

General Specifications

Model AV550G Zirconia Oxygen Analyzer Averaging Converter



GS 11M12D01-01E

Overview

Zirconia oxygen analyzers are used in combustion facilities to measure the flue gas oxygen concentration. Boiler operators use the oxygen measurement to optimize fuel usage, minimize atmospheric emissions and reduce energy consumption.

A multiple point oxygen measurement system is required for situations when gas stratification in the flue duct affects combustion control. The AV550G Averaging Converter can accept inputs from up to eight zirconia oxygen detectors. It sends output signals for the individual as well as averages of multiple oxygen concentrations. A robust multipoint converter reduces installation and maintenance costs.

A large 5.7-inch color LCD shows various measurement, setup, calibration, and trend screens.

Its intuitive touch screen, is easy to read and makes set up and maintenance simple. Other standard features include new self-diagnostics and a hot swap function that allows a desired probe to be disconnected/reconnected for inspection or maintenance just by turning off the power of the relevant channel.

The AV550G Averaging Converter is ideal for combustion control in large utility boilers or various industrial furnaces.

Features

- Full color touch screen.
- Special trend graph functions with customer graph configuration.
- Multiple display modes shows average data, single detector or all detector gas concentrations.
- Handles input of up to 8 oxygen detectors.
- "Hot swap" of channel cards so the analyzer remains on line while maintenance is performed.
- Eight 4-20mA outputs for individual detectors.
- Three 4-20mA outputs for average oxygen concentration outputs.
- Failed, in calibration, or alarming, detectors are automatically excluded from average calculations.



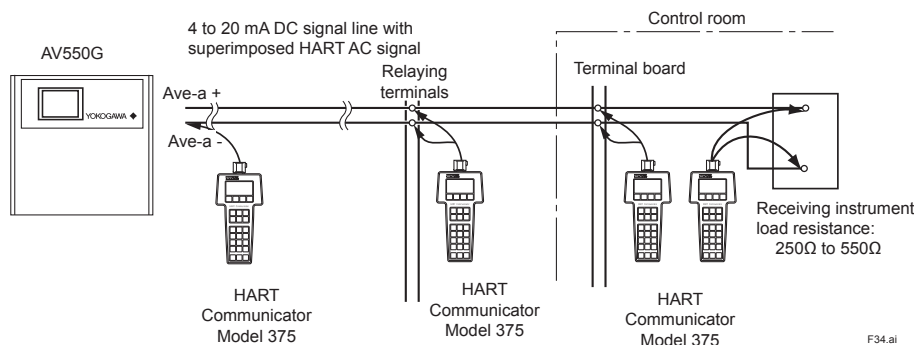
- Allows contact input, calibration activation, range change and detector performance validation.
- Remote maintenance using digital communications (HART or FOUNDATION Fieldbus) reduces maintenance costs. *1

*1: HART is a registered trademark of HART Communication Foundation.
FOUNDATION is a registered trademark of Fieldbus foundation.

Applications

Utility Boiler – With large boilers used in the utility industry, the oxygen concentration varies in different zones across the flue. In order to obtain the most reliable oxygen data, the most common method used is the arithmetical averaging of several measuring points using an external averaging unit. The model AV550G Averaging Converter not only averages the signals but fully controls all of the individual detectors thereby eliminating the need for costly, redundant hardware or DCS programming.

