YOKOGAWA ZR402

QUICK START GUIDE

YOKOGAWA

Yokogawa Corporation of America

This guide is intended to provide assistance during the commissioning of the ZR402 analyzer and ZR22 detector. It is not intended to be comprehensive. Please read the appropriate instruction manual for complete instructions.

Installation of the Detector

Location

The following should be taken into consideration when installing the detector:

(1) Easy and safe access to the detector for checking and maintenance work.
(2) Ambient temperature of not more than 150°C, and the terminal box should not affected by radiant heat.
(3) A clean environment without any corrosive gases.

CAUTION

- A natural convection type detector (model ZR22G-☐-☐-☐-C), which uses ambient air as reference gas, requires that the ambient oxygen concentration be constant.

(4) No vibration.
(5) The measurement gas satisfies the specifications described in Chapter 2.
(6) No measured gas-pressure fluctuations.

Probe Insertion Hole

Includes those analyzers equipped with a probe supporter and probe protector.

When preparing the probe insertion hole, the following should be taken into consideration:

CAUTION

- The outside dimension of detector may vary depending on its options. Use a pipe that is large enough for the detector. Refer to Figure 3.1 for the dimensions.
- If the detector is mounted holizontally, the calibration gas inlet and reference gas inlet shuld face downwards.
- When using the detector with pressure compensation, ensure that the flange gasket does not block the reference air outlet on the detector flange. If the flange gasket blocks the outlet, the detector cannot conduct pressure compensation. Where necessary, make a notch in the flange gasket. Confirm the external dimensions of the detector in Section 3.8 before installation.
- The sensor (zirconia cell) at the probe tip may deteriorate due to thermal shock if water drops are allowed to fall on it, as it is always at high temperature.

Installation of the Converter

Location

The following should be taken into consideration when installing the converter:

(1) Readability of the indicated values of oxygen concentration or messages on the converter display.
Easy and safe access to the converter for operating keys on the panel.
(2) Easy and safe access to the converter for checking and maintenance work.
(3) An ambient temperature of not more than 55°C and little change in temperature (recommended within 15°C in a day).
(4) The normal ambient humidity (recommended between 40 to 75% RH) and without any corrosive gases.
(5) No vibration.
(6) Near to the detector.
(7) Not in direct rays of the sun. If the sun shines on the converter, prepare the hood (/H) or other appropriate sunshade.

Mounting of the Converter

The converter can be mounted on a pipe (nominal JIS 50A: O.D. 60.5 mm), a wall or a panel. The converter can be mounted at an angle to the vertical, however, it is recommended to mount it on a vertical plane.

Mount the converter as follows.

<Pipe Mounting>

(1) Prepare a vertical pipe of sufficient strength (nominal JIS 50A: O.D. 60.5 mm) for mounting the converter. (Converter weighs approximately 6 kg.)
(2) Mount the converter on the pipe. Fix it firmly on the pipe in the procedure described in Figure 3.7.

