General Specifications

GS 11G04G06-E

EXA IR Model SG700 Stack Gas Analyzer

EXAIR

GENERAL

The SG700 Stack Gas Analyzer consists of an infrared gas analyzer, a zirconia oxygen analyzer and a sampling unit.

The SG700 can simultaneously measure up to five components: sulfur dioxide (SO_2) , nitrogen oxides (NO_x) , carbon monoxide (CO), carbon dioxide (CO_2) and oxygen (O_2) .

FEATURES

1. Simultaneously measure up to five gas components:

Using a combination of infrared gas analyzer(s) and a dedicated zirconia oxygen detector, the SG700 stack gas analyzer can simultaneously determine concentrations of up to five gas components – NO_x , SO_2 , CO, CO_2 and O_2 .

2. Minimize interaction between gases

The use of interference compensation in the analyzing section virtually eliminates the effect of concentration of any gas component on the concentration readings of others.

3. Reliable zirconia oxygen analyzer

To measure oxygen concentration, the SG700 can incorporate a Zirconia oxygen detector with superior long-term stability and excellent reliability.

SAMPLING SYSTEM CONFIGURATION



4. A wealth of functions, including self-diagnostic functions which enhance reliability

The system features many functions – built-in autocalibration, conversion to O_2 -based values, averaging, high alarms, etc.

5. Wide dynamic range

SG700 stack gas analyzer has high sensitivity and wide dynamic range, allowing for switched ranging of up to 1:25.







Yokogawa Electric Corporation 2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 Japan Tel.: 81-422-52-5617 Fax.: 81-422-52-6792 GS 11G04G06-E ©Copyright Oct. 2006 3rd Edition Sep. 2008

System Components

<1> Probe

A gas sampling probe. Removes dust in sample gas. For details, see page 6.

<2> Drain separator

Separates drain in sample gas.

<3> Mist filter

Removes drain, dust and mist in sample gas.

<4> Drain pot

Consists of positive and negative pressure drain pots. Adjusts sample gas pressure.

<5> Pump

A sample gas aspirator. Flow rate of approximately 2 L/ min.

<6> Sampling module

Contains an electric gas cooler, solenoid valves, a membrane filter, and a flowmeter.

- Electric gas cooler: Dehumidifies sample gas.
- Solenoid valve: Used for introducing calibration gas.
- Membrane filter: Glass fiber filter or PTFE filter. Removes fine dust. Dust buildup conditions can be monitored through front panel of analyzer.
- Flowmeter: Adjusts and monitors the flow rate of sample gas.

<7> Standard gas

Used for zero and span calibrations of the infrared gas analyzer. When a zirconia oxygen analyzer is used, instrument air (dew point of -10°C or less) /atmospheric air can be used for zero calibration of NO_x , SO_2 , CO_2 , CO analyzers and for span calibration of the oxygen analyzer.

<8> Zirconia oxygen analyzer

Measures oxygen concentration (0 to 25%) of sample gas. Used in combination with an infrared gas analyzer.

<9> 3-way solenoid valve

Incorporated when using atmospheric air instead of air standard gas.

<10> Switch box

Contains 7 on/off switches for the following equipment.

- Pump
- Built-in fan
- Fluorescent lamp and service outlet (2A max.)
- Sampling module, built-in recorder, converter (for NO_x measurement) and isolated signal converter.
- · Zirconia oxygen analyzer
- Built-in space heater

Besides the above, contains 3 molded case circuit breakers for main power supply, probe and heating tube.

<11> NO,/NO converter

Uses a special catalytic material for efficient conversion of NO₂ to NO gas. Also used for reducing errors due to NO₂ interference with SO₂ measurement. Recommended catalyst replacement intervals are 8 months (when NO₂ is 10 ppm).

<12> Mist catcher

Removes sulfuric acid mist in sample gas. When SO_3 concentration is 30 ppm, replacement intervals are approximately 4 months. Should be used when SO_2 is 500 ppm or higher or for oil/coal boilers.

<13> Needle Valve

Adjust the flow of sample gas.

• For selection of system configuration, refer to the SG700 Inquiry Sheet on pages 26-28.



SYSTEM CONFIGURATION

For the selection of instruments, refer to the Inquiry Form on pages 26 to 28.



T01.EPS

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Ambient Temperature	External Drain Separator (K9641EA)	External Tube	Stack Gas Analyzer	Standard Gas	Pressure Reducing Valve (L9850BA)
-5 to 40°C	Used when the tilt of the sampling tube between the probe and the analyzer is 15° or less. Use two drain separators when the SO ₂ concentration is 500 ppm or greater.	Sampling tube (10 mm O.D./8 mm I.D.) SG8SAP-L Specify the length in meters (50 m max.)	Standard type	* A standard gas cylinder contains 3.4L	Necessary for every standard gas.
-15 to 40°C	Unnecessary (Can t use this unless anti-freeze measures can be taken.)	Heating sampling tube (10 mm O.D./8 mm I.D.) SG8HSAP-L□□ Specify the length in meters (50 m max.) An AC 100V power supply from the SG700.	Specify the cold- district version /T1 : -15 to 40°C /T2 : -10 to 40°C	3.4L	j
Other than the range noted above			Out of scope of the standard specifications		

STANDARD SPECIFICATIONS

Maximum range ratio is 1:25, except O_2 measurement. **Display:** LCD with backlight

Indication:

Instantaneous value $(NO_x, SO_2, CO_2, CO, O_2)$, O_2 correction instantaneous value $(NO_x, SO_2, CO \text{ with } O_2$ measurement), O_2 correction average value $(NO_x, SO_2, CO \text{ with } O_2 \text{ measurement})$, Average O_2 value (When provided with O_2 measurement), Peak count value (CO), Parameter settings

Output signal: 4-20 mA DC or 0-1 V DC

5 outputs for instantaneous values (NO_x, SO₂, CO₂, CO, O₂), 3 outputs for O₂ correction instantaneous values (NO_x, SO₂, CO), 3 outputs for O₂ correction average values (NO_x, SO₂, CO), 1 output for average O₂ value Permissible load resistance: 550 Ω max. (750 Ω max. for isolated output)

Measurement:

1. Stack Gas Analyzer

Up to 4 components (NO_x, SO₂, CO₂, CO) and O₂

Measuring method:

NO_x, SO₂, CO₂, CO:

Non-dispersive infrared method

Zirconia or paramagnetic method

Measuring range:

O₂:

NO.:	0-50 ppm to 0-5000 ppm		
SO.:	0-50 ppm to 0-1000 ppm		
CO_:	0-1 vol% to 0-20 vol%		
CO:	0-50 ppm to 0-5000 ppm		
O_:	0-10/0-25 vol%		
Each is 2 range type.			

O, correction:

 NO_x , SO_2 , and CO are corrected for O_2 reference value. Results are provided in display and 4-20 mA DC signal output.

Example: O₂ correction

on concentration =
$$\frac{21 - O_R}{21 - O_S} \times C_S$$

Where:

 O_R : O_2 reference value

 O_s : O_2 concentration

 C_s : NO_x , SO_2 and CO measured concentration Setting range: 0 to 19%

Reference: O_2 correction reference value (1) Oil fired boiler 4%, (2) Gas fired boiler 5%, (3) Solid fuel fired boiler/oil heating furnace 6%, (4) Coke oven 7%, (5) Incinerator 12%.

O₂ corrected average and average O₂ values:

- NO_x, SO₂, and CO are corrected to O₂ and averaged and results are provided in display and 4-20 mA DC output.
- Averaging time is user configurable.
- Setting range: 1 to 59 minutes, 1 to 4 hours (factory default: 1 hour)

Contact output:

(1) Each 1a contact

- (contact capacity 250V AC/2A, or 30V DC/3A)
- Each component range identification, analyzer failure, calibration failure, calibration status, maintenance status.
- CO peak count alarm
- (2) Each 1c contact
 - (contact capacity 250 V AC/1A or 30 V DC/1A)
 - Each instantaneous value alarm (H/L/HL,
 - configurable)
 - Analyzer power shutdown

Contact input:

Voltage-free contact (1.5 seconds or longer)

Auto calibration start, average reset.

