution Regulation [Bundes-Immissionsschutzverordnung (BImSchV)] both for pure emission measurements as well as for applications in the Biogas area and for process gas measurements. For this there are 6 different analyzer modules with 5 different measurement principles available – and this in 3 different housing variants.

In each housing up to 3 analyzer modules can be installed and an optional 2 more measured values can be processed by external measured value sensors via analog inputs. Thus maximum 5 measured values can be taken into account, calculated together, displayed and output via a serial interface. From these, 4 measured values are brought out on analog outputs. All 5 measured values are available with data output via a serial interface and additional data, time and status information.

Optionally from the calculation of actual measured values, a virtual measured value can be generated, which is displayed and can be brought out on an analog output. All measured values can additionally be provided with alarm-limit values. The intelligent microprocessor control enables an automated and low maintenance operation with control functions for the industrial measuring devices including all important device functions, such as fully-automated calibration with test gas or calibrated cuvette (optional).

Also self-monitoring and fault diagnosis are integrated. Operation is done with menu guides with texts on large LCD displayed.

Product versions and combination options

Different housing variants are available depending on the location of use and ambient conditions:

S700  19" rack housing with 3 rack units for standard applications The custom shape S711 with smaller installation depth can be used everywhere that analog old devices should be replaced with new ones	S715  Wall housings for use in harsh industrial environments and Ex Zone 2 (ATEX) and Class I, Division 2, Groups A, B, C and D (NEC/CEC (US/CA))	S720 Ex  In pressurized encapsulation EEx-d for Ex-Zone 1 (ATEX) The custom shape S721 Ex has a larger analyzer housing, in order to utilize the max. analyzer combination options
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A housing can accept up to 3 analyzer modules.

The table shows you the selection options of the analyzer modules, that are differentiated using the following measurement principles:

- NDIR spectroscopy (UNOR and MULTOR)
- Electrochemical cell (OXOR-E)
- Paramagnetic dumbbell principle (OXOR-P)
- Interference filter correlation (FINOR)
- Thermal conductivity measurement (THERMOR)

Simply combine the modules with each other from the different groups. The combination options apply for most housing types. Depending on the scope of equipping and application limitations with the combinations are however possible.

Descriptions of the analyzer modules and their measured values are found on the following product detail pages.

Analyzer modules Group 1	Analyzer modules Group 2	Analyzer modules Group 3
UNOR MULTOR OXOR-E OXOR-P FINOR No module	UNOR ¹⁾ OXOR-E OXOR-P No module	THERMOR OXOR-E OXOR-P No module

¹⁾ Not possible if selected in Group 1 FINOR.

S710 E – completely configured analyzer devices

for the measurement of the most common components and measuring ranges with defined product variants.

- **Flexible use:** Within the specified ranges, the desired measuring range can be conveniently set for the application in question.
- **Flexible adaptation:** The devices are delivered with the setting “mg/m³”. They can be converted to ppm with ease at any time.
- **Easy and efficient ordering:**
 - Via part number
 - Via regional sales organization
 - Direct online via www.sick.com/S700
- **Short delivery time:** The devices are fully configured stock items and are delivered within a few days once the order has been received.

For details refer to „Ordering information“ on page 10.

TAILOR-MADE GAS ANALYSIS FOR PROCESS AND EMISSION MONITORING



Product description

The S700 modular system is very easy to configure to provide a tailor-made application. An S700 housing can be equipped with up to 3 analyzer modules for compact and cost-effective system solutions. A total of 6 different analyzer modules are available for analyzing more than 60 gas components. Depending on the measuring task, installation

site, and ambient conditions, the following housing types are available:
S710 19" rack for analyzer cabinets and standard applications
S715 wall-mounting enclosure for harsh application conditions and zone 2 explosive environment (ATEX)
S720 flame-proof housing for zone 1 explosive environment (ATEX)

At a glance

- 5 different measurement principles available
- More than 60 measuring components to choose from
- 3 different housing variants for different fields of application
- Up to 3 analyzer modules in a single housing

Your benefits

- Easy application-specific adaptation due to modular design
- Also suitable for zone 1 and zone 2 explosive environments (ATEX)
- Automatic adjustment with test gas or calibration cell
- Integrated self-monitoring and fault diagnosis



Additional information

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→ www.sick.com/S700
For more information, simply visit the above link to obtain direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Fields of application

- Emission measurement according to 13th (2001/80/EC), 17th (2000/76/EC), and 27th German Federal Emission Protection Directive (BImSchV).
- Cooling gas monitoring of turbo generators
- Measurement of CO for coal mill monitoring
- Purity measurement of H₂ in pressure swing adsorption plants
- Monitoring of CO₂ in natural gas in natural gas conditioning plants

Detailed technical data

The exact device specifications and performance data of the product may deviate from the information provided here, and depend on the application in which the product is being used and the relevant customer specifications.

