

S700 Gas Analyzer



Modular Gas Analyzer System

Using the modular S700 analyzer system, a customized and application specific analyzer can be assembled for nearly every industrial measurement application. A total of 6 different analyzer modules are available for the measurement of more than 60 different gases: from emission measurements according to German standards for industrial boilers, waste incinerators and crematories, to applications in biological gas analysis and process gas analysis.

Depending on the installation location and the environmental conditions, there are 3 types of enclosures to choose from:

- **Enclosure S710:** 19"-rack mounted chassis
- **Enclosure S715:** for rough environmental conditions or for Ex-zone 2 areas as an option
- **Enclosure S720 Ex:** flame-proof EEx-d enclosure for Ex-zone 1

As special versions the following enclosures are available:

- **Enclosure S711:** similar to the enclosure S710, but with shorter installation depth which allows replacement of older instruments
- **Enclosure S721 Ex:** similar to the enclosure S720 Ex with a larger housing which allows the maximum of possible configurations

In addition to the max. 3 built-in analyzer modules, 2 other analog signals from external sources can be input and used in the system^{*)}. Up to 5 analog signals can be considered, calculated with one another and displayed. From these 5 signals, 4 can be given as analog outputs. With output to the serial interface all 5 signals are available, plus information about date, time and status.

A calculated measuring value can be obtained through computation^{*)} of the actual analog measuring values. This virtual measuring value can be displayed and given as one of the analog output signals and it can also be associated with an alarm contact.

The intelligent microprocessor control provides automatic and low maintenance operation with control functions for industrial plants as well as all important instrument functions such as fully automatic calibration with test gas, or calibration cuvette^{*)}. Self diagnostics and internal watchdog functions are also integrated. The menu-driven operator interface includes text messages on a large LCD.

^{*)} Option

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Module Combinations

Up to 3 analyzer modules can be integrated in one single housing. The chosen combination is valid for many types of enclosures. Depending on enclosure, choice of modules and application some restrictions in combination may occur. The maximum number of possible combina-

tions of analyzer modules can be obtained from the table below. How to select: Choose from each column one module. If a module is not required in a specific column simply select "no module" and proceed to the next column.

Column 1	Column 2	Column 3
<p>UNOR</p> <p>MULTOR</p> <p>FINOR</p> <p>OXOR-P</p> <p>OXOR-E</p> <p>NO MODULE</p>	<p>UNOR^{*)}</p> <p>OXOR-P</p> <p>OXOR-E</p> <p>NO MODULE</p> <p><small>*) Combination is only possible when selection in column 1 is UNOR or MULTOR</small></p>	<p>THERMOR</p> <p>OXOR-P</p> <p>OXOR-E</p> <p>NO MODULE</p>
<p>Example 1</p> <p>MULTOR</p> <p>for SO₂, NO</p>	<p>UNOR</p> <p>for CO</p>	<p>OXOR-P</p> <p>for O₂</p>
<p>Example 2</p> <p>FINOR</p> <p>for CO, CO₂, CH₄</p>	<p>NO MODULE</p>	<p>THERMOR</p> <p>for H₂</p>

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face all 5 signals are available, plus information about date, time and status.

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Analyzer Modules

Analyzer Modules	
UNOR	The UNOR uses the well proven NDIR-absorption principle of operation. It can selectively measure every gas which absorbs energy in the infrared spectral range.
MULTOR	The MULTOR is a multi-component NDIR-gas analyzer, which can be used to measure up to three different IR absorbing components and additionally H ₂ O for cross sensitivity compensation.
THERMOR	THERMOR uses the different thermal conductivity of gases to determine the gas concentration of a particular gas in a binary or quasi-binary gas mixture. The influence of other components in non-binary gas mixtures can be taken into account by the cross sensitivity correction ^{*)} in case that the components are measured with other modules or by external measuring devices. The THERMOR is also available as high corrosion resistant measuring cell ^{*)} .
FINOR	The FINOR operates with the interference filter correlation (IFC) principle. Up to three different gas components can be measured simultaneously.
OXOR-P	The OXOR-P uses the paramagnetic measuring principle to determine the concentration of oxygen in a gas sample. The OXOR-P is also available as high corrosion resistant ^{*)} and solvent resistant ^{*)} version.
OXOR-E	The OXOR-E determines the oxygen concentration using an electrochemical cell.

^{*)} Option

Enclosures	
S710	<ul style="list-style-type: none"> • 19" 3HU-chassis • IP 20 • weight: ≈10 ... 20 kg, depend. on config.
S711	<ul style="list-style-type: none"> • special enclosure S710 with reduced installation depth • weight: ≈ 9 ... 19 kg, depend. on config.
S715	<ul style="list-style-type: none"> • wall mounting enclosure • IP 65 (Nema 4X) • gas-tight separation of the measuring and electronic sections • each section separately purgeable^{*)} • optional installation in Ex zone 2 areas with restricted breathing enclosure, for gases which are not combustible, marking II 3 G EEx n R II T6 • when used in a hazardous area the valid Statement of Conformity "TÜV 01 ATEX 1725 X" has to be observed. • optional installation in Ex zone 2 areas with type of protection "Simplified Pressurization" with an ext. approved control unit^{*)}, for gases which may be combustible, marking II 3 G EEx n R P II T6 • integrated flame arrestors^{*)} for gas inlet and outlet • intrinsically safe signal outputs^{*)} • weight: ≈ 20 ... 30 kg, depend. on config.
S720 Ex	<ul style="list-style-type: none"> • flame-proof enclosure/intrinsic. safe • IP 65 (NEMA 7) • suitable for Ex zone 1 areas • test certificate number: TÜV 97 ATEX 1207 X, EEx d ia IIC T6 or EEx d ia [ia] IIC T6 w. intrinsic safe signal output^{*)} • When used in a hazardous area the valid EC-Type Examination Certificate "TÜV 97 ATEX 1207 X" has to be observed. • purgeable^{*)} • integrated flame arrestors^{*)} for gas inlet and outlet • intrinsically safe signal outputs^{*)} • weight: ≈ 60 ... 70 kg, depend. on config.
S721 Ex	<ul style="list-style-type: none"> • special enclosure S720 Ex with a larger housing which allows the max. number of possible configurations • when used in a hazardous area the valid EC-Type Examination Certificate "TÜV 97 ATEX 1207 X" has to be observed. • weight: ≈90 ... 100 kg, depend. on config.