Voltage-free contact (status hold)

Range switching (1st range when contact closes), output hold, remote pump off (off when contact closes.)

Automatic calibration:

- Interval range: 1 to 99 hours (1 hour increments) or 1 to 40 days (1 day increments)
- Time of calibration gas flow: 60 to 599 seconds (1 second increments)
- Manual/automatic calibration failure contact output: Released when calibration volume exceeds 50%FS.
- Automatic calibration status and maintenance status contact output: Released while calibration gas is flowing and being replaced.
- Automatic calibration remote start contact input: Calibration starts when the input is opened after it has been shorted for at least 1.5 seconds.
- Calibration gas consumption: Approximately 1year when 3.4 L cylinder is used at intervals of 7 days.

Remote output hold:

- Whole output signals for concentration values are held by external contact input.
- · Outputs are held during the input shorted.

Average reset input:

- Output and display of O₂ correction average value is reset by external contact input.
- Reset when the input is shorted for at least 1.5 seconds.

Automatic range switching:

- Automatically switchable from low to high ranges or vise versa.
 - Low to high: Switched at 90% of low range.
 - High to low: Switched at 80% of low range.

Remote range switching:

- Switchable between low and high ranges for each measurement component by external contact input.
- High range with the input opened; low range with the input shorted.

Range identification contact output:

- · Identification of high/low range by contact output.
- Low range when the contact is closed.

CO peak count alarm:

- Alarm is sounded and displayed when CO instantaneous value exceeds the setpoint for more than the specified times.
 - Count setting range: Alarm setting range:
- 1 to 99 times 10 to 1000 ppm (5 ppm increments)

• The number of times it exceeded per hour is displayed.

Analyzer failure contact output:

Contact output is released when the analyzer is abnormal.

Temperature input signal:

2 inputs, K thermocouple (for input of optional recorder)

Power supply:

100/110/115/200/230 V AC ±10%, 50/60 Hz ±0.5 Hz

Power consumption:

Approx. 600 to 1000 VA (depending on specifications), excluding probe and heating sample tube.

Main wetted materials:

SUS304, neoprene, CaF_2 , Teflon, polyethylene, Viton, PVC

Construction:

Outdoor/indoor stand-alone system, non-explosionproof, rainproof, single swing front door, standard plate thickness of 2.3 mm (both housing and door)

Color: Munsell 5Y7/1 semigloss

Filter mesh: Outside/inside 40 µm or more

Finish: Melamine resin, baked.

Installation conditions:

Avoid direct sunlight and vibration

- Ambient temperature: -5 to 40°C
- -15 to 40°C (cold district version: specify "/T1")
- -10 to 40°C (cold district version: specify "/T2")

Ambient humidity: 90%RH or less

Weight: Approx. 350 kg (without standard gases)

Sample conditions

Temperature:	1400°C or less		
Dust:	500 mg/Nm ³ or less		
Pressure:	-5 to 5 kPa		
Note: For press	ures outside the above range, consult with		
Yokogawa	а.		
Flow rate:	Approximately 2 L/min		

Sample gas components and their range:

- SO₂ (*): 1000 ppm or less
- NO²: 5000 ppm or less
- NO_2^{*} : 10 ppm or less
- CO₂: 20 vol% or less
- CO: 5000 ppm or less
- O₂: 0 to 21 vol%
- NH_a: should be excluded
- H₂O²: 0 to 20 vol%
- HF, H₂S: 1 ppm or less
- N₂: Carrier gas
- (*) When the SO₂ concentration exceeds 500 ppm, the
 - option code "/SO1" must be specified.

[Restrictions]

- The standard system is not applicable to the following applications and sample conditions due to measurement restrictions. Consult with Yokogawa.
- 1. Sample gas containing SO_3 mist of concentration greater than 30 ppm
- 2. Exhaust gas of diesel engines
- 3. Outlet gas of glass melting furnaces
- 4. Sample gas containing dust whose concentration exceeds 500 mg/Nm³
- 5. Sample gas containing corrosive components such as HCl, Cl_2 , and Na_2SO_4

Characteristics

Repeatability	/: ±0.5% of full scale
Linearity:	±1.0% of full scale
Stability:	
Zero drift:	±1% of full scale/week, ±2% of full scale/
	week for the range of 200 ppm or less
	±2% of full scale/month for zirconia oxygen
	analyzers
Span drift:	±2% of full scale/week
	±2% of full scale/month for zirconia oxygen

- analyzer
- **90% response time:** (From the inlet of the system) Approximately 4 minutes for SO₂ Approximately 2 minutes for others

Warm-up time: Approximately 4 hrs. (after power-on) Note: Fluctuation in the operation period of 4 hours from the end of warm-up time is within ±2%FS.

Effects of interfering gases:

When sample gas contains gas components listed below, the measurement accuracy may suffer. Consult Yokogawa for countermeasures or effect on accuracy.

Analyzer	Interfering	Effect
SO ₂ analyzer	NO ₂	50 ppm of NO_2 is equivalent to -6 ppm of SO_2
CO analyzer	CO ₂	15% of CO_2 is equivalent to 7 to 10 ppm of CO
CO analyzer	N ₂ O	1000 ppm of N_2O is equivalent to 80 ppm of CO
		T03.EPS

2. Probes and External Primary Filters

2.1 Filtering probes

The Type F filtering probe is Yokogawa's standard probe and widely used in many applications including boilers. In using the filtering probe, the temperature at a sampling point must be higher than the dew point (approx. 150°C). For the conditions in selecting a filtering probe, refer to Table 1, "Selection of Filtering Probes" in the Inquiry Form on page 26.

Name	Type F Filtering Probe	Type M1E Filtering Probe	Type M2E Filtering Probe
Part number	K9718VC	K9219ED	K9718VE
Operating temperature	150 to 400°C	150 to 700°C (*2)	150 to 7008C (*2)
Probe material	SUS304	SUS304	SUS304
Filter	SUS304 (20 μm)	SUS304 (20 μm)	SUS316 (5 μm)
Position of filter	Inside stack	Outside stack	Outside stack
Heating method	None	Electricity at approx. 80 VA (*1)	Electricity at approx. 130 VA (*1)
Flange material	JIS 5K-80-RF (SUS304)	JIS 5K-80-RF (SUS304)	JIS 10K-50-FF (SUS304)
Insertion length	700 mm	700 mm	1000 mm
Weight	Approx. 5 kg	Approx. 11 kg	Approx. 15 kg
Filter element	K9718RS	K9718RX	K9718VF
			T04 EPS

(*1) When wiring the power supply to the heater of the Type M1E and M2E filtering probes, use a heatproof cable equivalent to JIS C3323-KGB.

(*2) When the temperature at a sampling point is lower than the acid dew point (approx. 150°C), use Type M1E or M2E filtering probes. As condensation tends to form on the mounting point of the probe, this point needs to be insulated or heated to more than the acid dew point (approx. 150°C) (heating/ insulation to be provided by customer). For details, refer to pages 23, 24 and 25.

2.2 Open type probes and external primary filters The open type probe should be selected according to dust volume, moisture content, temperature and SO₂ concentration range. The external primary filter should be selected according to the heating method (utility). For the conditions in selecting a probe and an external primary filter, refer to Table 2, "Selection of Probe and External Primary Filter" in the Inquiry Form on pages 26, 27.

Open type probes

Name	Type M2 Open Type Probe	Type M3 Open Type Probe
Part number	K9718PD	K9718QA
Operating temperature range	800°C max.	1400°C max.
Probe material	SUS310S	SiC
Flange material	JIS 5K-80-RF (SUS304)	JIS 5K-80 RF (SUS304)
Insertion length	700 mm	1040 mm
Weight	Approx. 5 kg	Approx. 5 kg
		T05 EP

• External primary filters

Name	Type M1E External Primary Filter	Type MS External Primary Filter
Part number	K9718TA	K9718UA
Filter container	SUS304	SUS304
Filter	SUS304 (20 microns)	SUS304 (20 microns)
Heating method	Electricity, approx. 80 VA	Saturated steam, 100 to 300 kPa
Weight	Approx. 7 kg	Approx. 7 kg
Filter element	K9718RX	K9718US

T06.EPS

Note: When wiring the power supply to the heater of the Type M1E external primary filter, use a heatproof cable equivalent to JIS C3323-KGB.