S700 system

Gas flow rate	No integrated sample gas pump: 5 l/h ... 100 l/h With integrated sample gas pump: 30 l/h ... 60 l/h
Sample gas temperature	0 °C ... +45 °C Temperature at analyzer inlet
Process pressure	Tubed gas lines: -200 hPa ... 1,000 hPa Hosed gas lines: -200 hPa ... 300 hPa
Process gas humidity	Non-condensing
Dust load	Free of dust and aerosols
Ambient temperature	+5 °C ... +45 °C
Storage temperature	-20 °C ... +70 °C
Ambient pressure	700 hPa ... 1,200 hPa
Geographical altitude	≤ 2,000 m (above mean sea level)
Ambient humidity	≤ 95 % Relative humidity; non-condensing
Electrical safety	CE, cCSAus
Analog outputs	4 outputs: 0/4 ... 20 mA, 500 Ω 0 ... 10 V Electrically isolated
Analog inputs	2 inputs: 0/2/4 ... 20 mA Option: 0 ... 10 V DC
Digital outputs	8 relay contacts: Three relay outputs preset for failure, service and maintenance 8 Open collector outputs: Freely adjustable
Digital inputs	8 optical coupler inputs: Electrically isolated; freely programmable
Interfaces and bus protocols	RS-232c Modbus RTU
Indication	LC display
Operation	Menu-driven operation via LC-display and membrane keyboard
Menu languages	German, English, French, Italian, Dutch, Polish, Swedish, Spanish
Power supply	Voltage 100 V AC / 115 V AC / 230 V AC Frequency 48 ... 62 Hz Power consumption ≤ 150 W Depending on system configuration

Corrective functions	Automatic testing and adjustment with test gases Manual adjustment with test gases
Options	Integrated sample gas pump (only with hoses gas lines) Tubed gas lines Up to three separate gas lines Flow sensor Humidity sensor Barometric pressure correction Sample gas pressure correction Sample point switching (max. 8 sample points)

S710 design

Description	19" rack enclosure with 3 rack units, for integration in cabinets
Enclosure rating	IP 20
Dimensions (W x H x D)	483 mm x 132.5 mm x 390 mm (for details see dimensional drawings)
Weight	10 kg ... 20 kg Depending on configuration
Sample gas connections	PVDF bulkhead fitting For hose 6 x 1 mm Option: Swagelok 6 mm Option: Swagelok 1/4"

S711 design

Description	19" rack enclosure with 3 rack units and reduced depth, for integration in cabinets
Enclosure rating	IP 20
Dimensions (W x H x D)	483 mm x 132.5 mm x 290 mm (for details see dimensional drawings)
Weight	9 kg ... 19 kg Depending on configuration
Sample gas connections	PVDF bulkhead fitting For hose 6 x 1 mm Option: Swagelok 6 mm Option: Swagelok 1/4"

S715 design

Description	Wall-mounting enclosure with gas-tight separated analyzing and electronic units, purgable separately
Ex-approvals	ATEX II 3G Ex nR P II T6 II 3G Ex nR II T6 NEC/CEC (US/CA) Class I, Division 2, Groups A, B, C, D
Enclosure rating	IP 65 / NEMA 4x
Dimensions (W x H x D)	555 mm x 470 mm x 288 mm (for details see dimensional drawings)
Weight	20 kg ... 30 kg Depending on configuration
Sample gas connections	Inside thread G1/4" For screw-in fittings Option: PVDF compression fitting For hose 6 x 1 mm Option: Swagelok 6 mm Option: Swagelok 1/4"
Auxiliary gas connections	Purge gas: Inside thread G1/4" For screw-in fittings Option: Swagelok 8 mm Option: Swagelok 10 mm Option: Swagelok 3/8"
Options	Intrinsically safe outputs for measured values

S720 Ex design

Description	Flame-proof enclosure for use in Ex-zone 1 areas
Ex-approvals	ATEX II 2G EEx d ia IIC T6 II 2G EEx d ia [ia] IIC T6
Enclosure rating	IP 65 / NEMA 7
Dimensions (W x H x D)	For details see dimensional drawings
Weight	60 kg ... 70 kg Depending on configuration
Sample gas connections	Inside thread G1/4" For screw-in fittings Option: PVDF compression fitting For hose 6 x 1 mm Option: Swagelok 6 mm Option: Swagelok 1/4"
Auxiliary gas connections	Purge gas: Inside thread G1/4" For screw-in fittings
Options	Intrinsically safe outputs for measured values

S721 Ex design

Description	Flame-proof enclosure for use in Ex-zone 1 areas with large analyzer unit for maximum system configuration
Ex-approvals	ATEX II 2G EEx d ia IIC T6 II 2G EEx d ia [ia] IIC T6
Enclosure rating	IP 65 / NEMA 7
Dimensions (W x H x D)	For details see dimensional drawings
Weight	90 kg ... 100 kg Depending on configuration
Sample gas connections	Inside thread G1/4" For screw-in fittings Option: PVDF compression fitting For hose 6 x 1 mm Option: Swagelok 6 mm Option: Swagelok 1/4"
Auxiliary gas connections	Purge gas: Inside thread G1/4" For screw-in fittings
Options	Intrinsically safe outputs for measured values