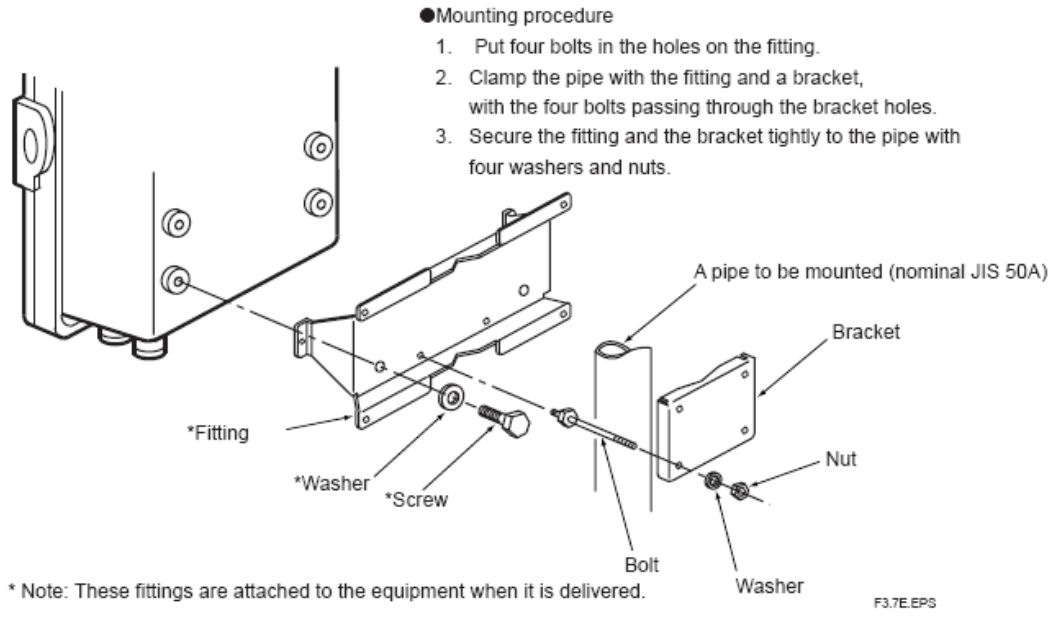


Figure 3.7 Pipe Mounting

<Wall Mounting>

(1) Drill mounting holes through the wall as shown in Figure 3.8.

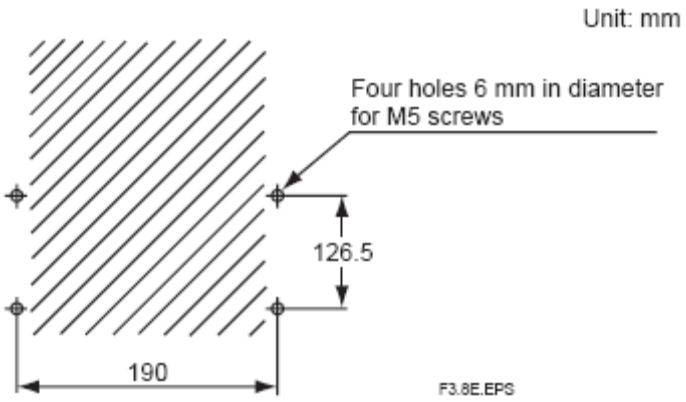


Figure 3.8 Mounting holes

(2) Mount the converter. Secure the converter on the wall using four screws.

Note: For wall mounting, the bracket and bolts are not used.

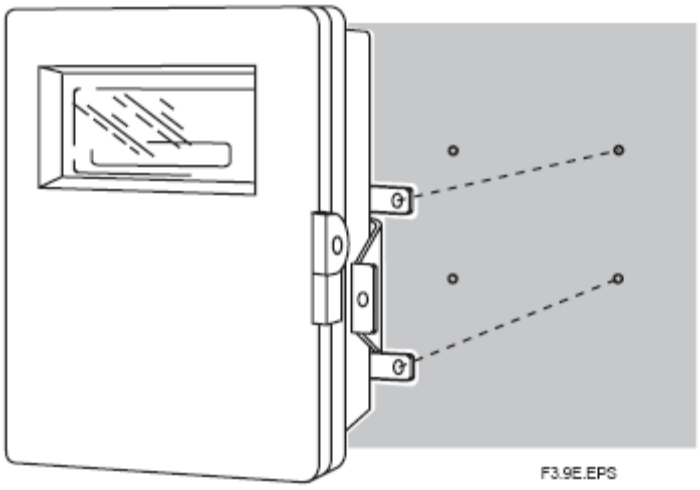


Figure 3.9 Wall Mounting

Connection to the Calibration Gas Inlet

When carrying out calibration, connect the piping (6(O.D) ~4(I.D.) mm tube) from the standard gas unit to the calibration gas inlet of the detector. First, mount a stop valve (of a quality specified by YOKOGAWA) on a nipple (found on the open market) as illustrated in Figure 4.2, and mount a joint (also found on the open market) at the stop valve tip. (The stop valve may be mounted on the detector prior to shipping the detector.)

Note 1: Mount the stop valve close to the detector.