3. External Drain Separator

- Used when the sampling tube between the probe and the analyzing system tilts at 15° or less
- When the SO₂ concentration is 500 ppm or more, two drain separators should be used Part number: K9641EA Material of parts in contact with gas: Vinyl chloride Weight: Approx. 3.5 kg Ambient temperature: -5 to 40°C

4. Sampling Tubes

4.1 Sampling tubes (SG8SAP-LDD)

Length:	50 m max.		
Material:	Polytetrafluoroethylene (Teflon)		
Diameter: 10 mm O.D./8 mm I.D.			
Operating temperature: -5 to 200°C			

4.2 Heating sampling tubes (SG8HSAP-L

- (1) Used in cold districts where drain in the sampling tube is likely to freeze
- (2) Used when the SO₂ concentration in sample gas is 100 ppm or less. The heating sampling tube comes with an Input Power Kit (for the power supply) and a Termination Kit (for tube-end processing), with which the tube should be assembled in the field.

Length: 50 m max.

Material:Polytetrafluoroethylene (Teflon)Sheath:PVC (93°C max.)

Tube diameter: 10 mm O.D./8 mm I.D.

Heating sampling tube: 33 mm O.D. Tracing temperature: Outdoor temperature plus approximately 90°C Power consumption: Approximately 36.5 VA/m (at AC 100V)

5. Standard gas cylinders (Refer to pages 15 and 16 for their part number)

Part number:	See the Model Codes
Composition:	See the Model Codes
Pressure:	Approximately 10 MPa
Capacity:	3.4 L
Weight:	Approximately 6 kg

6. Pressure Reducing Valves for Gas Cylinders (Refer to page 16 for their part numbers)

Part number:	L9850BA		
Pressure gauge	: Primary:	0 to 25 MPa	
	Secondary:	0 to 0.1 MPa	
Operating press	ure range: 0.01 to	0.06 MPa	
(30 kPa for the SG700 analyzer)			
Connection:	Inlet: W22 14-t.p.i. (female) right-hand		
	thread		
	Outlet: Rc1/4		
Weight:	Approximately 1.5 kg		

7. Recorders

- A recorder can be installed in the SG700 by specifying the option code "/M□". Use Yokogawa's µR10000 (maximum 6-point recording). Refer to the GS 04P01B01-01E general specifications for the details.
- Choose V DC input for the input signal and 100 V AC for the power supply voltage to the recorder. When the output of the SG700 is 4 to 20 mA DC, prepare a 250 ohms shunt resistance.

Model Code

Stack Gas Analyzer

MODEL	Suffix Code	Option Code	Description
SG700			Stack Gas Analyzer
Measurable component	-A -B -C -D -E -F -G -H -J		$\begin{array}{c} SO_{2}-(O_{2}) \\ NO_{x}^{-}(O_{2}) \\ NO_{x}^{-}SO_{2}-(O_{2}) \\ CO^{-}(O_{2}) \\ CO_{2}-(O_{2}) \\ CO_{2}^{-}CO_{2}(O_{2}) \\ NO_{x}^{-}CO^{-}(O_{2}) \\ NO_{x}^{-}SO_{2}-CO^{-}(O_{2}) \\ NO_{x}^{-}SO_{2}-CO^{-}(O_{2}) \\ NO_{x}^{-}SO_{2}-CO^{-}(O_{2}) \\ O_{x}^{-}SO_{2}^{-}CO^{-}(O_{2}) \\ \end{array}$
O ₂ Analyzer	-1 -2 -N		Built-in zirconia type O_2 sensor (note 7) Built-in paramagnetic type O_2 sensor (note 7) Without O_2 analyzer
1st Component 1st Range (note 1)	A B C D E F G H J K L M P Q		0-50ppm (note 2) 0-100ppm (note 2) 0-200ppm 0-250ppm 0-300ppm 0-500ppm 0-1000ppm 0-2000ppm 0-5000ppm 0-5000ppm 0-5% 0-2% 0-5% 0-10% 0-20%
1st Component 2nd Range (note 1)	B C D E F G H J K L M P Q N		0-100ppm 0-200ppm 0-250ppm 0-300ppm 0-300ppm 0-1000ppm 0-2000ppm 0-2000ppm 0-5000ppm 0-1% 0-2% 0-5% 0-5% 0-10% 0-20% Not available
2nd Component 1st Range (note 1)	ABCDEFGHJKLMPQN		0-50ppm 0-100ppm 0-200ppm 0-250ppm 0-300ppm 0-500ppm 0-1000ppm 0-2000ppm 0-1% 0-2% 0-5% 0-5% 0-10% 0-20% Not available

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MODEL	Suffix	Code		Option Code		Description
SG700	-n-nnn				Stack Gas Analvzer	
2nd Componen	t B				0-100ppm	
2nd Range	Ĺ				0-200ppm	
(note 1)					0-250ppm	
()	F				0-300ppm	
					0-500ppm	
	Ġ				0-1000ppm	
	Гн				0-2000ppm	
	Li li				0-5000ppm	
	ĸ				0-1%	
					0-1%	
	Ь				0-2%	
	P				0-1/0%	
	lò				0-20%	
	N N				Not available	
3rd Component		Δ			0-50 nm	
1st Range		ר ב			0-30ppin 0-100ppm	
(note 1)		_			0-100ppin	
(Š			0-200ppm	
		=			0-250ppm	
		_			0-300ppm	
					0-500ppm	
		э _			0-1000ppm	
	r	- -			0-2000ppm	
		J /			0-5000ppm	
	r	`			0-1%	
		_			0-2%	
		וי			0-5%	
		2			0-10%	
		Ч			0-20%	
Ond Common on one	ľ					
and Component		B			0-100ppm	
(note 1)					0-200ppm	
					0-250ppm	
		1E			0-300ppm	
		F			0-500ppm	
		G			0-1000ppm	
		IH.			0-2000ppm	
		J			0-5000ppm	
		K			0-1%	
					0-2%	
		M			0-5%	
		P			0-10%	
		Q			0-20%	
					Not available	
4th Component			A		0-50ppm	
1st Range			В		0-100ppm	
(note 1)			С		0-200ppm	
			D		0-250ppm	
			E		0-300ppm	
			F		0-500ppm	
			G		0-1000ppm	
			Н		0-2000ppm	
			J		0-5000ppm	
			K		0-1%	
			L		0-2%	
			M		0-5%	
			Р		0-10%	
			Q		0-20%	
			Ν		Not available	