^{*)} Option

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Common Features

Measuring Value, Status and Control Outputs	
Measurement signals (analog)	<ul style="list-style-type: none"> • 4 measuring value outputs • assigned either to an analyzer module, calculated value or to an ext. analog signal^{*)}, freely selectable • 0/4 ... 20 mA or 0 ... 10 V^{*)}, linear • potential-free (galvanically isolated) • max. load 500 Ω, • max. load 390 Ω with intrinsically safe^{*)} output • programmable live zero • during the calibration cycle, the output signal can be selected to either follow the calibration values or to hold the last process measur. value
Output ranges	<ul style="list-style-type: none"> • 2 output ranges^{*)} freely programmable over the basic measuring range • max. range switching ratio^{*)} 1 : 10^{**)}, e.g. 400 ... 500 ppm with basic meas. range 0 ... 1000 ppm ratio 1 : 20 on request^{*)} • data sheet specification is valid for the basic measuring range and ordered output ranges^{*)}
Status- and control outputs	<ul style="list-style-type: none"> • 8 relay contacts • 8 open-collector outputs • 3 relay contacts pre-set, all other contacts can be def. by the user, e.g.: <ul style="list-style-type: none"> - 4 alarm levels, freely programmable for high or low alarm limits - fault - service required (NAMUR-signal "service required") - service/calibration (NAMUR-signal "function monitoring") - 4 measuring range IDs - 5 signals to control the solenoid valves for man. or auto. calibration for sample, zero and test gases - manual control of an external sample gas pump and automatic shut-down thereof in the event of a <ul style="list-style-type: none"> - fault: external sample pump ON/OFF - logic freely selectable
Digital Interfaces	
RS232C (unidirektional)	<ul style="list-style-type: none"> • automatic output of measuring value and status with date and time
RS232C (bidirektional)	<ul style="list-style-type: none"> • limited AK-protocol • remote control via modem or serial PC direct connection

Measuring Value and Control Inputs	
Measurement value inputs	<ul style="list-style-type: none"> • 2 inputs • 0/2/4 ... 20 mA or 0 ... 10 V • for cross-sensitivity^{*)} or other signal computation^{*)} • shown on LC-Display • output on analog measuring value output possible
Control inputs	<ul style="list-style-type: none"> • 8 inputs • galv. isolated via int. opto-couplers • can be freely programmed for up to 24 different meanings, e.g.: <ul style="list-style-type: none"> - calibration control - ext. measuring range switching - monitoring of ext. system components, e.g. cooler, test gas bottles - service/calibration lock-out (NAMUR-Signal "communication") to insure uninterrupted sample analysis
Display and Menu Drive	
Display	<ul style="list-style-type: none"> • back-lit LC-graphic display (120 mm wide, 90 mm high)
Measuring value display	<ul style="list-style-type: none"> • digital, 5-digit (17.5 mm high) • quasi-analog (bargraph) • in engineering units: ppb, ppm, %, mg/m³ n, g/m³ n, to be specified • measur. value and status messages are always shown in every menu step
Menu drive	<ul style="list-style-type: none"> • 3 levels accord. to NAMUR standard • 2 levels are protected against unauthorized access • context related and explanatory help texts accessible
Clear text messages	<ul style="list-style-type: none"> • clear and descriptive text messages: <ul style="list-style-type: none"> - status conditions ("calibration",...) - fault diagnostics ("gas flow", "IR-source, ...) - service required ("zero point drift", ...) etc.
Menu languages	<ul style="list-style-type: none"> • German, English, French, Italian, Spanish, Dutch, Polish, Swedish

^{*)} Option

^{**)} FINOR: maxi,um 1 : 2

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Data sheet

Calibration	
Automatic	<ul style="list-style-type: none"> fully auto. at pre-programmed intervals, via man. or via ext. start signal calibration lock-out in critical measuring situations only zero gas required when using the calibration cuvette^{*)} (UNOR and MULTOR only) or by use of zero and span gases
Manual	<ul style="list-style-type: none"> only zero gas required when using the calibration cuvette^{*)} (UNOR and MULTOR only) or by use of zero and span gases
Gas Inlet and Outlet Conditions	
Gas temperature	<ul style="list-style-type: none"> 0 ... +45 °C
Gas quality	<ul style="list-style-type: none"> dew point of sample gas must be below ambient temperature sample gas must be free of dust, particles and aerosol
Sample gas pressure relative to ambient pressure	<ul style="list-style-type: none"> tubed gas lines: -200 ... +1000 hPa hosed gas lines: -200 ... +300 hPa limitations accord. to Ex approvals possible
Sample gas pump^{*)}	<ul style="list-style-type: none"> max. 60 l/h at 100 hPa subpressure pump capacity adjust. by software only for hosed gas lines limitations according to Ex approvals possible
Sample gas/reference gas flow rate^{*)}	<ul style="list-style-type: none"> without built-in sample pump: 5 ... 100 l/h with built-in sample pump^{*)}: 30 ... 60 l/h limitations according to Ex approvals possible
General Data	
Line voltage	<ul style="list-style-type: none"> 100/115 / 230 VAC (+10 %, -15 %), switchable, fuse change necessary 48 ... 62 Hz
Special version^{*)}	<ul style="list-style-type: none"> 24 V AC
Power consumption	<ul style="list-style-type: none"> max. 150 VA, typically 50 VA, depending on configuration
Ambient temperature (operation)	<ul style="list-style-type: none"> +5 ... +45 °C
Transport and storage temp.	<ul style="list-style-type: none"> -20 ... +70 °C
Relative humidity	<ul style="list-style-type: none"> humidity class F (DIN 40040) ≤ 75 % annual average ≤ 95 % occasionally non-condensing