UNOR analyzer module

Description	Highly selective NDIR analyzer for continuous measurement of almost any gas component which absorbs in the infra-red spectral range																		
Measurement principles	NDIR spectroscopy																		
Measuring ranges	<table> <tr><td>CH₄</td><td>0 ... 100 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₂H₂</td><td>0 ... 300 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₂H₄</td><td>0 ... 300 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₂H₆</td><td>0 ... 100 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₂H₂Cl₂</td><td>0 ... 500 ppm / 0 ... 30 Vol.-%</td></tr> <tr><td>C₃H₆</td><td>0 ... 300 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₃H₈</td><td>0 ... 100 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₄H₁₀</td><td>0 ... 100 ppm / 0 ... 100 Vol.-%</td></tr> <tr><td>C₅H₁₂</td><td>0 ... 300 ppm / 0 ... 100 Vol.-%</td></tr> </table>	CH ₄	0 ... 100 ppm / 0 ... 100 Vol.-%	C ₂ H ₂	0 ... 300 ppm / 0 ... 100 Vol.-%	C ₂ H ₄	0 ... 300 ppm / 0 ... 100 Vol.-%	C ₂ H ₆	0 ... 100 ppm / 0 ... 100 Vol.-%	C ₂ H ₂ Cl ₂	0 ... 500 ppm / 0 ... 30 Vol.-%	C ₃ H ₆	0 ... 300 ppm / 0 ... 100 Vol.-%	C ₃ H ₈	0 ... 100 ppm / 0 ... 100 Vol.-%	C ₄ H ₁₀	0 ... 100 ppm / 0 ... 100 Vol.-%	C ₅ H ₁₂	0 ... 300 ppm / 0 ... 100 Vol.-%
CH ₄	0 ... 100 ppm / 0 ... 100 Vol.-%																		
C ₂ H ₂	0 ... 300 ppm / 0 ... 100 Vol.-%																		
C ₂ H ₄	0 ... 300 ppm / 0 ... 100 Vol.-%																		
C ₂ H ₆	0 ... 100 ppm / 0 ... 100 Vol.-%																		
C ₂ H ₂ Cl ₂	0 ... 500 ppm / 0 ... 30 Vol.-%																		
C ₃ H ₆	0 ... 300 ppm / 0 ... 100 Vol.-%																		
C ₃ H ₈	0 ... 100 ppm / 0 ... 100 Vol.-%																		
C ₄ H ₁₀	0 ... 100 ppm / 0 ... 100 Vol.-%																		
C ₅ H ₁₂	0 ... 300 ppm / 0 ... 100 Vol.-%																		

	C ₆ H ₁₄	0 ... 300 ppm / 0 ... 10 Vol.-%
	CO	0 ... 20 ppm / 0 ... 100 Vol.-%
	CO ₂	0 ... 10 ppm / 0 ... 100 Vol.-%
	Frigen 11, CCl ₃ F	0 ... 500 ppm / 0 ... 50 Vol.-%
	Frigen 134a, C ₂ H ₂ F ₄	0 ... 100 ppm / 0 ... 100 Vol.-%
	Frigen 22, CHClF ₂	0 ... 100 ppm / 0 ... 100 Vol.-%
	NH ₃	0 ... 300 ppm / 0 ... 100 Vol.-%
	NO	0 ... 75 ppm / 0 ... 100 Vol.-%
	N ₂ O	0 ... 50 ppm / 0 ... 100 Vol.-%
	SF ₆	0 ... 50 ppm / 0 ... 100 Vol.-%
	SO ₂	0 ... 75 ppm / 0 ... 100 Vol.-%
	More than 60 measuring components available	
Certified measuring ranges		
	CO	0 ... 100 mg/m ³
	NO	0 ... 100 mg/m ³
	SO ₂	0 ... 100 mg/m ³
Response time (t ₉₀)		3 s Typical at 60 l/h, depending on cell length and gas flow
Sensitivity drift		≤ 1 % of measuring range full scale per week
Zero point drift		≤ 1 % of smallest measuring range per week
Conformities		2001/80/EC (13. BImSchV) 2000/76/EC (17. BImSchV) 27.BImSchV TA-Luft (Prevention of Air Pollution) EN 14181
Material in contact with media		Viton B, PVDF, CaF ₂ , BaF ₂ , stainless steel 1.4571, gold, Aluminum
Corrective functions		Manual or automatic adjustment with test gases or adjustment cell