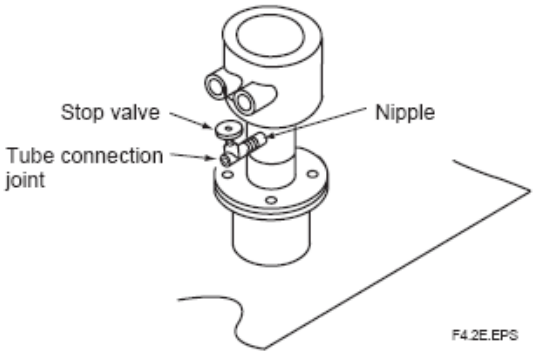


Figure 4.2 Connection to the calibration gas inlet

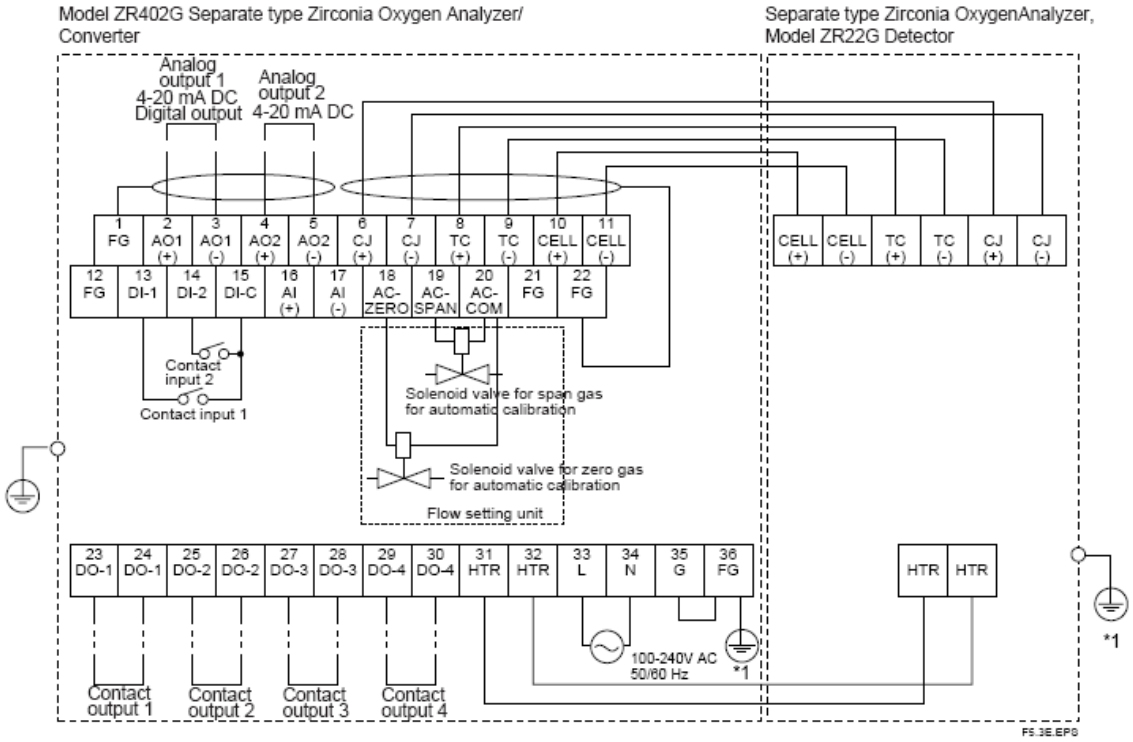
Connection to the Reference Gas Inlet

- Normally, no piping is required for the reference gas inlet when the equipment uses natural convection for reference gas (models ZR22G-□-□-□-C). Leave the plug as it is . If the air around the detector is polluted and the necessary oxygen concentration (21 vol% O_2) cannot be obtained, prepare piping the same as which described in Section 4.2, System 2.
- When the equipment uses instrument air for the reference gas, piping is required as described in Section 4.2, System 2 (models ZR22G-□-□-□-E or P).

5.1.2 Wiring

Connect the following wiring to the converter. It requires a maximum of eight wiring connections as shown below.

(1) Detector output (connects the converter with the detector.)
(2) Detector heater power (connects the converter with the detector.)
(3) Analog output signal
(4) Power and ground
(5) Contact output
(6) Operation of the solenoid valve of automatic calibration unit
(7) Contact input



*1 The protective grounding for the converter should be connected to either the protective ground terminal in the equipment or the ground terminal on the case.
Standard regarding grounding: Ground to earth, ground resistance: 100 Ω or less.

Figure 5.3 Wiring connection to the converter

Connection to the Detector

To connect cables to the detector, proceed as follows:

(1) Mount conduits of the specified thread size or cable glands to the wiring connections of the detector.
The detector may need to be removed in future for maintenance, so be sure to allow sufficient cable length.

(2) If the ambient temperature at the location of wire installation is 80 to 150°C, be sure to use a flexible metallic wire conduit. If a non-shielded " 600V silicon rubber insulated glass braided wire " is used, keep the wire away from noise sources to avoid noise interference.

(3) Figure 5.6 shows the layout of the detector terminals.