^{*)} Option

EMI-Protection/Electrical Safety	
CE label	<ul style="list-style-type: none"> EMI guidelines 89/336/EC low voltage guidelines 72/23/EC
EMI-testing according to	<ul style="list-style-type: none"> EN 50081 EN 50082
Criteria	<ul style="list-style-type: none"> NAMUR-standard
Protection class	<ul style="list-style-type: none"> EN 61010
Hardware Options	
Sample gas pump	<ul style="list-style-type: none"> for sample gas delivery
Stainless steel tubing	<ul style="list-style-type: none"> for increased safety
Separate gas lines	<ul style="list-style-type: none"> up to 3 separate gas lines possible
Calibration cuvette	<ul style="list-style-type: none"> for calibration without the need for span gases (UNOR, MULTOR), only zero gas required
Filter cuvette	<ul style="list-style-type: none"> for the reduction of cross interference (UNOR, MULTOR)
Fault monitor flow	<ul style="list-style-type: none"> for monitoring the gas flow
Fault monitor moisture	<ul style="list-style-type: none"> to check for condensate in the sample gas
Barometric pressure correction	<ul style="list-style-type: none"> to compensate for changes in air pressure
Sample gas pressure correction	<ul style="list-style-type: none"> to compensate for changes in sample gas pressure
Sample point switch	<ul style="list-style-type: none"> for switching between up to 8 sample points with external solenoid valves
Gas connections	
Enclosure S710 Enclosure S711	<ul style="list-style-type: none"> PVDF bulkhead fitting for 6 x 1 mm hose 6 mm SWAGELOK^{*)} stst ¼" SWAGELOK^{*)}
Enclosure S715 Enclosure S720 EX Enclosure S721 EX	<ul style="list-style-type: none"> G ¼" inner winding for screw fittings integrated flame arrestors^{*)}
Screw fittings:	<ul style="list-style-type: none"> 6 mm SWAGELOK^{*)} ¼" SWAGELOK^{*)} 6 mm PVDF^{*)} (for hosed gas lines)
Purge Gas Connections	
Enclosure S710 Enclosure S711	<ul style="list-style-type: none"> 6 mm SWAGELOK^{*)}
Enclosure S715	<ul style="list-style-type: none"> ⅜" SWAGELOK^{*)} 8 mm SWAGELOK^{*)} 10 mm SWAGELOK^{*)}
Enclosure S720 EX Enclosure S721 EX	<ul style="list-style-type: none"> G ¼" inner winding for screw fittings (see gas connections)

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UNOR Module

The module UNOR is a precision NDIR gas analyzer for continuous measurement of CO, CO₂, SO₂, CH₄, NO and more than 60 other components with high selectivity and measuring sensitivity. Through variable, adjustable chopper frequency, the instrument is largely insensitive to building vibrations.

Technical Data	
Zero point drift	• ≤ 1% of the smallest measuring span/week ^{**}
Sensitivity drift	• ≤ 1%/week
Noise	• ≤ 0,5 % of smallest measuring span ^{**}
Linearity deviation	• ≤ 1 % of selected output range
Ambient temperature influence	• ≤ 1 % of the smallest output range per 10 K for the zero point ^{**} • ≤ 1 % of measuring value per 10 K for sensitivity ^{**}
Flow dependency	< 0.5 % change in measuring signal 10 l/h change in flow rate
Air pressure influence with open sample gas outlet or process gas pressure influence with sample return to process	• without pressure compensation: 0.6 ... 1 % change • in measuring value for 1 % change in pressure • barometric pressure correction ^{*)} and open sample gas outlet • or sample pressure correction ^{*)} and with sample gas return to process: ≤ 0.1 % change in measuring value for 1 % change in pressure (pressure range 700 ... 1300 hPa)
Line voltage, line frequency influence	• ≤ 0.5 % of the smallest measuring span within the specified voltage and frequency ranges
Times	
Display delay (T₉₀)	• dependant on the cuvette length and gas flow, typically 3 s at 60 l/h
Time constant (T_{90,el}):	• 1 ... 300 s selectable
Warm-up time	• ≈ 45 min
General Data	
Materials in contact with the sample gas	• Viton B, PVDF, glass, stst 1.4571 (Gold)
Certifications (TÜV)	
TA air act / 13. BImSchV / 17. BImSchV / 27. BImSchV	• CO 0 ... 100 mg/m ³ • NO 0 ... 100 mg/m ³ • SO ₂ 0 ... 100 mg/m ³

^{*)} option ^{**}) double values for ranges < 2 x smallest meas. range

Measuring component	Chemical formula	Lowest meas. range	
		[ppm]	[mg/m ³]
Acetylene	C ₂ H ₂	300	350
Ammonia	NH ₃	300	250
1,3 Butadiene	C ₄ H ₆	300	750
Butane	C ₄ H ₁₀	100	250
1-Butanol	C ₄ H ₁₀ O	1000	3000
2-Butanone	C ₄ H ₈ O	1000	3000
1-Butene	C ₄ H ₈	500	1300
Trans-2-Butene	C ₄ H ₈	500	1300
Carbon dioxide	CO ₂	10	20
Carbon disulfide	CS ₂	500	1600
Carbon monoxide	CO	20	30
Chloroform	CHCl ₃	3000	15000
Cyclohexane	C ₆ H ₁₂	300	1100
Cyclohexanone	C ₆ H ₁₀ O	500	2100
1,1-Dichlorethane	C ₂ H ₄ Cl ₂	500	2100
1,1-Dichlorethene	C ₂ H ₂ Cl ₂	500	2100
Dichlormethane	CH ₂ Cl ₂	200	800
Dimethylether	(CH ₃) ₂ O	1000	2000
Ethane	C ₂ H ₆	100	130
Ethanol	C ₂ H ₅ OH	1000	2000
Ethylene	C ₂ H ₄	300	350
Freon 11	CCl ₃ F	100	600
Freon 12	CCl ₂ F ₂	100	510
Freon 13	CClF ₂	100	450
Freon 13B1	CBrF ₃	300	2000
Freon 22	CHClF ₂	500	1800
Freon 113	C ₂ Cl ₃ F ₃	300	2400
Freon 114	C ₂ Cl ₂ F ₄	300	2000
Freon 134a	C ₂ H ₂ F ₄	100	500
n-Heptane	C ₇ H ₁₆	500	2100
n-Hexane	C ₆ H ₁₄	300	1100
Methane	CH ₄	100	70
Methanol	CH ₃ OH	500	700
Methylal	C ₃ H ₈ O ₂	1000	3400
Methylchlorid	CH ₃ Cl	500	1100
Nitric oxide	NO	75	100
Nitrous oxide	NO ₂	50	100
n-Pentane	C ₅ H ₁₂	300	900
Propadiene	C ₃ H ₄	500	900
Propane	C ₃ H ₈	100	200
n-Propanol	C ₃ H ₇ OH	1000	2500
Propylene	C ₃ H ₆	300	600
Sulfur dioxide	SO ₂	40	100
Sulfur hexafluoride	SF ₆	50	300
Tetrachlorethene (Per)	C ₂ Cl ₄	500	3500
Toluene	C ₇ H ₈	500	2000
1,1,1-Trichlorethane	C ₂ H ₃ Cl ₃	1000	5600
Trichlorethylene (Tri)	C ₂ HCl ₃	1000	5500
Water vapor	H ₂ O	1000	820
o-Xylene	C ₈ H ₁₀	500	2200

Other meas. components and ranges on request. Calculated values from ppm into mg/m³ at 20 °C, 1013 hPa. All data are valid for gas mixtures of sample gas and N₂.