MULTOR analyzer module

Description		Multi-component NDIR analyzer for continuous measurement of up to 3 IR-absorbing gases and H ₂ O for internal interference sensitivity correction
Measurement principles		NDIR spectroscopy
Measuring ranges		
	CH ₄	0 ... 470 ppm / 0 ... 100 Vol.-%
	CO	0 ... 160 ppm / 0 ... 100 Vol.-%
	CO ₂	0 ... 100 ppm / 0 ... 100 Vol.-%
	NO	0 ... 190 ppm / 0 ... 100 Vol.-%
	SO ₂	0 ... 85 ppm / 0 ... 100 Vol.-%
Certified measuring ranges		
	CO	0 ... 200 mg/m ³
	NO	0 ... 250 mg/m ³
	SO ₂	0 ... 250 mg/m ³
Response time (t₉₀)		≤ 25 s At 60 l/h, depending on cuvette length, gas flow and number of measuring components
Sensitivity drift		≤ 1 % of measuring range full scale per week
Zero point drift		≤ 1 % of smallest measuring range per week
Conformities		2001/80/EC (13. BImSchV) TA-Luft (Prevention of Air Pollution) EN 14181

Material in contact with media	Viton B, PVDF, CaF ₂ , BaF ₂ , stainless steel 1.4571, gold, Aluminum
Corrective functions	Manual or automatic adjustment with test gases or adjustment cell

OXOR-E analyzer module

Description	Determination of oxygen content using an electrochemical cell
Measurement principles	Electrochemical cell
Measuring ranges	O ₂ 0 ... 10 Vol.-% / 0 ... 25 Vol.-%
Certified measuring ranges	O ₂ 0 ... 25 Vol.-%
Response time (t₉₀)	20 s Typical at 60 l/h, depending on gas flow
Sensitivity drift	≤ 1 % of measuring range full scale per week
Zero point drift	≤ 2 % of smallest measuring range per month
Conformities	2001/80/EC (13. BImSchV) 2000/76/EC (17. BImSchV) 27.BImSchV TA-Luft (Prevention of Air Pollution) EN 14181
Material in contact with media	Viton B, PVDF, stainless steel 1.4571
Corrective functions	Manual or automated adjustment with test gases

OXOR-P analyzer module

Description	Accurate oxygen analyzer which operates according to the paramagnetic measurement principle
Measurement principles	Paramagnetic dumbbell principle
Measuring ranges	O ₂ 0 ... 1 Vol.-% / 0 ... 100 Vol.-% Optional: suppressed measuring ranges up to 95 ... 100 vol.-%
Certified measuring ranges	O ₂ 0 ... 25 Vol.-%
Response time (t₉₀)	≤ 4 s At a gas flow of 60 l/h
Sensitivity drift	≤ 1 % of measuring range full scale per week
Zero point drift	≤ 1 % of smallest measuring range per week Measuring ranges smaller 5 vol%: ≤ 0.05 Vol.-% per week
Conformities	2001/80/EC (13. BImSchV) 2000/76/EC (17. BImSchV) 27.BImSchV TA-Luft (Prevention of Air Pollution) EN 14181
Material in contact with media	Viton B, PVDF, glass, stainless steel 1.4571, platinum, nickel
Corrective functions	Manual or automated adjustment with test gases
Remark	Special versions with highly solvent-resistant or highly corrosion-resistant measuring cells available

THERMOR analyzer module

Description	Heat conductivity analyzer for the determination of concentrations in binary or quasi-binary gas mixtures
Measurement principles	Thermal conductivity measurement
Measuring ranges	H₂ in Ar H₂ in CH₄ H₂ in CO₂ H₂ in blast furnace gas H₂ in N₂ H₂ in O₂ 0 ... 1 Vol.-% / 0 ... 100 Vol.-% 0 ... 1 Vol.-% / 0 ... 100 Vol.-% 0 ... 1 Vol.-% / 0 ... 100 Vol.-% 0 ... 1 Vol.-% / 0 ... 100 Vol.-% 0 ... 1 Vol.-% / 0 ... 100 Vol.-% 0 ... 1 Vol.-% / 0 ... 100 Vol.-% Other measuring ranges and components on request
Response time (t₉₀)	≤ 20 s At a gas flow of 60 l/h
Sensitivity drift	≤ 1 % of measuring range full scale per week
Zero point drift	≤ 1 % of smallest measuring range per week
Material in contact with media	Glass, stainless steel 1.4571, PVDF (HCl resistant version)
Corrective functions	Manual or automated adjustment with test gases