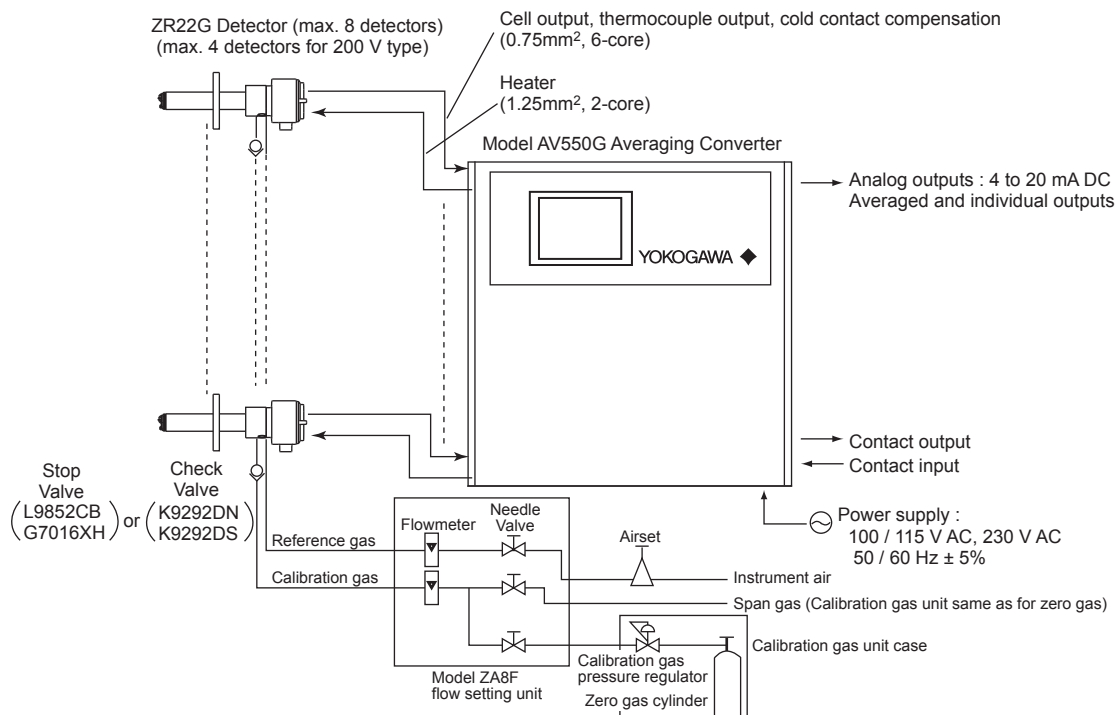
Process Heater – Process industries, such as refining, use large numbers of individual oxygen analyzers to maximize the combustion efficiency of process heaters. The model AV550G Averaging Converter receives and controls inputs from oxygen detectors mounted on the same or multiple flues and transmits either individual or averaged output signals.



Basic System Configuration

- Instrument air is used as the reference gas. (max. 8 detectors)

A standard gas cylinder can be used for the calibration gas for more accurate calibration.



F01.EF

■ STANDARD SPECIFICATIONS (Averaging Converter)

1. General Specifications

Compatibility of Detectors : ZR22G, ZO21D, ZO21DW

Number of Detectors : 1 to 8 (100 V type)

Expandable up to 8

Detectors : 1 to 4 (200 V type)

Expandable up to 4

(Note) Specify 4 Channel Base when 200 V type is selected.

Averaging interval: 0.2 seconds

Display: 5.7 inches color LCD display of size 320 by 240 dot with touch screen

Output Signal: 4 to 20 mA DC (maximum load resistance 550 Ω)

Average-value Output; 3 points

(Note) Number of averaging output is 2 when suffix code “-F” (FOUNDATION Fieldbus communication) is selected.

Independent Output; Output to each channel

Common isolation / Individual isolation selectable

Used exclusively for communication when suffix code “-F” (FOUNDATION Fieldbus communication) is selected.

Digital Communication (HART): 250 to 550 Ω, depending on number of field devices connected to the loop (multi-drop mode).

(Note) HART is a registered trademark of the HART Communication Foundation.

Contact Output: Contact capacity 30V DC 3A, 250V AC 3A (resistive load) Normally open / normally close selectable

Common Contact Output; 5 points, Four of the output points can be selected to either normally energized or normally deenergized status. Contact output 5 is normally energized.

Contact Output for Individual Channel Fail; Output to each channel

Normally energized.

Solenoid Valve Contact Output: Contact capacity 30V DC 1A, 250V AC 1A, voltage free contacts / 24 voltage (option) selectable

DC 24V power supply Maximum DC 30mA

Contact Input: 2 points, voltage free contacts

Ambient Temperature: -5 to +50°C

Storage Temperature: -20 to +70°C

Humidity Range: 10 to 85%RH (non-condensing)

Installation Altitude: 2000 m or less

Category based on IEC 1010: II (Note)

Pollution degree based on IEC 1010:2 (Note)

Note: Installation category, called over-voltage category, specifies impulse withstand voltage. Category II is for electrical equipment.

Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength. Degree 2 is the normal indoor environment.