S700 MULTOR Module

The module MULTOR is a precision NDIR gas analyzer for the continuous measurement of up to 3 IR-components. H₂O can be measured as 4th component for internal cross sensitivity correction. The MULTOR has

a high selectivity and measuring sensitivity. Through variable, adjustable chopper frequency, the instrument is largely insensitive to building vibrations.

Technical Data	
Zero point drift	• ≤ 1% of the smallest measuring span/week ^{**)}
Sensitivity drift	• ≤ 1%/week
Noise	• ≤ 1% of the smallest measuring span ^{**)}
Linearity deviation	• ≤ 2% of the selected measuring span
Incline influence	• none
Ambient temperature influence	• zero point: ≤ 1.5% of the measuring span/10 K • sensitivity: ≤ 2% of the measuring span/10 K
Flow dependency	• < 0.5% change in measuring value at 10 l/h change in flow rate
Air pressure influence with open sample gas outlet or process gas pressure influence with sample return to process	• without pressure compensation: ≤ 1% change in measuring value for 1% change in pressure • with barometric pressure correction ^{*)} and open sample gas outlet or • with sample gas pressure correction ^{*)} sample gas return to process: • ≤ 0.1% change in measuring value for 1% change in pressure • (pressure range 700 ... 1300 hPa)
Line voltage, line frequency influence	• ≤ 0.5% of the smallest measuring span within the specified voltage and frequency ranges
Times	
Display delay (τ₉₀)	• dependant on the cuvette length, gas flow rate and the number of components, max. 25 s at 60 l/h
Time constant (T_{90,el})	• 1 ... 300 s adjustable
Warm-up time	• ≈ 45 min

Measuring Components and Lowest Meas. Ranges			
Component	Chemical Formula	Lowest meas. range	
Carbon dioxide	CO ₂	100 ppm	200 mg/m ³
Carbon monoxide	CO	160 ppm	200 mg/m ³
Methane	CO ₄	470 ppm	200 mg/m ³
Nitric oxide	NO	190 ppm	200 mg/m ³
Sulfur dioxide	SO ₂	85 ppm	200 mg/m ₃
Calculated values from ppm to mg/m ³ at 20 °C, 1013 hPa. Other measuring components and measuring ranges on request ^{*)} . All data are valid for gas mixtures of sample gas and flue gas.			
General Data			
Materials in contact with the sample gas		• Viton B, PVDF, glass, stst 1.4571 (Gold)	
Certifications (TÜV)			
TA air act / 13. BImSchV /		• CO 0 ... 200 mg/m ³ • NO 0 ... 250 mg/m ³ • SO ₂ 0 ... 250 mg/m ³	

^{*)} option

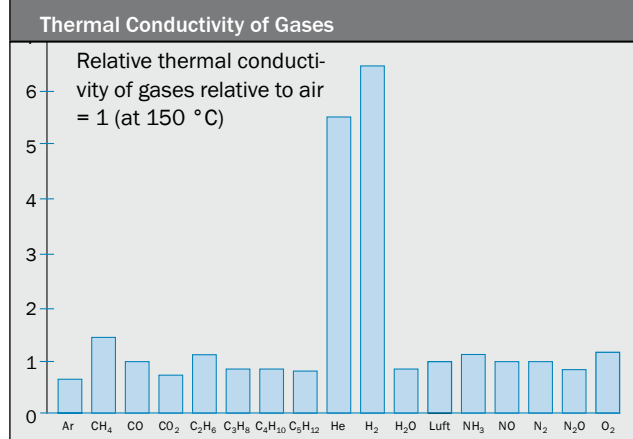
^{**)} double values for ranges < 2 x smallest meas. range

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THERMOR Module

The module THERMOR is a precision thermal conductivity gas analyzer. H₂, He, CO₂, Ar as well as other gases in binary or quasi-binary mixtures can be measured with high measuring sensitivity. The influence of other components in non-binary gas mixtures can be taken into account by the cross sensitivity correction in case that these components are measured with other modules^{*)} or by external measuring devices^{*)}. As an option, the analyzer can be configured for monitoring^{*)} of H₂ cooled turbine generators.

Technical Data	
Zero point drift	• ≤ 1% of smallest measuring span/week ^{**)}
Sensitivity drift	• ≤ 1 % per week
Noise	• ≤ 0,5 % of the smallest measuring span ^{**)} (at T _{90,el} = 10 s)
Linearity deviation	• ≤ 1 % of the selected output range
Ambient temperature influence	• ≤ 1 % of the smallest measuring span per 10 K for the zero point • ≤ 1 % of the measuring value per 10 K for sensitivity
Flow dependency	• < 0.2 % change in measuring value for a change in flow of 10 l/h • for the smallest measuring ranges Δλ ≤ 20 μW/(cm K): < 0.3 % change in measuring value for a change in flow rate
Atmospheric pressure influence	• none
Line voltage, line frequency influence	• ≤ 0.5 % of the smallest measuring span within specified voltage and frequency ranges