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MODEL Suffix Code				Option Code	Description
SG700	-0-0000000	-			Stack Gas Analyzer
4th Componen	B				0-100ppm
2nd Range	С				0-200ppm
(note 1)	D				0-250ppm
	E				0-300ppm
	F				0-500ppm
	G				0-1000ppm
					0-2000ppm
	J				0-5000ppm
					0-7%
	M				0-5%
	P				0-10%
	Q				0-20%
	N				Not available
O ₂ Analyzer	-1				0-10/0-25%
Range	-N				Not available
Power supply	-5				100V AC, 50Hz
	-6				100V AC, 60Hz
	-A				110V AC, 50Hz
	-В				110V AC, 60Hz
	-7				115V AC, 50Hz
	-8				115V AC, 60Hz
	-3				220V AC, 50Hz
	-4				220V AC, 60Hz
	-1				240V AC, 50Hz
Output	-2				240V AC, 00HZ
Output	4				4-2011A 0-1V DC
Isolated output	of analog 1				SO Isolated output
instantaneous	value 2				SO_2 isolated output
(note 3)					NO_Isolated output
(note 4)	4				NO_x isolated output
	5				$NO_x O_2$ isolated output
	6				$NO_x SO_2$ isolated output
	7				CO isolated output
	8				$CO-O_{\alpha}$ isolated output
	9				NO -CO Isolated output
	A				NO_x -CO-O ₂ Isolated output
	В				NOSOCO Isolated output
	C				NO_{2}^{x} -SO_{2}^{z}-CO-O ₂ Isolated output
	D				NO SO CO Isolated output
	E				NO ² -SO ² -CO ² -CO-O ₂ Isolated output
	F				CO ₂ Isolated output
	G				CO ₂ -O ₂ Isolated output
	Н				CO ₂ -CO Isolated output
	J				CO ₂ -CO-O ₂ Isolated output
	N				Without isolated output
O ₂ correction v	alue 1				SO ₂ Isolated output
insulation output	ut 3				NO _x Isolated output
(note 3)	5				NO _x -SO ₂ Isolated output
(note 4)	7				CO Isolated output
	9				NO _x -CO Isolated output
	B				NU _x -SU ₂ -CU isolated output
	N				vvitnout isolated output
Isolated output	of average value	1			SO ₂ Isolated output
atter O ₂ correct	ion	3			NO _x Isolated output
(note 3)		5			NO _x -SO ₂ Isolated output
		1			
		9 D			
		Б N			NO_x -SO ₂ -CO isolated output
	,	N			
Isolated output	of average	A			Isolated output
value on O ₂ me	eter (note 3), (note 4)	N			Without isolated output
Cubicle structu	re	1			Indoor structure
		2	_		Outdoor structure
External standa	ard gas cylinder		1		3 cylinders
			Ż		6 cylinders
			N		Not available
Indication			F		English
L					Lingiion

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Stack Gas Analyzer (Continued)

Model	Suffix Code	Option Code	Description
SG700	-0-0000000-0-00000000		Stack gas analyzer
Option:	Built-in recorder (note 5)	/M□	Build-in recorder
	Insulation of sampling tube (note 2)	/S	50 m max. Required for heating sampling tube
	Cold district version	/T1 /T2	-15 to 40 _i C (2 heaters + insulation) -10 to 40 _i C (2 heaters)
	Window	/WD	With window
	Instrument air Atmospheric air	/Q /R	Instrument air as zero gas Atmospheric air as zero gas
	Air purge	/A	Flow meter for air purge, with pressure regulator
	Arrester, for power supply Arrester, for signal (note 6)	/AP1 /AP2 /AS□□	With arrester for power supply (100 V) With arrester for power supply (200 V) With arrester for signal
	Tag plate, acryl SUS	/U1 /U2	Specified tag No. (attached) Specified tag No. (attached)
	Nameplate, acryl SUS	/V1 /V2	Specified description (screw on) Specified description (screw on)
	Channel base	/W	Enclosed type
	High SO_2 concentration version	/SO1	Gas dryer with SO $_3$ mist catcher (2 spares supplied). Required when SO $_2$ is 500 ppm or more
	NO _x converter	/NO1	Required when measuring only SO_2 in sludge incinerator to reduce NOx interference.
			T10.EPS

Footnotes

- For measuring ranges, refer to tables on pages 13 and 14. The 1st, 2nd, 3rd and 4th components in the code correspond to 1: those described in that order in the description of the measurable component. For example, in the SG700-C: NO₂ - SO₂ - (O₂) analyzer, the 1st component is NO, and the 2nd is SO,
- 2: Option code "/S" must be specified for SO, measurement of 100 ppm or less.
- 3: Combination of isolated outputs and non-isolated outputs is not allowed. When suffix code "N" is selected all for O₂ correction instantaneous value, O₂ correction average value and average O₂ value outputs, all outputs will be non-isolated. If both isolated and non-isolated outputs are selected inconsistently, outputs will be isolated only and outputs for which suffix code "N" is selected will be disabled.
- For recorder output, suffix code "N" should be specified. 4.

Use Yokogawa's µR10000 (up to 6 points recording) recorder. Output signals should be selected from the table below and specify the appropriate number in . For details, refer to GS 04P01B01-01E. When using a recorder other than the µR10000, the mounting size and other specifications should be checked.

The output signals for a recorder cannot be used as external outputs. The specification of recorder and external outputs of the same component should be handled as a customized order. Consult Yokogawa. In this case, up to 4 components can be specified.

No combination of isolated outputs and non-isolated outputs are allowed.

5: Select output components to the recorder and specify option code "/MD" accordingly.

		/M1	/M2	/M3	/M4	/M5	/M6
NOx	instantaneous value			0			0
	average value	0	0	0			0
	O ₂ corrected value			0			0
SO ₂	instantaneous value			0		0	
	average value	0		0		0	
	O ₂ corrected value					0	
CO	instantaneous value		0		0		
	average value	0	0		0		
	O ₂ corrected value				0		
O ₂ inst	antaneous value	0	0	0	0	0	0
Combu	stion temperature	0	0		0		
EP insi	de temperature	0	0		0		
							T11.EPS

The total number of arresters for signal should be specified in two digits. O₂ sensor is included if suffix code "-1" or "-2" for O₂ Analyzer is specified. 6:

7:

Notes:

• Gas sampling probe with automatic blowback is handled as a cutomized order. Consult Yokogawa. • When SO, measuring range exceeds 1000 ppm, consult Yokogawa.

Standard Accessories (supplied with the instrument at delivery time)

			Part		Qua	ntity		
	No.	Name	number	SG700-A	SG700-C	SG700-B	SG700-D	Remark
			(*5)		SG700-H SG700-J	SG700-G	SG700-E SG700-F	
	1	Filter paper for membrane filter	K9350MD			1pack	1pack	25 papers per pack, 0.5 μm
	2	Filter paper for membrane filter	K9219BA	5, 10(*1)	5, 10(*1)			(*1) PTFE 0.1 μm
0	3	Filter for gas conditioner	K9350MH	1	1	1	1	
arts	4	O-ring for gas conditioner	K9350MF	1	1	1	1	G65 chloroprene
ce b	5	Fuse (for device SW)	K9350VN	2	2	2	2	2 A
nan	6	Fuse (for device SW)	K9350VP	2	2	2	2	3.2 A
ntei	7	Fuse (spare for infrared analyzer)	K9218SB	2	2	2	2	3 A for analyzer
Mai	8	Catalyst for NO ₂ /NO converter	K9350LP	1(*2)	1	1		For NO _x analyzer or (*2)
-	9	Glass wool for NO ₂ /NO converter	K9350LQ	1(*2)	1	1		For NO _x analyzer or (*2)
	10	SO ₃ mist catcher	K9350XV	2(*1)	2(*1)			(*1) change every four months
	11	Diaphragm for pump	K9350GE	1	1			With spanner
	12	Standard gas joint	K9219LA	(*3)	(*3)	(*3)	(*3)	(*3) For pressure regulator Rc 1/4- $\varphi 6$
	13	Hose band for fixing standard gas cylinder	K9219LB	(*4)	(*4)	(*4)	(*4)	(*4) For pressure regulator
es	14	Toalon tube for standard gas connection	K9641KA	1	1	1	1	1 m
sori	15	Polyethylene tube for standard gas connection	K9641KB	1	1	1	1	6 m
ces	16	Anchor bolt for cubicle installation	K9350ZA	4	4	4	4	
Ac	17	Water bottle for injection	K9219BG	1	1	1	1	For refilling water of gas conditioner
	18	Water bubbler bottle	K9350XR	1	1	1	1	For correction of moisture interference
	19	Cell assembling tool	K9358UA		1(*6)		1(*6)	For block cell
					-			T12 EPS

(*1) When option code /SO1 is selected.
 (*2) When option code /NO1 is selected.
 (*2) When option code /NO1 is selected.
 (*3) [The number of measuring components + 1] fittings are included. For external gas cylinders, the quantity is doubled.
 (*4) 4×[The number of measuring components + 1] hose bands are included.
 (*5) A part number contains one piece of part.
 (*6) Supplied when CO₂ measurement is performed.