Power Supply Voltage: Ratings; 100 / 115 V AC, 230 V AC

Acceptable range; 85 to 126.5 V AC, 199.5 to 253 V AC

Power Supply Frequency: Rating; 50/60 Hz

Acceptable range; 50 Hz ±5%, 60 Hz ±5%

Power Consumption:

Max. 40 W + (120 W) (Number of detectors)

for steady operation (100 V type)

Max. 40 W + (220 W) (Number of detectors)

for warm-up (100 V type)

Max. 40 W + (140 W) (Number of detectors)

for steady operation (200 V type)

Max. 40 W + (220 W) (Number of detectors)

for warm-up (200 V type)

Safety and EMC Compliance**Safety Standards:**

EN61010-1

CAN/CSA-C22.2 No.61010.1

UL Std. No. 61010-1

EMC Standards:

EN 61326-1 Class A Table 2 (for use in industrial locations)

EN 61326-2-3

EN 61000-3-2

EN 61000-3-3

CE, C-tick

Korea Electromagnetic Conformity Standard

Maximum Distance between Detector and Converter:

Conductor two-way resistance must be

10Ω or less (when a 1.25mm² cable or equivalent is used, 300 m or less)

Construction: Indoor installation**Wiring Connection: Number of wire holes 30 pieces**

Wire hole size: Ø17 mm for grommet

Ø6 to Ø12 mm for cable gland

(option).

Installation: Wall mounting

Case: Aluminum alloy (100 V type), Steel plate

and Aluminum alloy (200 V type)

Paint Color: Silver Gray (Munsell 3.2PB7.4/1.2)

Finish: Polyurethane corrosion-resistance coating

Weight: Approx. 13 kg (100 V type), Approx. 25 kg (200 V type)

Functions:**Display Functions:**

Value Display; Displays values of the measured oxygen concentration, etc

Graph Display; Displays trends of measured oxygen concentration

Data Display; Displays various useful data for maintenance, such as cell temperature, reference junction temperature, maximum/ minimum oxygen concentration, or the like.

Status Message; Indicates an alarm or error occurrence with flashing of the corresponding icon. Indicates status such as warming up, calibrating, or the like by icon.

Alarm, Error Display; Displays alarms such as "Abnormal cell e.m.f." when any such status occurs.

Calibration functions:

Auto-Calibration; It calibrates automatically at specified intervals.

Semi-auto Calibration; Input calibration direction on the touch screen or contact, then it calibrates automatically afterwards.

Manual Calibration; Calibration with opening/ closing the valve of calibration gas in operation interactively with an LCD touch screen.

Validation Function: Permits control room

activation of zero, span or midpoint gas concentrations without running an actual calibration.

Blowback Function:

Output through the contact in the set period and time. Auto/semi-auto selectable.

Maintenance Functions:

Can operate updated data settings in daily operation and checking. Display data settings, calibration data settings, blowback data settings, current output loop check, input/output contact check.

Setup Functions:

Initial settings suit for the plant conditions when installing the converter. Equipment settings, current output data settings, alarm data settings, contact data settings, other settings.

Self-diagnosis: This function diagnoses conditions of the converter or the detector and indicates when any abnormal condition occurs.

Password Functions:

Enter your password to operate the analyzer excepting data display. Individual passwords can be set for maintenance and setup

Display and Setting Content:**Measuring Related Items:**

Oxygen concentration (vol% O₂)

Display Items:

Cell e.m.f (mV), thermocouple e.m.f (mV), cold junction resistance (Ω) or voltage(mV), cell temperature (°C), cold junction temperature (°C), span correction factor (%), zero correction factor (%), cell response time(second), cell condition(in four grades), cell internal resistance (Ω), next calibration estimate (year/month/day), heater on-time rate (%), time (year/month/day, hour/minute), software revision, maximum/minimum/ average oxygen concentration(vol%O₂), calibration record (ten times), internal temperature rise alarm record.