^{*)} option

^{**)} double values for ranges < 2 x smallest meas. range

Times			
Display delay (T_{90,ges})	• < 20 s at T _{90,el} = 1 s and sample gas flow 60 l/h		
Time constant (T_{90,el}):	• 1 ... 300 s adjustable		
Warm-up time	• ≈ 30 min		
Measuring Components and Smallest Meas. Ranges			
Component	in	Chemical formula	Smallest meas. range [%]
Argon	Oxygen	Ar in O ₂	5
	Nitrogen	Ar in N ₂	5
Ammonia	Carbon dioxide	NH ₃ in CO ₂	15
	Room air	NH ₃ in air	75
Carbon dioxide	Air	CO ₂ in air	10
Helium	Nitrogen	He in N ₂	1
Hydrogen	Argon	H ₂ in Ar	1
	Air	H ₂ in Ar	1
	Blast furnace gas	H ₂ in blast furnace gas	1
	Carbon monoxide	H ₂ in CO	1
	Methane	H ₂ in CH ₄	1
	Oxygen	H ₂ in O ₂	1
Methane	Nitrogen	H ₂ in N ₂	1
	Ferment. gas	CH ₄ in ferment gas	60

Other measuring components and suppressed measuring ranges on

Option: Cooling Gas Monitoring	
Application	• monitoring of H ₂ cooled turbo generators: during filling/emptying process and during operation for H ₂ purity
Measuring ranges	• 0 ... 100 Vol% CO ₂ in air • 0 ... 100 Vol% H ₂ in CO ₂ • 80 ... 100 Vol% H ₂ in air
Calibration	• for test and zero gas only 100 % H ₂ and 100 % CO ₂ are required
Control and monitoring functions	• manual range switching • external measuring range switching from control system • 4 alarm messages freely programmable • high level of up time through auto. calibration and self-diagnostics
General Data	
Materials in contact with sample gas	• glass, stst 1.4571 or • glass, PVDF (HCl resistant version) ^{*)}
Special Measuring Cell ^{*)}	
As special model ^{*)} of the measuring cell a corrosive resistance cell made of PVDF is available.	

S700 FINOR Module

The module FINOR is a single beam NDIR photometer which operates on the principle of interference filter correlation (IFC). The analyzer can determine up to 3 com-

ponents in parallel. The measuring system incorporates a solid-state detector and as such the entire construction is rugged and insensitive to mechanical vibration.

Technical Data	
Zero point drift	• ≤ 1,5% of the smallest measuring span/week ^{**})
Sensitivity drift	• ≤ 1 %/week
Noise	• ≤ 1 % of the smallest measuring span
Linearity deviation	• ≤ 1,5 % of the selected output range
Incline influence	• none
Ambient temperature influence	• zero point: • ≤ 1.5 % of the measuring span/10 K sensitivity: • ≤ 1.5 % of the measuring span/10 K
Flow dependency	• < 0.1 % change in measuring value at 10 l/h change in flow rate
Air pressure influence with open sample gas outlet or process gas pressure influence with sample return to process	• without pressure compensation: ≤ 1 % change in measuring value for 1 % change in pressure • with barometric pressure correction ^{*)} and open sample gas outlet or • with sample pressure compensation ^{*)} and sample return to process: ≤ 0.1 % change in measuring value for 1 % change in pressure (pressure range 700 ... 1300 hPa)
Line voltage, line frequency influence	• ≤ 0.5 % of the smallest measuring span within the specified voltage and frequency ranges
Output ranges	• 2 output ranges ^{*)} freely programmable over the basic measuring range • max. range switching ratio 1 : 2 • data sheet specification is valid for the basic measuring range and ordered output ranges ^{*)}

Times			
Display delay (T_{90, ges})	• dependant on the cuvette length, gas flow rate and number of components, max. 25 s at 60 l/h		
Time constant (T_{90, el}):	• 1 ... 300 s selectable		
Warm-up time	• ≈ 45 min		
Measuring Components and Smallest Meas. Ranges			
Component	Chem. formula	Smallest meas. range	
		mg/m ³	Vol %
Carbon dioxide	CO ₂	2000	0,1
Carbon monoxide	CO	6000	0,5
Hydrocarbons ¹⁾	C _n H _m		2,0
Methane	CH ₄	15000	2,0
Sulfur hexafluoride	SF ₆		10
Calculation from ppm to mg/m ³ at 20 °C, 1013 hPa. Other components and measuring ranges on request ^{*)} . All data are valid for gas mixtures of sample gas and N ₂ .			

¹⁾ The measurement of hydrocarbons is performed via a broad range filter and allows only for a rough estimation of the existing hydro carbon concentration.

General Data	
Materials in contact with the sample gas	• Viton B, PVDF, stst 1.4571

^{*)} option

^{**)} double values for ranges < 2 x smallest meas. range

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OXOR-P Module

The module OXOR-P is a precision oxygen analyzer. The measuring module operates on the principle of a rotating diamagnetic dumbbell, which is suspended in an inhomogeneous magnetic field.

The paramagnetic characteristic of oxygen exerts torque on the dumbbell which is proportional to the concentration of O₂ in the sample gas.

Technical Data	
Zero point drift	<ul style="list-style-type: none"> < 1 % of the meas. span / week or < 0.05 Vol% O₂ / week for measuring spans less than 5 Vol% O₂
Sensitivity drift	<ul style="list-style-type: none"> < 1 % of the measuring value/week
Noise	<ul style="list-style-type: none"> < 0.5 % of the measuring span (at T_{90,el} = 10 s) ^{**)}
Detection limit	<ul style="list-style-type: none"> < 0,5 % of the measuring span
Linearity deviation	<ul style="list-style-type: none"> ≤ 1 % of the selected output range
Ambient temperature influence	<ul style="list-style-type: none"> ≤ 2 % of the measuring span/10 K < 0,1 Vol% O₂ /10 K for measuring spans ≤ 5 % O₂
Incline influence	<ul style="list-style-type: none"> < 0,05 Vol% O₂ /1° change
Flow dependency	<ul style="list-style-type: none"> < 0,05 Vol% O₂ at 10 ... 60 l/h at 10 l/h change in flow rate
Air pressure influence with open sample gas outlet or process gas pressure influence with sample return to process	<ul style="list-style-type: none"> without pressure compensation: ≤ 1 % change in measuring value for 1 % change in pressure with barometric pressure correction^{*)} and open sample gas outlet or with sample gas pressure correction^{*)} and sample return to process: ≤ 0.1 % change in measuring value for 1 % change in pressure (pressure range 700 ... 1300 hPa)
Line voltage, line frequency influence	<ul style="list-style-type: none"> ≤ 0.5 % of the smallest measuring span within the specified voltage and frequency ranges
Times	
Display delay (T_{90,ges})	<ul style="list-style-type: none"> < 4 s, standard (at T_{90,el} = 1 s and sample gas flow = 60 l/h)
Time constant (T_{90,el}):	<ul style="list-style-type: none"> 1 ... 300 s adjustable