One-Year-Usage Spare Parts (Optional)

		Part		Qua	ntity		
No.	Name	number	SG700-A	SG700-C	SG700-B	SG700-D	Remark
		(*3)		SG700-H SG700-J	SG700-G	SG700-E SG700-F	
1	Catalyst for NO ₂ /NO converter	K9350LP	2(*2)	2	2	_	For NO _x analyzer or (*2)
2	Glass wool for NO ₂ /NO converter	K9350LQ	2(*2)	2	2	—	For NO _x analyzer or (*2)
3	Fitting for NO ₂ /NO converter	K9350LV	4(*2)	4	4	-	For NO _x analyzer or (*2)
4	Filter for gas conditioner	K9350MH	2	2	2	2	
5	O-ring for gas conditioner	K9350MF	2	2	2	2	G65 chloroprene
6	Filter paper for membrane filter	K9350MD	—	—	1	1	25 papers per pack, 0.5 μm
7	Filter paper for membrane filter	K9219BA	12	12	-	-	PTFE 0.1 μm
8	O-ring for membrane filter	K9350MG	2	2	2	2	P49 chloroprene
9	O-ring for membrane filter	K9219BK	2	2	2	2	P3 chloroprene
10	Fuse (for device SW)	K9350VN	3	3	3	3	2 A
11	Fuse (for device SW)	K9350VP	4	4	4	4	3.2 A
12	Fixed diaphragm	K9641KC	1(*1)	1(*1)	—	—	50 kPa/0.6 L (*1)
13	Diaphragm for pump	K9350GE	1	1	1	1	
14	Valve for pump	K9350GF	1	1	1	1	
15	SO ₃ mist catcher	K9350XW	1(*1)	1(*1)	_	_	Change every four months (*1)
16	Spare parts set for 1 year (*4)	K9641JA	1	_	_	_	For SG700-A (without /SO1 and /NO1)
17	Spare parts set for 1 year (*2), (*5)	K9641JB	1(*2)	1	—	—	For SG700-A (with /NO1 and without /SO1) For SG700-C, -H, -J (without /SO1)
18	Spare parts set for 1 year (*6)	K9641JC	-	-	1	_	For SG700-B, -G
19	Spare parts set for 1 year (*7)	K9641JD	—	—	—	1	For SG700-D, -E, -F
20	Spare parts set for 1 year (*1), (*8)	K9641JE	1(*1)	_	_	-	For SG700-A (with /SO1 and without /NO1)
21	Spare parts set for 1 year (*1), (*2), (*9)	K9641JF	1(*1)(*2)	1(*1)	-	—	For SG700-A (with /SO1 and /NO1) For SG700-C, -H, -J (with /SO1)

(*2) When option code "/NO1" is selected.

(*1) When option code "/SO1" is selected.
 (*3) A part number contains one piece of part or one set of parts.
 (*4) K9641JA consists of No.4, 5, No.7–11 and No.13, 14.
 (*6) K9641JC consists of No.4, 5 and No.7–15.

(*5) K9641JB consists of No.1–5, No.7–11 and No.13, 14. (*7) K9641JD consists of No.4–6, No.8–11 and No.13, 14. (*9) K9641JF consists of No.1–5 and No.7–15.

Recommended Spare Parts

NO.	Name	Part number (*1)	Quantity per replacement	Recommended quantity
1	Filter element for Type F filtering probe	K9718RS	1	2
2	Filter element for Type M1E filtering probe	K9718RX	1	2
3	Filter element for Type M2E filtering probe	K9718VF	1	2
4	O-ring for Type M2E filtering probe	Y9144XB	2	8
5	Filter element for Type M1E external primary filter	K9718RX	1	2
6	Filter element for Type MS external primary filter	K9718US	1	2
(*1) Pa	Irt numbers refer to each one piece. When separately ordering more tha	n one of a part, specify		T14.EPS

(*1) Part numbers refer to each one piece. When separately ordering more than one of a part, specify the required quantity of the parts as well as the part number. Note: Order more spare parts at parts replacement time, to maintain the recommended quantity of spare parts.

T2.8E.EPS

1. Measuring Components and Ranges - Availability Table -

1.1 Single-Component Analyzer (NO_x, SO₂, CO₂, CO)

Table 1

$\left \right $	2nd Range	В	С	D	E	F	G	Н	J
1st	Range	0-100 ppm	0-200 ppm	0-250 ppm	0-300 ppm	0-500 ppm	0-1000 ppm	0-2000 ppm	0-5000 ppm
Α	0-50 ppm	★□0	★□0	★□0	★□0	★□0	★□0	-	-
В	0-100 ppm	-	★□0	★□0	★□0	★□○	★□0	★ □○ (note 1)	-
С	0-200 ppm	-	_	★□O	★□0	★□O	★□0	★ □○ (note 1)	★ □○ (note 1)
D	0-250 ppm	-	_	-	★□0	★□0	★□0	★ □○ (note 1)	★ □○ (note 1)
E	0-300 ppm	-	—	-	_	★□0	★□0	★ □○ (note 1)	★ □○ (note 1)
F	0-500 ppm	-	—	-	-	-	★□0	★ □○ (note 1)	★ □○ (note 1)
G	0-1000 ppm	-	_	-	-	-	-	★ □○ (note 1)	★ □○ (note 1)
Н	0-2000 ppm	-	-	-	_	-	-	-	★ □○ (note 1)
J	0-5000 ppm	-	_	-	_	-	-	-	—
K	0-1%	-	_	-	—	_	-	-	—
L	0-2%	-	—	-	_	-	-	-	—
Μ	0-5%	-	—	-	-	-	-	-	-
Ρ	0-10%	-	_	-	-	-	-	-	-
Q	0-20%	-	_	-	-	-	-	_	_

\sim	2nd Range	К	L	М	Р	Q
1st	Range	0-1%	0-2%	0-5%	0-10%	0-20%
Α	0-50 ppm	-	-	-	-	-
В	0-100 ppm	-	-	-	-	-
С	0-200 ppm	_	-	-	-	—
D	0-250 ppm	-	-	-	-	-
E	0-300 ppm	-	-	-	-	-
F	0-500 ppm	○ (note 2)	-	-	-	-
G	0-1000 ppm	○ (note 2)	○ (note 2)	-	-	-
Н	0-2000 ppm	○ (note 2)	○ (note 2)	-	-	-
J	0-5000 ppm	○ (note 2)	○ (note 2)	○ (note 2)	-	-
Κ	0-1%	-	©○ (note 2)	©○ (note 2)	0	0
L	0-2%	-	-	©○ (note 2)	0	0
Μ	0-5%	-	-	-	0	0
Ρ	0-10%	-	-	-	_	0
Q	0-20%	_	-	_	-	⊚ (note 3)

T15.EPS

★: NO_x analyzer measurable range; \Box : SO₂ analyzer measurable range; \odot : CO₂ analyzer measurable range; \bigcirc : CO analyzer measurable range

-: Not available

Note 1: Measuring range outside 0-1000 ppm of SO₂ analyzer is a customized order. Consult Yokogawa. Note 2: Measuring range outside 0-5000 ppm of CO analyzer is a customized order. Consult Yokogawa. Note 3: The same range cannot be specified for the first and second ranges. When a 0-20% range is specified for the first range, select "None" for the second range.

1.2 Two-Component Analyzer (NO_x-SO₂)

Table	2
-------	---

		SO ₂ Range ppm										
		50	100	200	250	300	500	1000*	2000*	5000*		
	50	0	0	0	0	0	0	0	0	-		
	100	0	0	0	0	0	0	0	0	-		
	200	0	0	0	0	0	0	0	0	0		
NO _x Range	250	0	0	0	0	0	0	0	0	0		
ppm	300	0	0	0	0	0	0	0	0	0		
	500	0	0	0	0	0	0	0	0	0		
	1000	0	0	0	0	0	0	0	0	0		
	2000	0	0	0	0	0	0	0	0	0		
	5000	_	_	0	0	0	0	0	0	0		
										T16 EPS		

* Measuring range outside 0-1000 ppm of SO₂ analyzer is a customized order. Consult Yokogawa.

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1.3 Two-Component Analyzer (NO_x-CO)

Both NO, and CO analyzers should meet the ranges in Table 1.