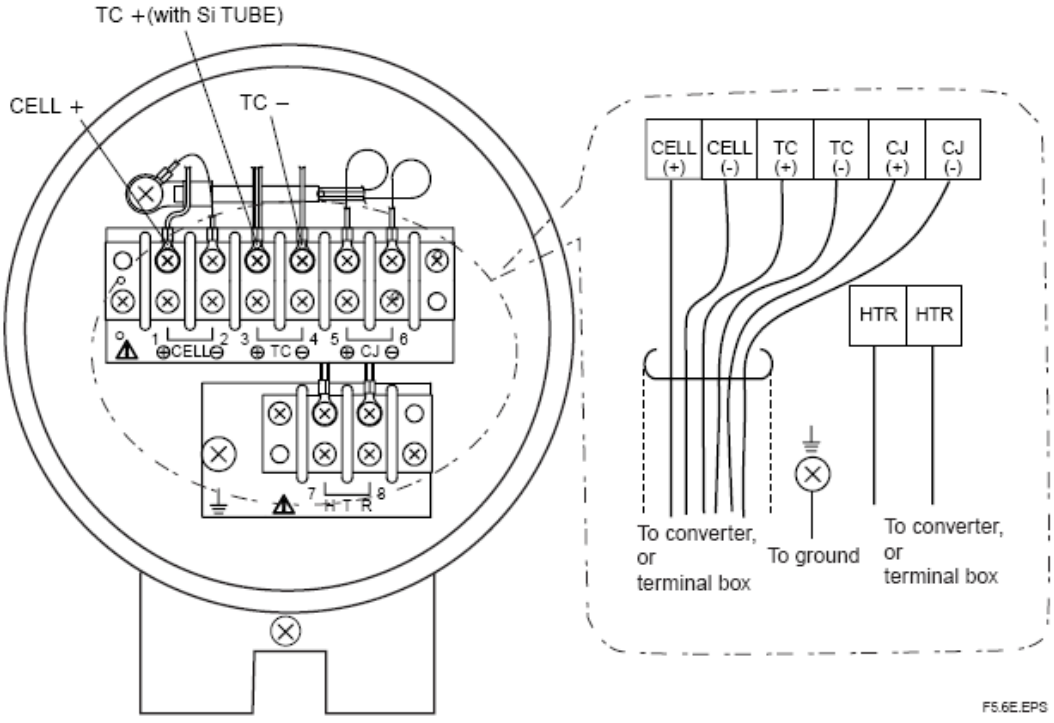


Figure 5.6 Detector terminals

The sizes of the terminal screw threads are M3.5 except for the M4 on grounding terminal. Each wire in the cable should be terminated in the corresponding size of crimp terminal (*1) respectively.

*1: If the ambient temperature at the detector installation site exceeds 60°C, use a " bare crimp-on terminal".

(4) Except when "600V silicon rubber insulated glass braided wire" is used, connect the cable shield to the FG terminal of the converter.

Supply power to the converter. A display as in Figure 7.1, which indicates the detector's sensor temperature, then appears. As the heat in the sensor increases, the temperature gradually rises to 750°C. This takes about 20 minutes after the power is turned on, depending somewhat on the ambient temperature and the measured gas temperature. After the sensor temperature has stabilized at 750°C, the converter is in measurement mode. The display panel then displays the oxygen concentration as in Figure 7.2. This is called the basic panel display.

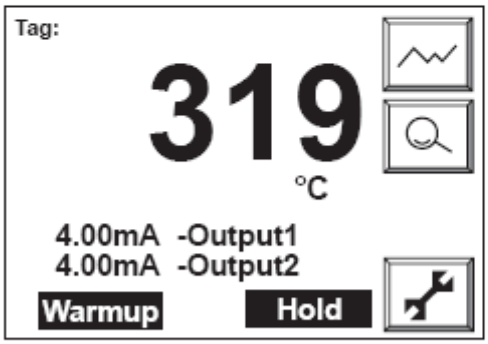


Figure 7.1 Sensor Display During Warmup

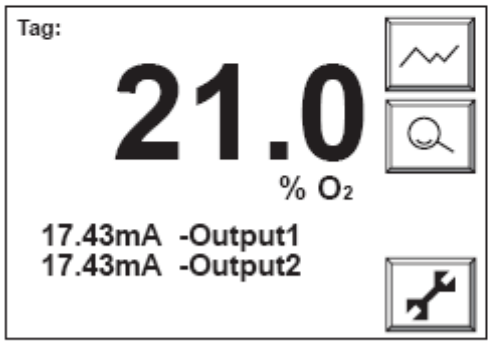


Figure 7.2 Measurement Mode Display

Touchpanel Switch Operations

Basic Panel and Switch

The converter uses a touchpanel switch which can be operated by just touching the panel display. Figure 7.3 shows the basic panel display. The switches that appear in the switch display area vary depending on the panel display, allowing all switch operations. Table 7.1 shows the switch functions.