Measuring and Output Ranges	
Basic measuring ranges	<ul style="list-style-type: none"> from 0 ... 3 Vol% O₂^{*)} to 0 ... 100 Vol% O₂ zero-suppressed ranges^{*)} (up to 95 ... 100 Vol% O₂)
Output ranges	<ul style="list-style-type: none"> up to 2 output ranges^{*)} freely adjustable within the measuring range, smallest output range 1 Vol% O₂ maximum range ratio^{*)} 1 : 10, ratio 1 : 20 on request^{*)} for example: <ul style="list-style-type: none"> output range 10 ... 12.5 Vol% O₂ with basic measuring range 0 ... 25 Vol% O₂ data sheet specifications are valid for basic measuring ranges and factory set output ranges^{*)}
General Data	
Operating altitude	<ul style="list-style-type: none"> ≤ 2000m above sea level, if installation is to be higher, please notify us at the time of order
Materials in contact with the sample gas	<ul style="list-style-type: none"> corrosion-resistant in Viton B, PVDF, glass, stst 1.4571, Platinum, Nickel
Certifications (TÜV)	
TA air act / 13. BImSchV / 17. BImSchV / 27. BImSchV	<ul style="list-style-type: none"> 0 ... 25 Vol% O₂
Special Versions	
Solvent resistant* or corrosion resistant* measuring cells are available as special versions.	

^{*)} option

^{***)} double values for ranges < 2 x smallest meas. range

S700

OXOR-E Module

The module OXOR-E is a precision oxygen analyzer. It operates using an electrochemical cell for the detection of oxygen.

Technical Data	
Zero point drift	<ul style="list-style-type: none"> • $\leq 2\%$ of the smallest measuring span/month
Sensitivity drift	<ul style="list-style-type: none"> • $\leq 1\%$/week
Noise	<ul style="list-style-type: none"> • $\leq 0,1\%$ O₂
Linearity deviation	<ul style="list-style-type: none"> • $\leq 1,5\%$ of the selected measuring span
Incline influence	<ul style="list-style-type: none"> • none
Ambient temperature influence	<ul style="list-style-type: none"> • zero point: $\leq 1.5\%$ of the measuring span/10 K • sensitivity: $\leq 1.5\%$ of the measuring span/10 K
Flow dependency	<ul style="list-style-type: none"> • 0.1 % change in measuring value at 10 l/h change in flow rate
Air pressure influence with open sample gas outlet or process gas pressure influence with sample return to process	<ul style="list-style-type: none"> • without pressure compensation: $\leq 1\%$ change in measuring value for 1 % change in pressure • with barometric pressure correction^{*)} and open sample gas outlet or • with sample gas pressure correction^{*)} and sample return to process: $\leq 0.1\%$ change in measuring value for 1 % change in pressure (pressure range 700 ... 1300 hPa)
Line voltage, line frequency influence	<ul style="list-style-type: none"> • $\leq 0.5\%$ of the smallest measuring span within the specified voltage and frequency ranges

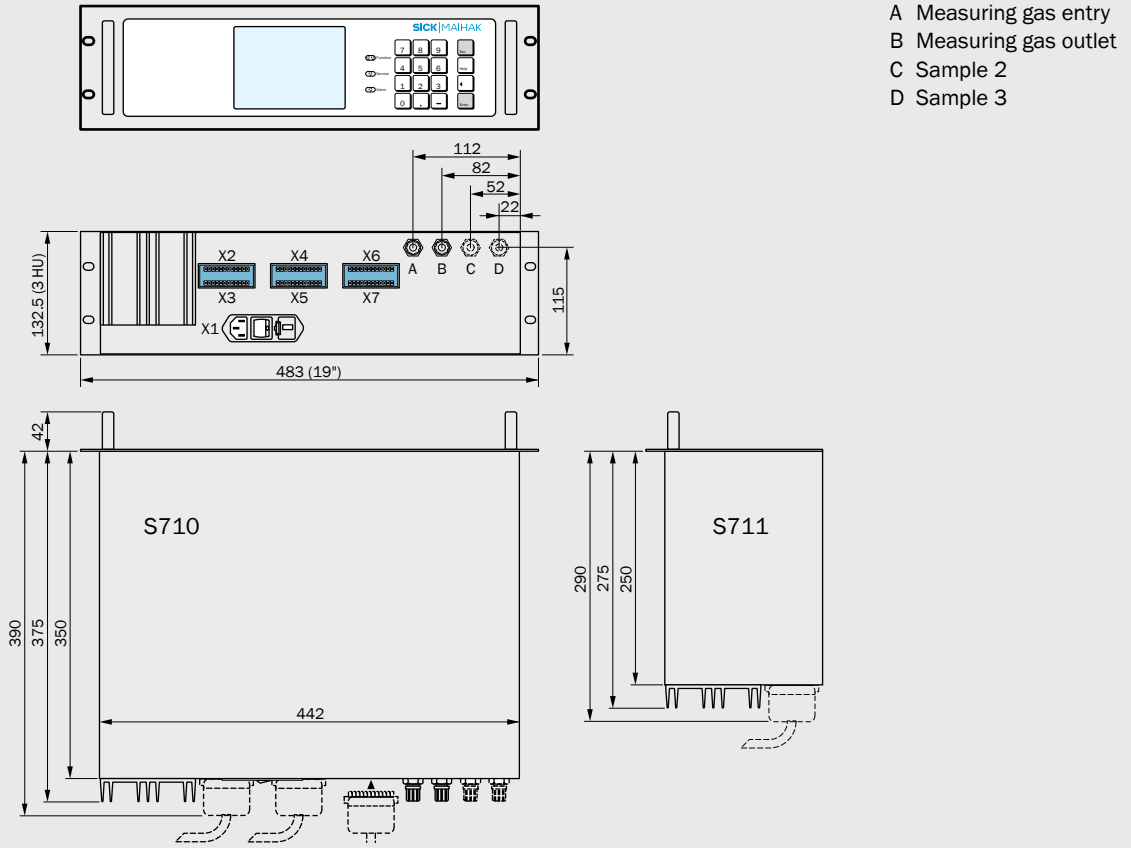
Times	
Display delay (T₉₀)	<ul style="list-style-type: none"> • dependant on the cuvette length, gas flow rate and number of components, max. 25 s at 60 l/h
Time constant (T_{90,el}):	<ul style="list-style-type: none"> • 1 ... 300 s selectable
Warm-up time	<ul style="list-style-type: none"> • none