1.4 Two-Component Analyzer (CO₂-CO)

Table 3

	_	CO ₂ Range								
		2000 ppm	5000 ppm	1%	2%	5%	10%	20%		
	100 ppm	-	-	-	-	-	0	0		
	200 ppm	-	-	-	-	-	0	0		
	250 ppm	-	-	-	-	-	0	0		
	500 ppm	-	-	0	-	-	0	0		
CO Range	1000 ppm	-	-	0	0	-	0	0		
	2000 ppm	-	-	0	0	0	0	0		
	5000 ppm	-	-	0	0	0	0	0		
	1%	-	-	0	0	0	0	0		
								T17.EPS		

1.5 Three-Component Analyzer (NO_x-SO₂-CO)

NO_v-SO₂ analyzer should meet the availability in Table 2 and CO analyzer the one in Table 1.

1.6 Four-Component Analyzer (NO_x-SO_y-CO_y-CO)

NO_x-SO₂ analyzer should meet the availability in Table 2 and CO₂-CO analyzer the one in Table 3.

1.7 O₂ Analyzer

 1st range:
 0-10%

 2nd range:
 0-25%

How to Select Ranges of Multiple-Component Analyzers

For combinations of measuring components and ranges not described above, consult Yokogawa. Measuring ranges in Tables 2 and 3 are minimum ranges, respectively, with exception of those of CO_2 in Table 3, which is maximum ranges.

Examples:

- (1) Model SG700-H, NO_x-SO₂-CO-(O₂) analyzer
- Check the range combination availability of NO_x -SO₂ analyzer with Table 2. Then, select the combinations of the first and second ranges from Table 1.
- (2) Model SG700-J, NO_x -SO₂-CO₂-CO-(O₂) analyzer Check the range combination availability of NO_x -SO₂ analyzer with Table 2, and that of CO₂-CO analyzer with Table 3. Then, select combinations of the first and second ranges from Table 1.

2. Probes and External Primary Filters

Name	Part Number	Temperature of Sample Gas	Utility	Configuration
Type F filtering probe	K9718VC	150 to 400°C		Probe integrated with filter
Type M1E filtering probe	K9219ED	150 to 700°C (*1)	Supply voltage: 100 to 115 V, approx. 80 VA max.	Probe integrated with filter
Type M2E filtering probe	K9718VE	150 to 700°C (*1)	Supply voltage: 100 to 115 V, approx. 130 VA max.	Probe integrated with filter
Type M2 open type probe	K9718PD	800°C max.		Probe
Type M3 open type probe	K9718QA	800 to 1400°C		Probe
Type M1E external primary filter	K9718TA		Supply voltage: 100 to 115 V, approx. 80 VA max.	Filter
Type MS external primary filter	K9718UA		Steam pressure: 100 to 300 kPa	Filter

T18.EPS

(*1) For applications where ambient temperature is 150°C or less, there are restrictions on sampling system installation, see p. 23 to 25.

3. External Drain Separator

Part Number	Description
K9641EA	
	T10 ED9

4. Sampling Tubes

4.1 Sampling tube

	Model	Suffix Code	Description
	SG8SAP		10 mm O.D./8 mm I.D. Teflon tube
	Length	-L□□	Length in meters, 50 m max.
Î			T20.EPS

4.2 Heating sampling tube

Model	Suffix Code	Description
SG8HSAP		10 mm O.D./8 mm I.D. heat insulating Teflon tube (with termination kit)
Length	-L□□	Length in meters, 50 m max.

T21.EPS

5. Standard Gas Cylinders

Export of such high pressure filled gas cylinders to most countries is prohibited or restricted.

5.1 Standard gas cylinder for NO: NO + N_2

Range	NO Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
0 to 50 ppm	45 to 50 ppm	K9354DA	L9850BA
0 to 100 ppm	90 to 100 ppm	K9354DB	L9850BA
0 to 200 ppm	180 to 200 ppm	K9354DC	L9850BA
0 to 250 ppm	225 to 250 ppm	K9354DD	L9850BA
0 to 300 ppm	270 to 300 ppm	K9354DH	L9850BA
0 to 500 ppm	450 to 500 ppm	K9354DE	L9850BA
0 to 0.1%	0.09 to 0.1%	K9354DF	L9850BA
0 to 0.2%	0.18 to 0.2%	K9354DG	L9850BA
0 to 0.5%	0.45 to 0.5%	K9354DJ	L9850BA

T22.EPS

5.2 Standard gas cylinder for SO_2 : $SO_2 + N_2$

Range	SO ₂ Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
0 to 50 ppm	45 to 50 ppm	K9354HA	L9850BA
0 to 100 ppm	90 to 100 ppm	K9354HB	L9850BA
0 to 200 ppm	180 to 200 ppm	K9354HC	L9850BA
0 to 250 ppm	225 to 250 ppm	K9354HD	L9850BA
0 to 300 ppm	270 to 300 ppm	K9354HN	L9850BA
0 to 500 ppm	450 to 500 ppm	K9354HE	L9850BA
0 to 0.1%	0.09 to 0.1%	K9354HF	L9850BA
0 to 0.2%	0.18 to 0.2%	K9354HG	L9850BA
			T23 EDS

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5.3 Standard gas cylinder for CO: CO + N_2

Range	CO Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
0 to 50 ppm	45 to 50 ppm	K9134UA	L9850BA
0 to 100 ppm	90 to 100 ppm	K9134UB	L9850BA
0 to 200 ppm	180 to 200 ppm	K9134UC	L9850BA
0 to 250 ppm	225 to 250 ppm	K9354YB	L9850BA
0 to 300 ppm	270 to 300 ppm	K9354NA	L9850BA
0 to 500 ppm	450 to 500 ppm	K9134UD	L9850BA
0 to 0.1%	0.09 to 0.1%	K9134UE	L9850BA
0 to 0.2%	0.18 to 0.2%	K9134UF	L9850BA
0 to 0.5%	0.45 to 0.5%	K9134UG	L9850BA
0 to 1%	0.9 to 1%	K9134UH	L9850BA
0 to 2%	1.8 to 2%	K9134UJ	L9850BA
	•	•	T24.EPS

5.4 Standard gas cylinder for CO_2 : $CO_2 + N_2$

Range	CO ₂ Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
0 to 1%	0.9 to 1%	K9134WH	L9850BA
0 to 2%	1.8 to 2%	K9134WJ	L9850BA
0 to 5%	4.5 to 5%	K9134WK	L9850BA
0 to 10%	9 to 10%	K9134WL	L9850BA
0 to 20%	18 to 20%	K9134WM	L9850BA
			T25.EPS

5.5 Standard gas cylinder for $O_2: O_2 + N_2$

Dry air cylinders are used as zero gas for NO, SO_2 , CO and CO_2 analyzers.

Range	O ₂ Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
0 to 10%	9 to 10%	K9354ZF	L9850BA
0 to 25%	20 to 21.5%	K9354ZG	L9850BA
			T26 EPS

5.6 Zero gas cylinder for NO, SO₂, CO₂, CO, O₂ (paramagnetic type O₂ analyzer): N₂

N ₂ Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
99.99% or more	K9134TA	L9850BA
		T27-1.EPS

5.7 Zero gas cylinder for $O_2: O_2 + N_2$

Used only with the system using a zirconia oxygen analyzer

O ₂ Concentration	Part Number (3.4L)	Part Number of Pressure Reducing Valve
0.95 to 1.0%	G7001ZC	L9850BA
		T27-2.EPS

6. Pressure Reducing Valve for Gas Cylinder

Application	Part	Description
Span gas cylinder	L9850BA	For low-concentration cylinders, containing less than 5% of combustible gases, used for CO analyzers and others, and for non-combustible gas cylinders
Zero gas cylinder	L9850BA	For any non-combustible gas cylinder
		T28.EPS

7. Recorders

- A recorder can be installed in the SG700 by specifying the option code "/M□".
- Use Yokogawa's μR10000 recorder (maximum 6-point recording) for the built-in recorder. For details of the μR10000, refer to GS 04P01B01-01E. To use recorders other than the μR10000, contact Yokogawa to confirm the specifications including mounting dimensions.