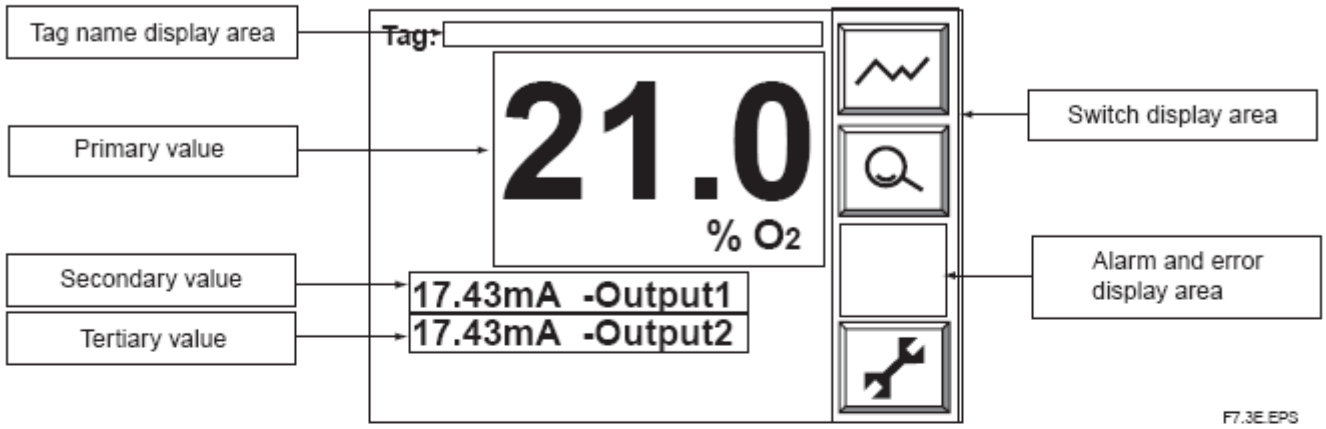


Figure 7.3 Basic Panel Display

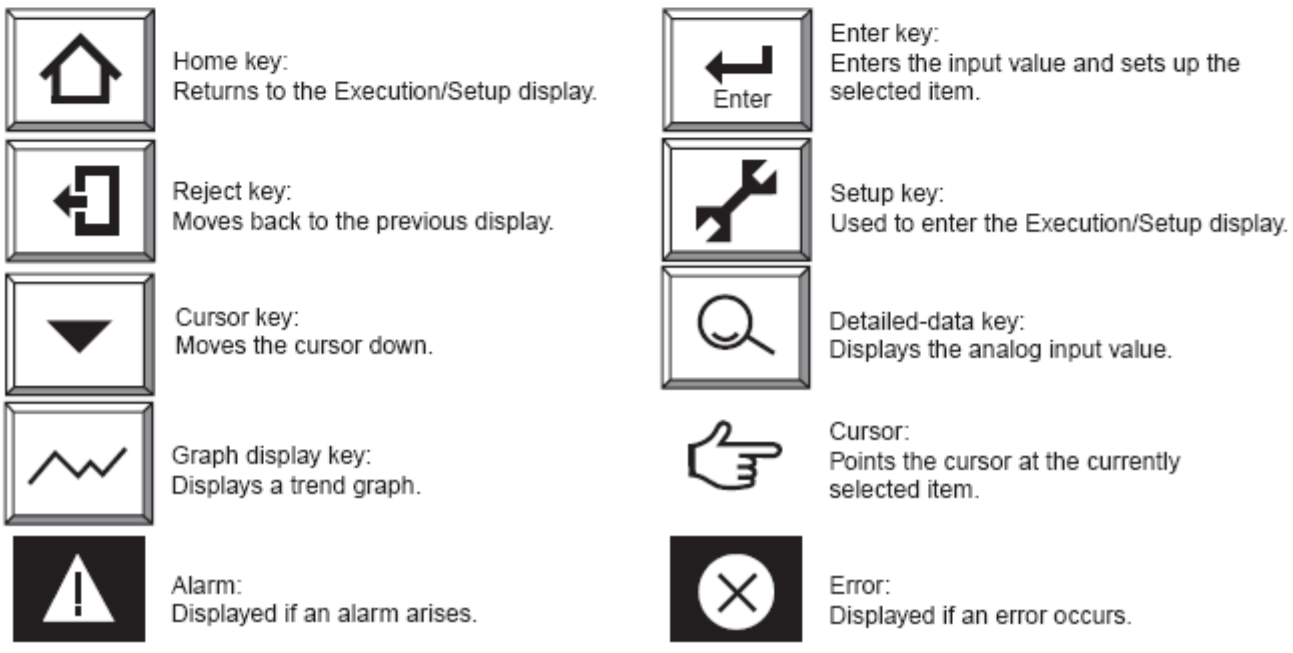
Tag name display area: Displays the set tag name (Refer to Section 10.1.4, "Entering Tag Name").