Measuring and Output Ranges	
Basic measuring ranges	<ul style="list-style-type: none"> • 0 ... 25 Vol% O₂
Smallest measuring range	<ul style="list-style-type: none"> • 10 Vol% O
Output ranges	<ul style="list-style-type: none"> • up to 2 output ranges^{*)} freely adjustable within the measuring range, • smallest output range 1 Vol% O₂ • data sheet specifications are valid for basic measuring ranges and factory ordered output ranges^{*)}
General Data	
Materials in contact with the sample gas	<ul style="list-style-type: none"> • corrosion-resistant in Viton B, PVDF, stst 1.4571
Certifications (TÜV)	
TA air act / 13. BImSchV / 17. BImSchV / 27. BImSchV	<ul style="list-style-type: none"> • 0 ... 25 Vol% O₂

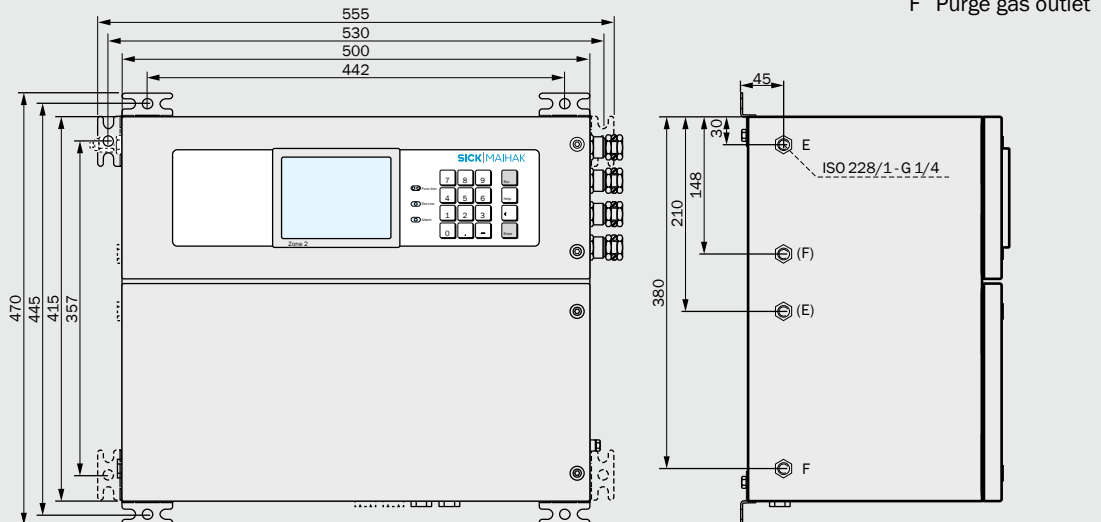
* Option

S700 Enclosures

S710

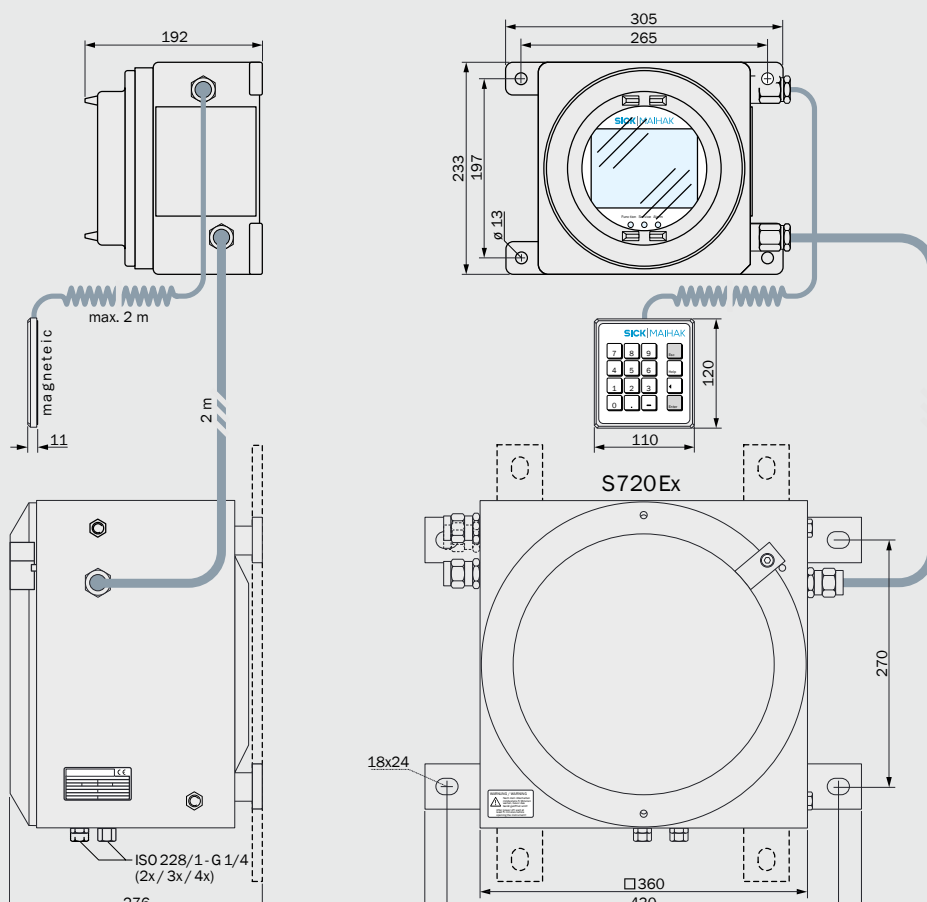


S715

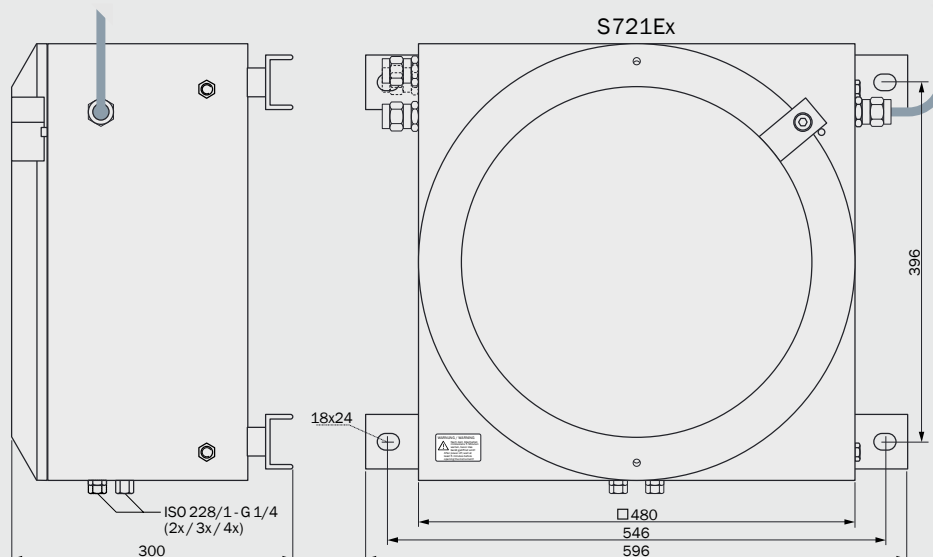


S700 Enclosures

S720 Ex

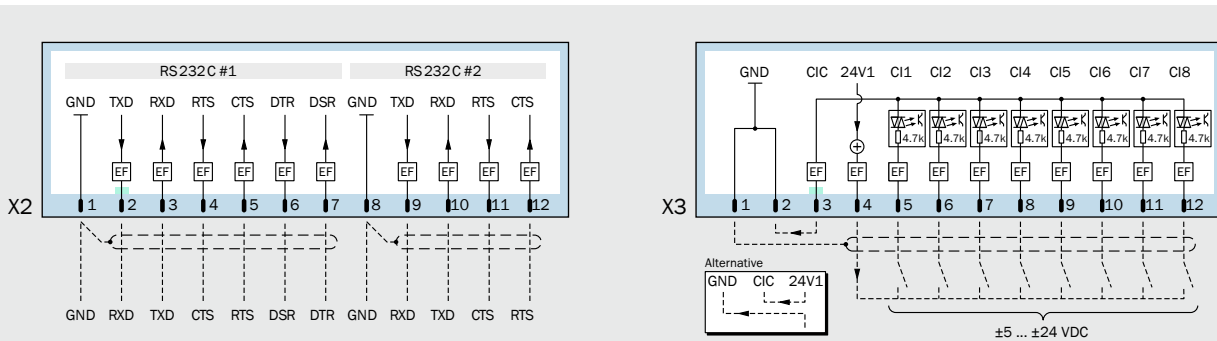


S721 Ex

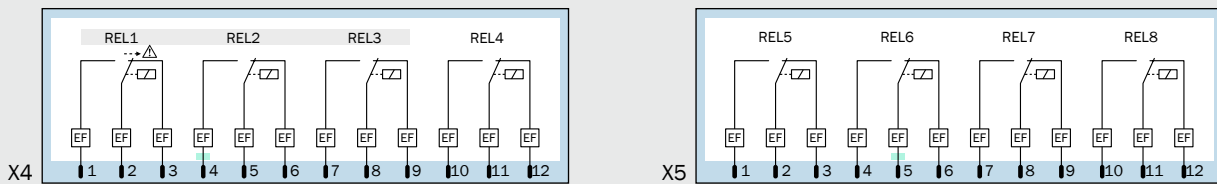


S700

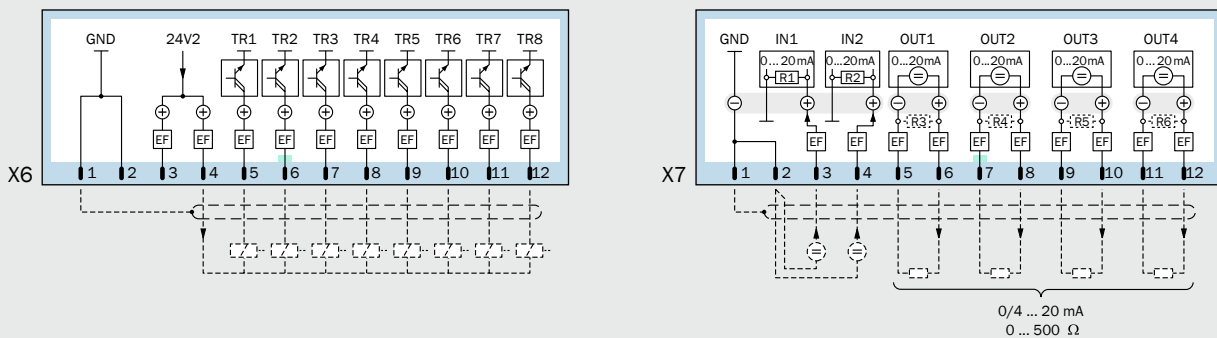
Signal Connections



- Keep away from external voltages