Calibration Setting Items: Span gas concentration (vol%O₂), zero-gas concentration (vol%O₂), calibration mode (auto, semi-auto, manual), calibration type and method (zero-span calibration, zero calibration only, span calibration only), stabilization time (minute/second), calibration time (minute/second), calibration period (day/hour), starting time (year/month/day, hour/minute)

Equipment Related Items: Measuring gas selection; wet/dry Detector selection; ZR22/ZO21

Output Related Items: Analog output/output mode selection, output conditions when warming- up / maintenance/ calibrating (during blowback) / abnormal, 4 mA / 20 mA point oxygen concentration (vol%O₂), time constant, preset values when warming-up / maintenance / calibrating during blowback abnormal, output preset values on abnormal.

Alarm Related Items:

Oxygen concentration high-alarm/
high-high alarm limit values (vol% O₂), oxygen concentration low-alarm/
low-low alarm limit values (vol% O₂),
oxygen concentration alarm hysteresis
(vol% O₂), oxygen concentration alarm
detection, alarm delay (seconds)

Converter Output: mA analog output (4 to 20mA DC
(maximum load resistance of 550Ω)).
Average-value output; 3 points
(average value a, average value b,

$$\text{average } c = \frac{a + b}{2}$$

Independent Output; Output to each channel
Range; any setting between 0 to 5
through 0 to 100 vol% O₂ in 1 vol%
O₂, or partial range is available
(Maximum range value/minimum
range value 1.3 or more)

For the log output, the minimum range
value is fixed at 0.1 vol% O₂.

4 to 20 mA DC linear or log can be
selected.

Input/output isolation.

Output damping: 0 to 255 seconds.

Hold/non-hold selection, preset
value setting possible with hold

Contact Output: Five points, contact capacity 30
V DC 3 A, 250 V AC 3 A (resistive
load) Four of the output points can be
selected to either normally energized or
normally deenergized status.
Delayed functions (0 to 255 seconds)
and hysteresis function (0 to 9.9 vol%O₂)
can be added to high/low alarms.

The following functions are
programmable for contact outputs.

(1) Abnormal, (2) High-high alarm, (3)
High alarm, (4) Low-low alarm, (5) Low-
alarm, (6) Maintenance, (7) Calibration,
(8) Range switching answer-back, (9)
Warm-up, (10) Calibration-gas pressure
decrease (answerback of contact input),
(11) Blowback start, (12) Process
alarm (answerback of contact input),
(13) Calibration coefficient alarm, (14)
Internal temperature rise alarm. Contact
output 5 is set to normally operated,
fixed error status.

Contact Output for Individual Channel Fail: Output
to each channel Normally energized.
Each channel cards provides a
failure contact output.

(1)Abnormal cell, (2)abnormal cell
temperature(high/low), (3)abnormal
channel card, (4)abnormal control card,
(5)abnormal card communication

Contact Input: Two points, contact input The
following functions are programmable
for contact inputs:
(1) Calibration-gas pressure decrease
alarm, (2) Range switching, (3) External
calibration start, (4) Process alarm (if
this signal is received, the heater power
turns off), (5) Validation start, (6) Blow-
back start

Self-diagnosis: Abnormal cell, abnormal cell
temperature (high/low), abnormal
channel card, abnormal control card,
abnormal card communication

Calibration: Method; zero/span calibration

Calibration mode; automatic, semi-automatic and
manual (All are operated interactively
with an LCD touch screen). Either zero
or span can be skipped.

Zero calibration-gas concentration setting range;
0.3 to 100 vol% O₂ (0.01 vol%O₂ in
smallest units). Span calibration-gas
concentration setting range: 4.5 to
100 vol% O₂ (0.01 vol% O₂ in smallest
units). Use nitrogen-balanced mixed
gas containing 0 to 10 % scale of
oxygen, and 80 to 100 % scale of
oxygen for standard zero gas and
standard span-gas respectively.

Calibration period; date/time setting; maximum
255 days/23hours.

■ FOUNDATION Fieldbus communication function

The bi-directional digital communication as standard
for FOUNDATION Fieldbus that is established by
Fieldbus foundation.

Interface : FOUNDATION Fieldbus H1
(communication speed : 31.25 kb/s)

Physical layer type :
113 (standard-power signaling, bus
powered, non I.S.)

Communication line condition:
power supply----9 to 32 VDC, current
supply----15 mA (Max)

Signal insulation :
communication terminal to grand terminal,
dielectric strength 500 Vrms
(50/60 Hz, 1 min).

Device : Link master

Function block :

AI block :
3 blocks (1 block for each channels)
Transfer the data of averaging oxygen
concentration to other instruments.