Primary to tertiary display items: Displays the selected item. (Refer to Section 7.9, "Setting Display Item".)

Switch display area: Displays switches and functions selected according to the panel display.

Alarm and error display area: Displays an error if an alarm or error occurs. If you touch this area, the details of the error or alarm are then displayed.

Table 7.1 Switches and Their Functions



Output Range Setting

This section sets forth analog output range settings. For details, consult Section 8.1,"Current Output Settings," later in this manual.

Minimum Current (4 mA) and Maximum Current (20 mA) Settings

To set the minimum and maximum current settings, follow these steps:

(1) Select the Setup from the Execution/Setup display.
(2) From the Commissioning (Setup) display, select "mA-output setup"; the display shown in Figure 7.9 then appears.
(3) Select "mA-output1" from the "mA-outputs" display. The "mA-output1 range" display shown in Figure 7.10 then appears.
(4) In the display shown in Figure 7.10, select "Min. oxygen conc." and press the [Enter] key to display the numeric-value entry display. Enter the oxygen concentration at a 4-mA output; enter [010] for a ten-percent concentration measurement.
(5) Also in Figure 7.10, select "Max. oxygen conc." at a 20-mA output. Enter the appropriate maximum oxygen concentration (at the 20-mA output) in the same manner as in step 4 above.
(6) Set "mA-output2" in the same manner as in the appropriate steps above.

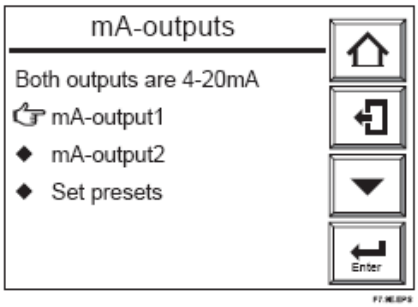


Figure 7.9 Setting "mA-output"

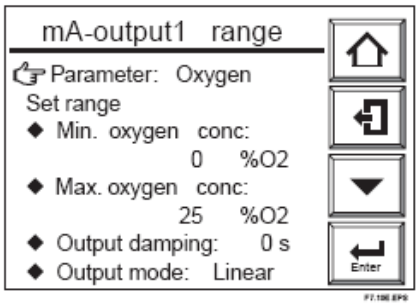


Figure 7.10 Setting "mA-output1 range"

Setting Oxygen Concentration Alarms

The analyzer enables the setting of four alarms — high-high, high, low, and low-low alarms — depending upon the oxygen concentration. The following section sets out the alarm operations and setting procedures.

Alarm Values

(1) High-high and high alarm values

If high-high and high alarm values are set to ON, then alarms occur if measured valves exceed the alarm set values. The oxygen alarm set values can be set in the range 0 to 100% O_2.

(2) Low and low-low alarm values

If low-low and low alarm values ore set, then alarms occur if measured values fall below the alarm set values. The oxygen alarm set values can be set in the range 0 to 100% O_2.

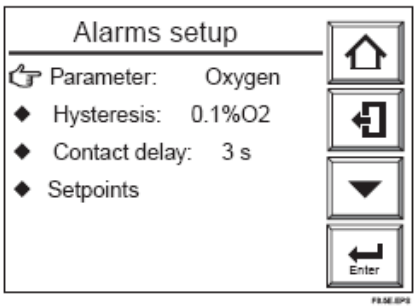


Figure 8.5 Alarms Setup Display

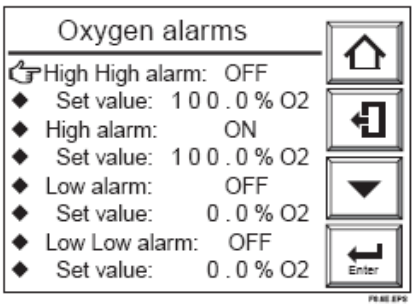


Figure 8.6 Oxygen Alarms Display

Default Values

When the analyzer is delivered, or if data are initialized, the default alarm set values are as shown in Table 8.3.