Any signal connected to the recorder cannot also be used as external output. If an external output is required in addition, contact Yokogawa. Choose V DC input as the input signal and 100 V AC as the power supply voltage to the recorder. When the output of the SG700 is 4 to 20 mA DC, prepare a 250 ohms shunt resistance.

EXTERNAL DIMENSIONS

1. SG700 Stack Gas Analyzer

Unit: mm



(*1) Installation and maintenance spaces and anchor bolt positions are the same for both outdoor and indoor types.

(*2) Both outdoor and indoor type analyzing systems weigh approximately 350 kg.

(*3) On the left side of the system, there are sample gas inlet, drain and exhaust. A space for piping is required.

<<Contents>> <<Index>>

- 2. Probes
- Type F filtering probe (K9718VC)



F04.E1

• Type M3 open type probe (K9718QA) Unit: mm



3. External Drain Separator (K9641EA)



• Type M2E filtering probe (K9718VE)





• Type M2 open type probe (K9718PD)





F09.EPS

- 4. External Primary Filters
- Type M1E external primary filter (K9718TA)



Type MS external primary filter (K9718UA)



5. Standard gas cylinder



7. Pressure Reducing Valve for Gas Cylinder (L9850BA)



6. Heating Sampling Tube (SG8HSAP-LDD)



EXTERNAL TERMINAL CONNECTION DIAGRAM



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MEASURABLE COMPONENTS AND THEIR OUTPUT CHANNELS

Suffix Code		Output Channel											
Measurable Component	O ₂ Analyzer	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch9	Ch10	Ch11	Ch12
- A	– N	SO ₂											
- B	– N	NOX											
- C	– N	NOX	SO ₂										
– D	– N	CO											
– E	– N	CO ₂											
– F	– N	CO ₂	CO										
– G	– N	$NO_{\rm X}$	CO										
– H	– N	$NO_{\rm X}$	SO ₂	CO									
— J	– N	$NO_{\rm X}$	SO2	SO ₂	СО								
- A	- 1, - 2	SO ₂	0 ₂	Corrected SO ₂	Corrected SO ₂ average	O ₂ Average							
– B	- 1, - 2	NO _X	0 ₂	Corrected NO _X	Corrected NO _X average	O ₂ Average							
- C	- 1, - 2	NO _X	SO ₂	0 ₂	Corrected NO _X	Corrected SO ₂	Corrected NO _X average	Corrected SO ₂ average	O ₂ Average				
– D	- 1, - 2	CO	0 ₂	Corrected CO	Corrected CO average	O ₂ Average							
– E	- 1, - 2	CO ₂	0 ₂	O ₂ Average									
– F	-1,-2	CO ₂	CO	0 ₂	Corrected CO	Corrected CO average	O ₂ Average						
– G	- 1, - 2	NO _X	СО	O ₂	Corrected NO _X	Corrected CO	Corrected NO _X average	Corrected CO average	O ₂ Average				
– H	- 1, - 2	NO _X	SO ₂	СО	O ₂	Corrected NO _X	Corrected SO ₂	Corrected CO	Corrected NO _X average	Corrected SO ₂ average	Corrected CO average	O ₂ Average	
– J	- 1, - 2	NO _X	SO ₂	CO ₂	СО	O ₂	Corrected NO _X	Corrected SO ₂	Corrected CO	Corrected NO _X average	Corrected SO ₂ average	Corrected CO average	O ₂ Average

T28-2.EPS

Typical System Configuration

The stack gas analyzer consists of the analyzing system and the sampling system for drawing sample gas properly from stack. The following illustrate three typical system configurations: a standard system, a system with thermal sampling tube and a system with external primary filter.

• Standard system (Filtering probe + (external drain separator) + analyzing system)

This system is used under the condition where the temperature at a sampling point is higher than the acid dew point (approx. <u>150°C</u>) and less than 700°C. When the system is used in the condition where the temperature at a sampling point is lower than the acid dew point (150°C), the mounting point of the probe should be insulated and heated to prevent condensation from forming on the probe.

The sampling system consists of the filtering probe, the standard sampling tube and the external drain separator.

Any of Type F, Type M1E (electric heating) or Type M2E (electric heating) filtering probes should be used. For the selection of filtering probes refer to Table 1 on page 26.

An external drain separator may be required, depending on the sample conditions.



• System with heating sampling tube (Filtering probe + heating sampling tube + analyzing system)

When the ambient temperature is under $0^{\circ}C$ where drain may freeze, the sampling tube should be heated to prevent condensation and freezing. If the SO₂ concentration is normally below 100 ppm, the heating sampling tube should be used to prevent the formation of drain that might cause dissolution loss of sample gas.

The sampling system consists of the heating filtering probe and the heating sampling tube.

Either of Type M1E or Type M2E filtering probe should be used.

If the system is installed where the temperature at a sampling point is under the acid dew point (approx. 150°C), the mounting point of the probe should be insulated and heated.

This system cannot be used in combination with the external primary filter.



System with external primary filter (Open-type probe + external drain separator + external primary filter + analyzing system)

This system is applied to where the maintainable filtering probe cannot be installed due to the installation site or the high temperature of sample gas. The system requires the external primary filter to eliminate dust coming through the open-type probe. Drain forming in the tube is eliminated by the external drain separator. The sampling system consists of the open-type probe, the standard sampling tube, the external drain separator and the external primary filter.

Either of Type M2 (150 to 800°C) or Type M3 (800 to 1400°C) open-type probe should be used.

Either of Type M1E (electric heating) or Type MS (steam heating) external primary filter should be used.



SG700 Stack Gas Analyzer Inquiry Form

Thank you for your inquiry about our SG700 Stack Gas Analyzer.

Please make inquiries by placing checkmarks in the appropriate boxes and filling in the blanks. (The items with check mark and descriptions previously filled on the underlines are fixed requirements.)

1. General Information

Company:	Delivery destinat	ion:
Responsible person:	Section:	(Phone No)
Plant name:	Measurement loc	cation:
Purpose: \Box Indication reading, \Box Reco	rding, 🗆 Telemeter tr	ansmission, 🗆 Alarm, 🗆 Control, 🗆 Other,
Requested delivery date (day/month/ye	ar):	
2. Specification Requirements		
2.1 Measuring objects:		
2.2 Measurement method:		
Non-dispersive infrared abs	sorption method	
$O_{_2}$ detector, \Box Required (\Box] zirconia method) (□] paramagnetic) 🗆 Not required
2.3 Conditions of measuring gases		
(1) Component: $\Box NO_x$, $\Box SO_2$, $\Box CO$,	$\Box \operatorname{CO}_2, \Box \operatorname{O}_2, \Box \operatorname{Oth}$	ers
(2) Temperature: □ 150 to 400°C, □ 4	00 to 700°C, □ 700 to	o 1400°C ,
(3) Pressure: N	⁄IPa, □ -5 to 5 kPa	
(4) Moisture:% (20% or less moisture	is required. Dew point and normal temperature at inlet of
	analyzing system)	
(5) Dust:mg	/Nm ³ (500 mg/Nm ³ or	less is required)
(6) Corrosive components:(ex	cept for SO ₂)	
(7) SO ₂ range:(Th	e range should be wi	thin 0 to 1000 ppm)
2.4 Measuring range		
$(1) \square NO_x _ \square ppm \square \%$	$(2) \square SO_2$	□ ppm □ %
(3) □ CO □ ppm □ %	(4) □ CO ₂	□ ppm □ %
(5) ⊔ 0 ₂ vol%		
3. Selection of Filtering Probe of	r Open Type Prob	e plus External Primary Filter

3.1 Filtering probe (Used in normal applications):

(1) Three types of filtering probe are available: Type F, Type M1E and Type M2E. Refer to Table 1 for the selection.

- □ Type F filtering probe (K9718VC) _____ quantity
- Type M1E filtering probe (K9219ED) quantity
- Type M2E filtering probe (K9718VE) _____ quantity

3.2 Open type probe plus external primary filter

Refer to Tables 1 and 2 for selecting the probe and external primary filter.