- Max. 48 V peak voltage (34 V AC / 48 V DC)
- Max. 500 mA
- Inductive loads must be equipped with discharging diodes



- Only use internal voltage sources (24 V DC)
- Max. 500 mA single
- Max. 1000 mA total (TR 1 ... TR 8)
- Inductive loads must be equipped with discharging diodes

S700

Planning Notes

Plant/method/process:

Measuring components		
Components	Measuring range	Unit ^{*)}

Measured gas details (concentr. off all components)				
Meas. gas	min.	normal	max.	Unit ^{*)}

^{*)} mg/m³ (stand. state/operation state), ppm, vol%, etc.

Plant details					
Feed gas (e.g. fuel gas):					
	min.		normal		max.
Operating temperature:		°C		°C	
Operating pressure:		hPa		hPa	
Water dewpoint:		°C		°C	
Acid dewpoint:		°C		°C	
Ambient temperature:		°C		°C	
• Sample point		°C		°C	
• Sample gas line		°C		°C	
• Analyzer/system		°C		°C	
Relative humidity max. per year: %		%		%	
	Sample point		Sample gas line		Analyzer/system
Solid components in mg/m ³					
	Quantity		Type		Granulation
Corrosive components:	<input type="checkbox"/> No		<input type="checkbox"/> Yes, which:		