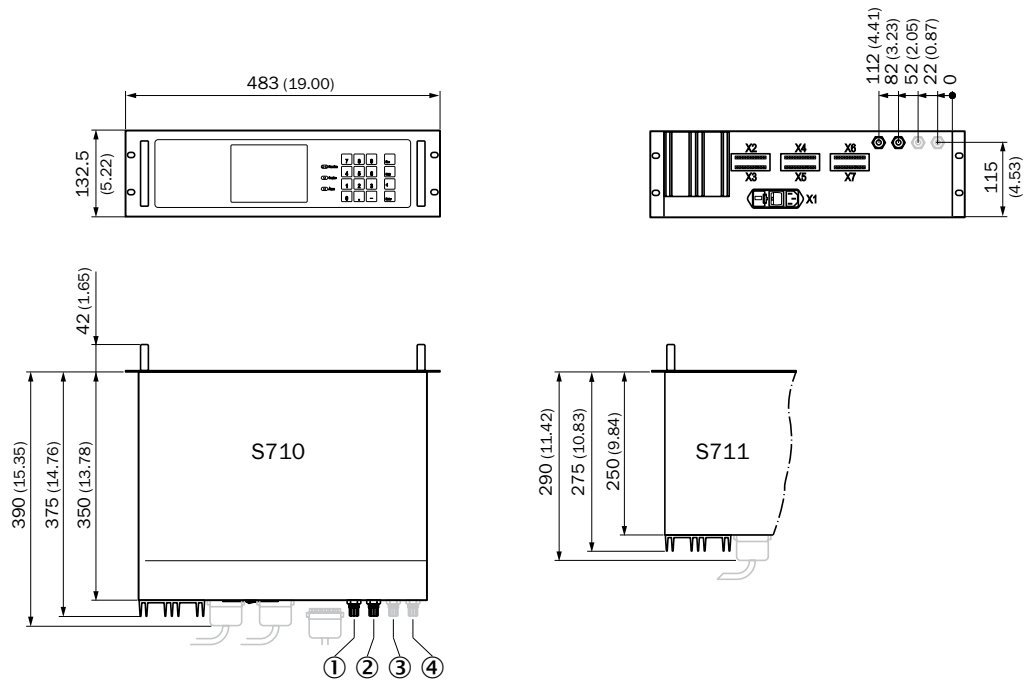
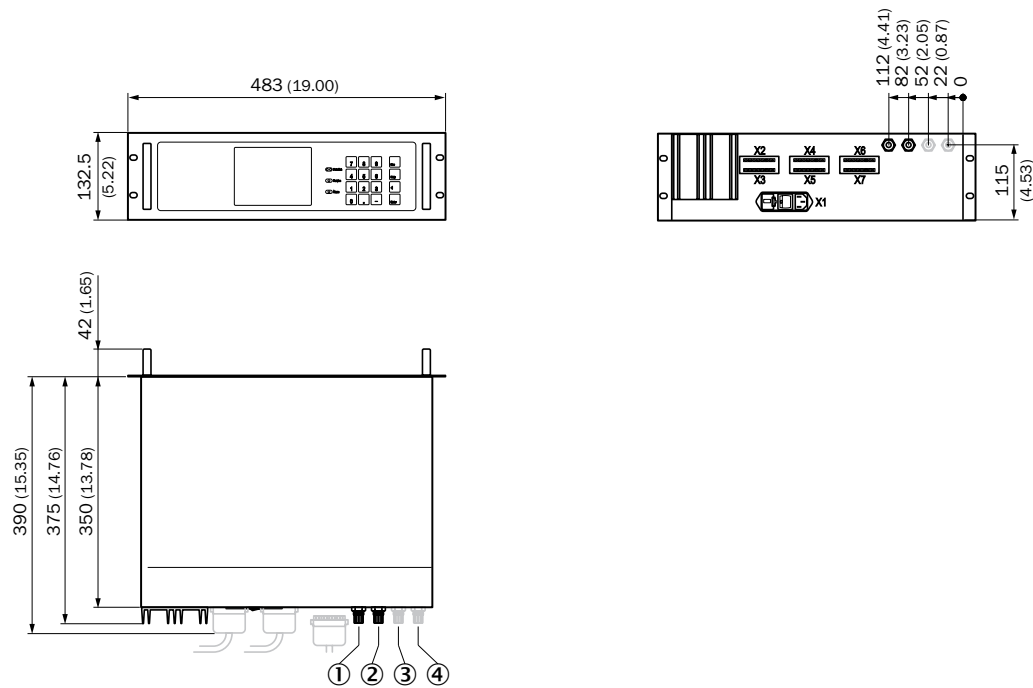
FINOR analyzer module

Description	Rugged IR analyzer with no moving parts for measuring gases in vol. % range
Measurement principles	Interference filter correlation
Measuring ranges	CH₄ CO CO₂ SF₆ 0 ... 2 Vol.-% 0 ... 0.5 Vol.-% 0 ... 0.1 Vol.-% 0 ... 10 Vol.-% Other measuring ranges and components on request
Response time (t₉₀)	≤ 25 s At 60 l/h, depending on cuvette length, gas flow and number of measuring components
Sensitivity drift	≤ 1 % per week
Zero point drift	≤ 1.5 % of smallest measuring range per week
Material in contact with media	Viton B, PVDF, stainless steel 1.4571, Aluminum, CaF ₂