(1) Probe:

Type M2 open type probe (K9718PD) ______ quantity
Used where the temperature of the sample gas is in the range of 150 to 800°C
Type M3 open type probe (K9718QA) ______ quantity
Used where the temperature of the sample gas is in the range of 800 to 1400°C.

(2) External primary filter:

- □ Type M1E external primary filter (K9718TA) _____ quantity
- □ Type MS external primary filter (K9718UA) _____ quantity

Table 1 Selection of Filtering Probe

Gas condition	Dust g/Nm ³			Temperature	SO ₂ concentration ppm *1		
Filtering probe	0.1 or less	0.5 or less	below 150°C	150 to 400°C	400 to 700°C	100 ppm or less	100 to 1000 ppm
(1) Type F (K9718VC)	Std.	-	-	Std.	-	-	Std.
(2)Type M1E (K9219ED)	Std.	-	-	Std.	Std.	-	Std.
(3) Type M2E (K9718VE)	Std.	Std.	Non-std.	Std.	Std.	Std.	Std.
Std · Applicable Non std · Applicable with conditions (See pages 23 and 24 for the details) · · Not applicable T29.eps							

Std. : Applicable, Non-std : Applicable with conditions (See pages 23 and 24 for the details), -: Not applicable

*1: Normal SO₂ concentration; the median of the measuring range should be taken as reference.

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Table 2 Selection of Probe and External Primary Filter

Gas condition	Dust	g/Nm ³ Temp		erature	SO ₂ concentration ppm *1	
Probe and Filter	0.1 or less	0.5 or less	150 to 800°C	800 to 1400°C	100 ppm or less	100 to 1000 ppm
(1) Type M2 open type probe (K9718PD)	Std.	-	Std.	-	-	Std.
(2) Type M1E open type probe (K9718QA)	Std.	-	-	Std.	-	Std.
(1) Type M1E filter (K9718TA) Electric heater (*2)	Std.	-	-	-	-	Std.
(2) Type MS filter (K9718UA) Steam heater (*2)	Std.	-	-	_	-	Std.
Std · Applicable - · Not applicable						T30.eps

Std. : Applicable, -: Not applicable

*2: The probe should be used in combination with the external primary filter. Either an electric or steam heater should

be used according to the customer's utility.

Sampling tube (Used to feed sample gas from the probe to the analyzer) 4.

Two types - the sampling tube and the heating sampling tube - are available and each should be used properly according to the following conditions.

- (1) \Box Sampling tube (SG8SAP-L $\Box\Box$): (length in meters) \times _ (quantity) (50 m max.)
- Used in the normal sample conditions. Whereas under the conditions described in (2) select the heating sampling tube. (2) □ Heating sampling tube (SG8HASP-L□□): ____(length in meter) ×_ _____(quantity) (50 m max.)

Related item: Select the heating sampling tube in Item 7.5 on this Inquiry Form. Operation conditions: (1) Ambient temperature is under 0°C, (2) Normal SO₂ concentration is less than 100 ppm

- The combination of either Type M1E (K9718TA) or Type MS (K9818UA) external primary filter with heating sampling tube is not possible.

5. Drain Separator (K9641EA): quantity

- (1) Should be specified when the tube between the probe and the analyzer is placed at less than a 15° tilt.
- (2) Two drain separators must be specified when the SO₂ range is 500 ppm or more.
- * Required conditions (1) Antifreeze measures should be taken

6. Restricted Conditions by the SO₂ Measuring Range and Recommended System

- 6.1 For measuring flue gas of wet desulfurization systems under the SO, range of less than 100 ppm, the following system is recommended as a customized order. Consult Yokogawa.
 - (1) System: Ammonia decomposition equipment + heating sampling tube + dual-type electric gas cooler
 - (2) Approximately 2% of SO₂ dissolution loss (under 80 ppm of SO₂ and 50 ppm of NH₃)
 - (3) The ammonia decomposition equipment is only for the SO, measurement and used when sample gas contains 0 to 20 ppm of NH₃ gas.

6.2 For the SO, range of 500 ppm or more, the following system is recommended

- (1) System: Double external drain separators (K9641EA) +SO, mist catcher
 - The option code "/SO1" should be specified. The option code "/SO1" does not include an external drain separator, so arrange it separately. Related item: Item 7.13 on the Inquiry Form

6.3 Under the following condition, the NO, converter should be specified

- (1) In measuring only SO, concentration of flue gas at sludge incinerators
- (2) Required to reduce the NO₂ interference error (e.g. approximately -6 ppm of SO₂ at 50 ppm of NO₂) The option code "/NO1" should be specified. (/NO1 includes the NOx converter.) Related item: Item 7.14 on the Inquiry Form

7. SG700 stack gas analyzer: _quantity

7.1 Power supply:

···· · · · · · · · · · · · · · · · · ·	
□ 100 V AC □ 110 V AC	□ 115 V AC □ 200 V AC □ 230 V AC ±10%
□ 50 ± 0.5 Hz □ 60 ± 0.5 Hz	<u>.</u>
ApproximatelyVA	\Box When the heating sampling tube is used for cold district, 36.5 VA per meter of tube
	should be added.
7.2 Output signal:	

 \Box 4 to 20 mA DC \Box 0 to 1 V DC

□ Non-isolated output (Recorder output) □ Isolated output (external output)

7.3 Panel construction:

□ For indoor installation □ For outdoor installation

7.4 Automatic calibration

Required

7.5 Heating and insulation of external tubes:

□ Required (Specify when using the heating sampling tube or when the SO₂ concentration at outlet of □ None desulfurization/denitrification is higher than 100 ppm. 50 m max.) (Specify the option code "/S") (Related item; The length of a heating sampling tube should be specified in Item 4 on the Inquiry Form)

^{*1:} Normal SO₂ concentration; the median of the measuring range should be taken as reference.

7.6 Built-in reco	rder:
□ None	□ Required Signals of recording components (Specify the option code "/M□". The µR10000 should be arranged separately.)
7.7 Cold-district	version:
□ None	\Box Required ((Related item: Should harmonize with Item 7.18 on the Inquiry Form)
-5 to 40°C	\Box -15 to 40°C (Specify the option code "/T1")
	\Box -10 to 40°C (Specify the option code "/T2")
7.8 Instrument a	ir:
□ None	Required as zero gas (Specify the option code "/Q")
7 0 Atmosphoria	
	an. \Box Required (as zero ass) (Specify the option code "/P")
7.10 Tag num	
	□ Required (specify the tag number)
	\Box Acryl (Specify the option code "/U1") \Box SUS (Specify the option code "/U2")
7.11 Name pla	te:
None	\Box Required (specify the description)
	\Box Acryl (Specify the option code "/V1")
	\Box SUS (Specify the option code "/V2")
Note: - Specify	the tag number and the description of a nameplate when ordering
- Any cha (within 2	weeks) before the requested delivery date may delay the delivery date.
7.12 Channel	base
Standard	\Box Enclosure-type base (Specify the option code "/W")
7.13 Specifica	tion for high SO ₂ concentration
7.14 NO _x conv	erter
	(4) in the option code "NOT" below conditions)
	(1) In the exhaust gas measurements at sludge incinerators and
	(2) to measure only the SO_2 concentration
7.15 Color/Coa IV Standard	ating: Munsell 5Y7/1 equivalent (Both inside and outside),melamine resin, baked finish
7 16 Installatio	n condition:
No direct sunlig	bt and negligible vibration should be allowed on the installation site
Ambient tempe	rature: (Related item: Should barmonize with Item 7.7 on the Inquiry Form)
\Box -5 to 40°C	
□ -10 to 40°C (Specify the option code "/T2")
□ -15 to 40°C (Specify the option code "/T1")
7 17 Window	
7.18 Air Purge	
7.19 Arrestor:	
For power supp	ly □ None □ Required
For signal	□ None □ Required
7.20 Weight	
Approximately 3	350 kg
7.21 Others	
Use this inquiry	form for consulting with your customers.
If you have any	question or need further assistance, please contact Yokogawa.
(Note) Teflon is	registerd trademark of Dupont.
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