Table 8.3 Alarm Setting Default Values

Item	Setting range	Default setting
Hysteresis	0 to 9.9 % O_2	0.1% O_2
Delay time	0 to 255 seconds	3 seconds
High-high limit alarm	——	Off
High-high-limit alarm setpoint	0 to 100% O_2	100% O_2
High-limit alarm	——	Off
High- and low-limit alarm setpoints	0 to 100% O_2	100% O_2
Low-limit alarm	——	Off
Low-limit alarm setpoint	0 to 100% O_2	0% O_2
Low-low-limit alarm	——	Off
Low-low-limit alarm setpoint	0 to 100% O_2	0% O_2

T8.3E.EPS

Calibration Procedures

This manual assumes that the instrument air is the same as the reference gas used for the span gas. Follow the steps below to conduct manual calibration:

(1) Press the Setup key in the basic panel display to display the Execution/Setup display. Then select Calibration in the Execution/Setup display. In doing so, the Calibration display as in Figure 7.17 appears.

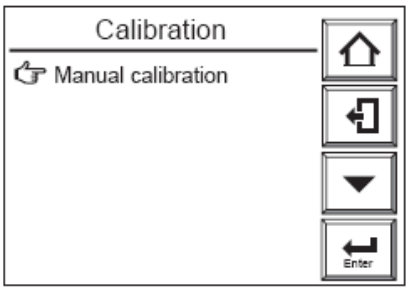


Figure 7.17 Calibration Display

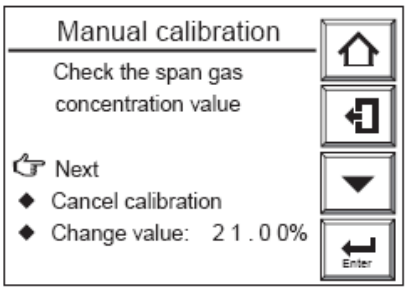


Figure 7.18 Manual Calibration

(2) Press the [Enter] key to select span-gas calibration. The Manual calibration display shown in Figure 7.18 then appears. Check that the oxygen concentration for the span gas in this display coincides with the oxygen concentration in the calibration gas actually used. If the check results are assumed to be OK, select Next in the Manual calibration display.

(3) Follow the display message in Figure 7.19 to turn on span gas flow. Open the span-gas flow valve for the Flow Setting Unit by loosening the valve lock-nut and slowly turning the valve shaft counterclockwise to flow the span gas at 600 ± 60 ml/min. Use the calibration gas flowmeter to check the flow.

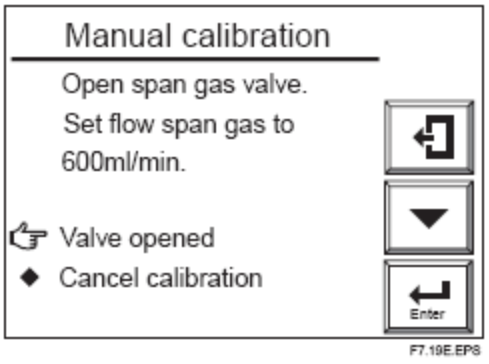


Figure 7.19 Span-gas Flow Display

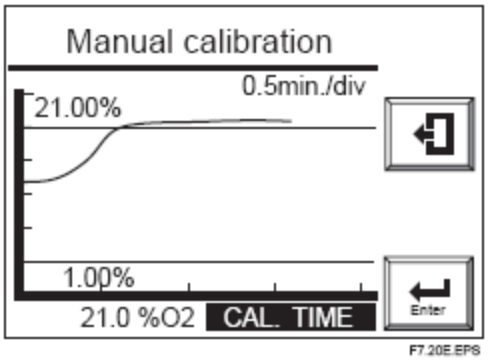


Figure 7.20 Manual Calibration Trend Graph (for Manual Calibration)

(4) If "Valve opened" is selected as in Figure 7.19 , an oxygen-concentration trend graph (with the oxygen concentration being measured) appears (see Figure 7.20). The CAL TIME in the bottom area of the panel flashes. Observe the trend graph and wait until the measured value stabilizes in the vicinity of 21% on the graph. At this point, calibration has not yet been executed yet, so even if the measured value is above or below 21%, no problem occurs.

(5) After the measured value has stabilized, press the [Enter] key to display the "span-calibration complete" display shown in Figure 7.21. At that point, the measured value is corrected to equal the span-gas concentration setting. Close the span-gas flow valve. The valve lock-nut should be tightened completely so that the span gas does not leak.