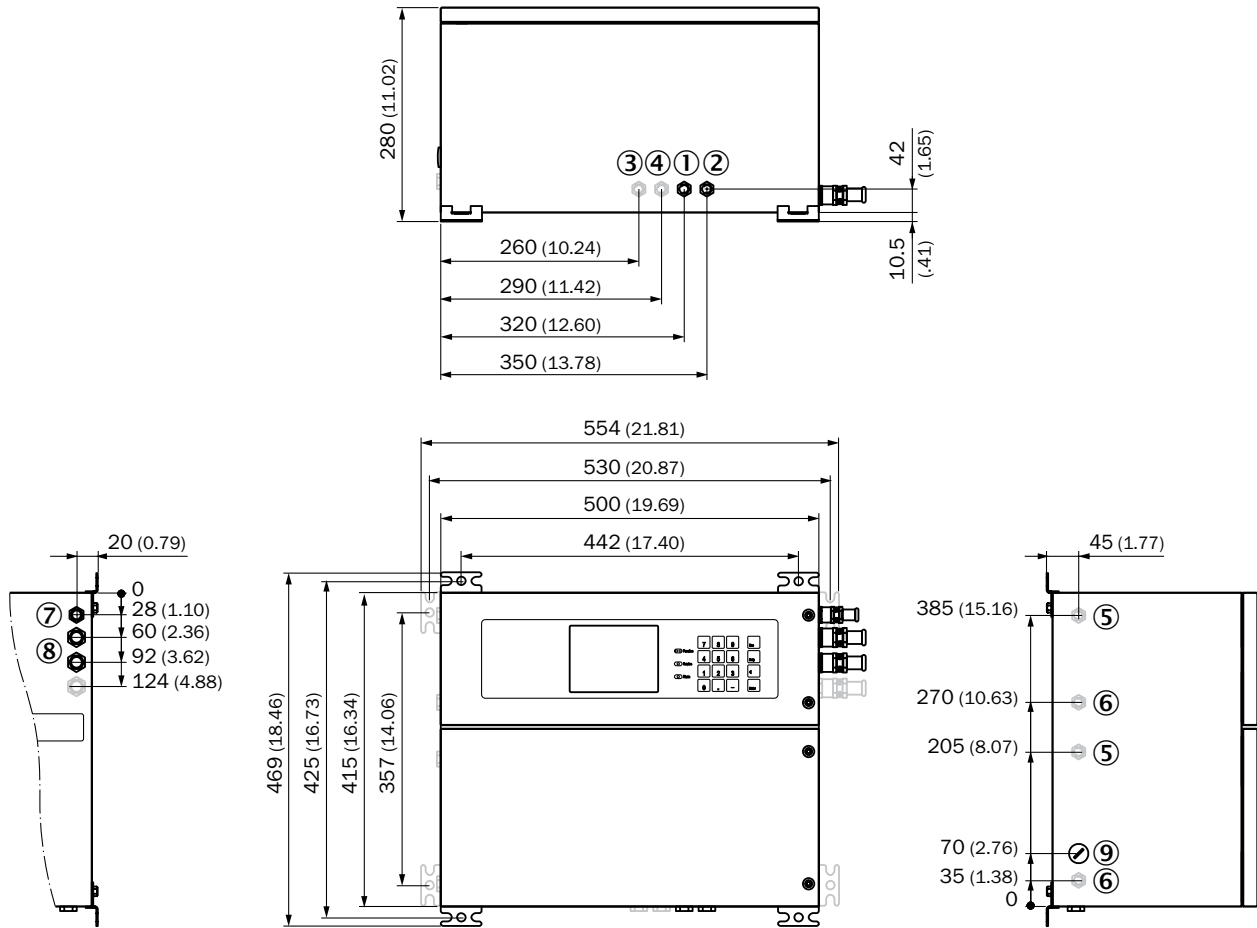
Ordering information

The analyzer devices listed below are completely configured and available with a short delivery time. Furthermore, a large number of device configurations – also customized – are available on request. Our regional sales organization will help you to select the optimum device configuration. → www.sick.com/S700

Min. measuring range	Max. measuring range	Integrated components	Type	Part no.
CO: 0 ... 200 mg/m ³	0 ... 2,000 mg/m ³	MULTOR analyzer module OXOR-E analyzer module PVDF bulkhead fitting	S710 E 1217512	1217512
NO: 0 ... 250 mg/m ³	0 ... 2,500 mg/m ³			
O ₂ : 0 ... 10 Vol.-%	0 ... 25 Vol.-%			
SO ₂ : 0 ... 250 mg/m ³	0 ... 2,500 mg/m ³			
CO: 0 ... 1,200 mg/m ³	0 ... 6,000 mg/m ³	MULTOR analyzer module OXOR-E analyzer module PVDF bulkhead fitting	S710 E 1217513	1217513
NO: 0 ... 1,000 mg/m ³	0 ... 8,000 mg/m ³			
O ₂ : 0 ... 10 Vol.-%	0 ... 25 Vol.-%			
SO ₂ : 0 ... 1,000 mg/m ³	0 ... 7,000 mg/m ³			