DI block :
2 blocks
Transfer the status of error and alarm
to other instruments.

MAI block
1 block (8 channels)
Transfer the data of individual oxygen
concentration to other instruments.

MAO block
1 block (8 channels)
Import the data of other instruments.

■ STANDARD ACCESSORIES (Averaging Converter)

Name	Part No	Quantity	Remarks
Fuse	A1112EF	2	2.5A
Hexagonal Allen Wrench	L9827AS	1	For lock screw

■ MODEL AND SUFFIX CODES

1. Detector

Refer to GS 11M12A01-01E for a detailed explanation of the detector specifications and available accessories.

2. Averaging Converter

Model	Suffix Code	Option code	Description
AV550G	-----	-----	Averaging Converter
Base (*1)	-A -B	----- -----	4 Channel Base 8 Channel Base
Number of Channel Cards (*2)	-A1 -A2 -A3 -A4 -A5 -A6 -A7 -A8 -B1 -B2 -B3 -B4 -B5 -B6 -B7 -B8	----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----	1 Oxygen Channel Card, Common Isolation 2 Oxygen Channel Cards, Common Isolation 3 Oxygen Channel Cards, Common Isolation 4 Oxygen Channel Cards, Common Isolation 5 Oxygen Channel Cards, Common Isolation 6 Oxygen Channel Cards, Common Isolation 7 Oxygen Channel Cards, Common Isolation 8 Oxygen Channel Cards, Common Isolation 1 Oxygen Channel Card, Individual Isolation 2 Oxygen Channel Cards, Individual Isolation 3 Oxygen Channel Cards, Individual Isolation 4 Oxygen Channel Cards, Individual Isolation 5 Oxygen Channel Cards, Individual Isolation 6 Oxygen Channel Cards, Individual Isolation 7 Oxygen Channel Cards, Individual Isolation 8 Oxygen Channel Cards, Individual Isolation
Display	-J -E -F -G	----- ----- ----- -----	Japanese English French German
Power supply	-1 -2	----- -----	100 / 115 V AC 230 V AC (*3)
Communication	-E -F	----- -----	HART communication FOUNDATION Fieldbus communication (*4)
Options		/SCT /24 /G □□	Stainless steel tag plate 24 Voltage output for Solenoid valve Cable gland (Numbers in □□) (*5)

(*1) Select code "-B" (8 Channel Base) when future expansion exceeding 4 channels is expected.
By so doing, the expansion can be made economically.

(*2) Common isolation is recommended, when the same instrument receives the analog outputs from each channel card. Individual isolation is recommended to prevent the trouble by mutual interference, when different instrument receives the analog outputs from each channel card.

(*3) When suffix code "-2" (230 V AC) is selected, select code "-A" (4 Channel Base).

(*4) When suffix code "-F" (FOUNDATION Fieldbus communication) is selected, used exclusively for communication

(*5) Input 01 to 30 in □□

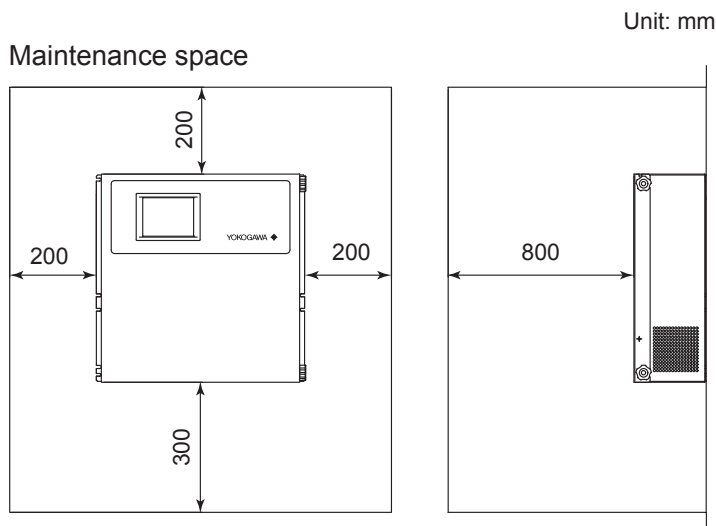


Fig.1 AV550G Averaging Converter

■ WIRING