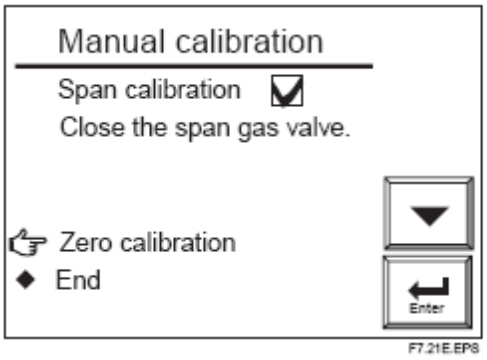


Figure 7.21 Span Calibration Complete Zero calibration start Display

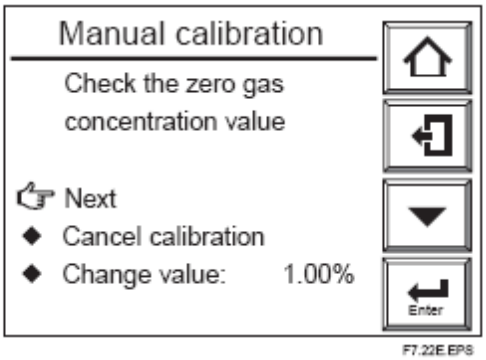


Figure 7.22 Zero-gas Concentration Check Display (in Manual Calibration)

(6) Select Zero calibration as in Figure 7.21 to display the zero-gas concentration check display (Manual calibration) . Check that the zero-gas oxygen concentration value and the calibration gas oxygen concentration value agree. Then select Next as in Figure 7.22.

(7) Follow the instructions in the display as in Figure 7.23 to turn on the zero gas flow. To do this, open the zero-gas flow valve for the Flow Setting Unit and adjust that valve to obtain a flow of 600 ± 60 ml/min.

(The valve should be adjusted by loosening its lock nut and slowly turning the valve shaft counterclockwise. Use the calibration gas flowmeter to check the flow.)

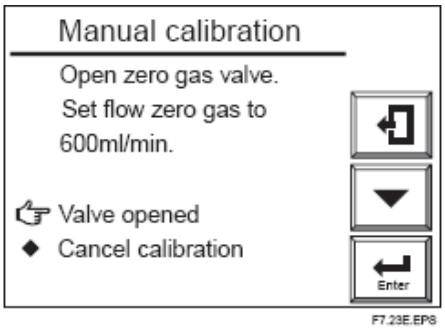


Figure 7.23 Zero-gas Flow Display (for Manual calibration)

(8) If "Valve opened" is selected as in Figure 7.23 , an oxygen-concentration trend graph (with the oxygen concentration being measured) appears (see Figure 7.25). The CAL TIME in the bottom area of the panel flashes. Observe the trend graph and wait until the measured value stabilizes in the vicinity of the zero-gas concentration on the graph. At this point, no calibration has been executed yet, so even if the measured value is above or below the zero-gas concentration value, no problem occurs.

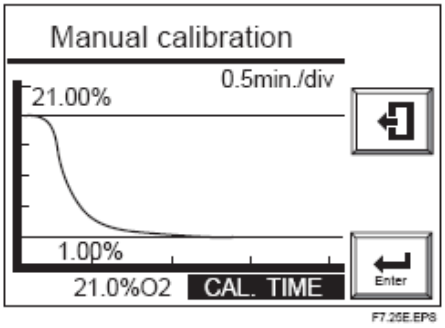


Figure 7.25 Manual Calibration, Trend Graph

(9) After the measured value has stabilized, press the [Enter] key to display the "zero-calibration complete" display shown in Figure 7.26. At this point, the measured value is corrected to equal the zero-gas concentration, setting are made to agree. Close the zero-gas flow valve. The valve lock-nut should be tightened completely so that the zero gas does not leak.

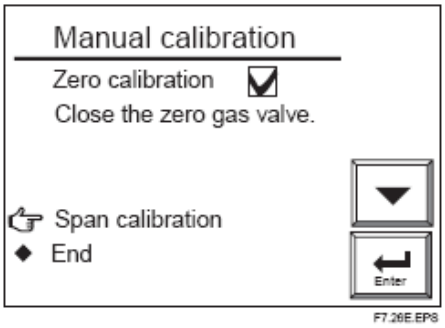


Figure 7.26 Zero Calibration Complete Display

(10) Select End in the display as shown in Figure 7.26. An oxygen concentration trend graph (with the oxygen concentration being measured) appears and HOLD TIME then flashes. This time is referred to as the output-stabilization time. If the HOLD TIME has been set with the output-hold setting, the analog output remains held (refer to Section 8.2, "Setting Output Hold," later in this manual). Manual calibration is completed when the preset output-stabilization time elapses. This output-stabilization time is set to 10 minutes at the factory before shipment. If you press the [Enter] or [Return] key within the output-stabilization time, manual calibration is then completed.