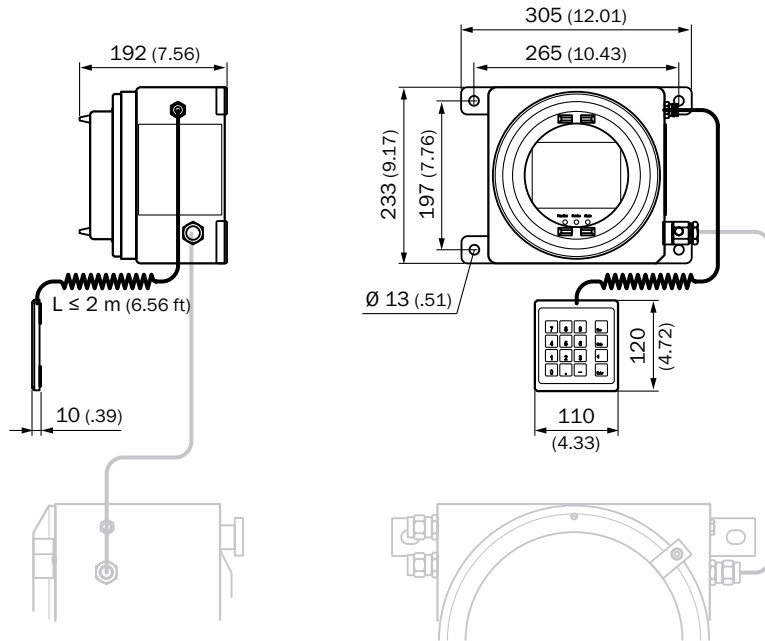
Dimensional drawings (Dimensions in mm (inch))**S710 and S711 design****S710 E 1217140****S710 E 1217141**

S715 design

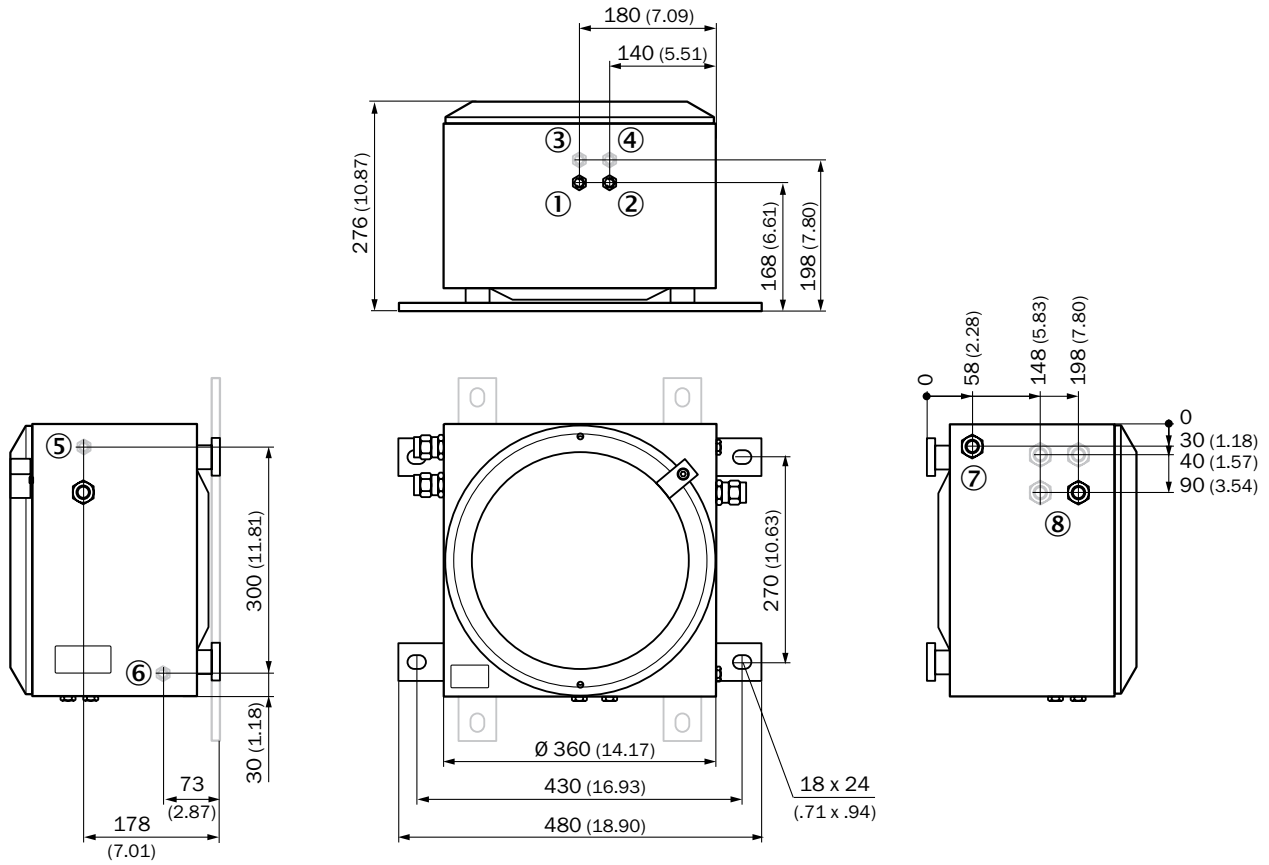


- ① 1. sample gas inlet
- ② Exhaust gas outlet
- ③ 2. sample gas inlet
- ④ 3. sample gas inlet
- ⑤ Purge gas inlet
- ⑥ Purge gas outlet

Display and keyboard for S720 Ex and S721 Ex design

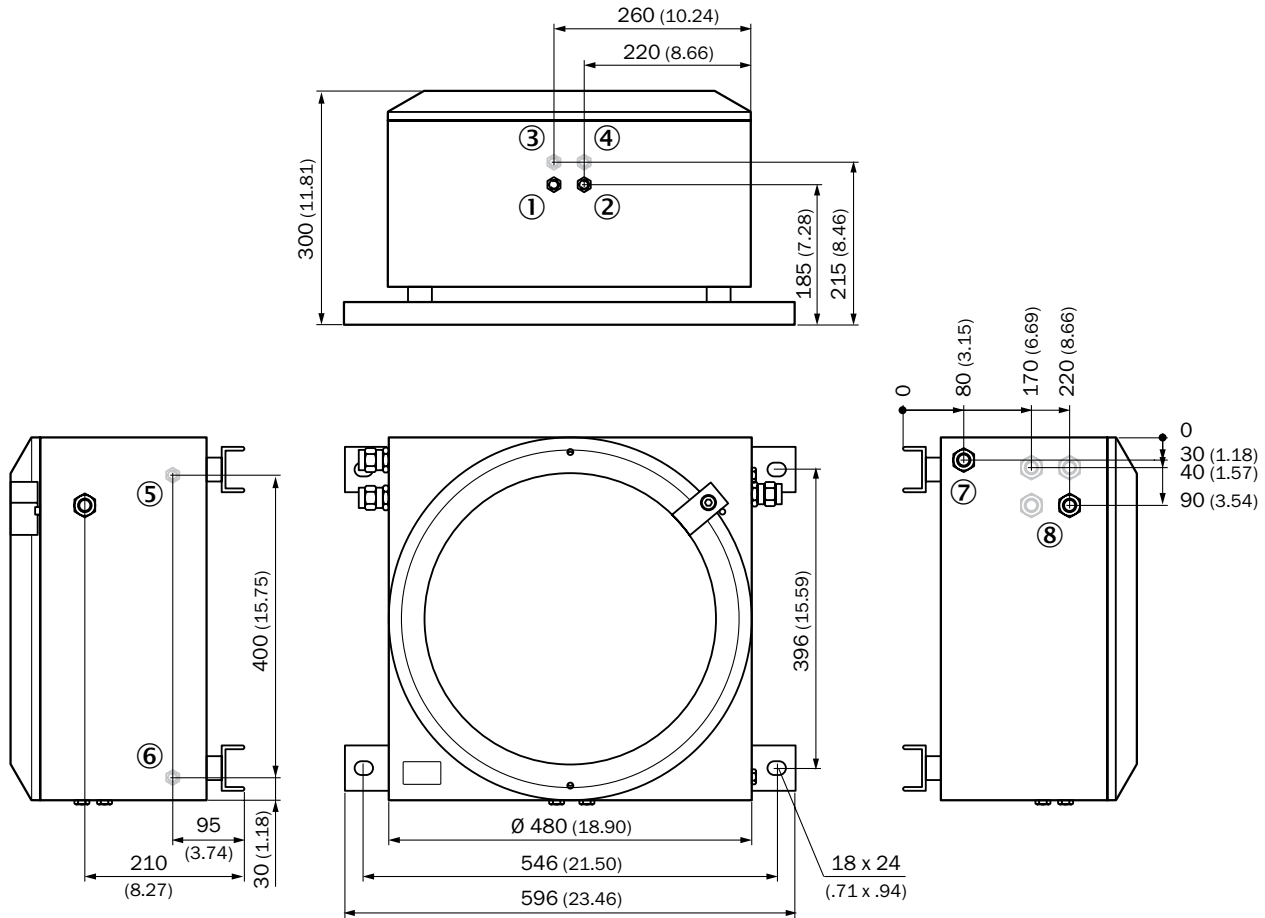


S720 Ex design



- ① 1. sample gas inlet
- ② Exhaust gas outlet
- ③ 2. sample gas inlet
- ④ 3. sample gas inlet
- ⑤ Purge gas inlet
- ⑥ Purge gas outlet

S721 Ex design



- ① 1. sample gas inlet
- ② Exhaust gas outlet
- ③ 2. sample gas inlet
- ④ 3. sample gas inlet
- ⑤ Purge gas inlet
- ⑥ Purge gas outlet

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.



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