Introduction

This is the HART Communicator manual for the EXAxt ZR series of Model ZR202G, ZR402G. This manual is described under the HART equipment that is ready to operate. When using the EXAxt ZR HART Protocol for the Zirconia Oxygen Analyzer/High Temperature Humidity Analyzer, please refer to the following instruction manuals.

Zirconia Oxygen Analyzer
IM 11M12A01-02E for ZR22G and ZR402G Separate type Zirconia Oxygen Analyzer
IM 11M12A01-04E for ZR202G Integrated type Zirconia Oxygen Analyzer

Zirconia High Temperature Humidity Analyzer
IM 11M12A01-03E for ZR22G and ZR402G Separate type Zirconia High temperature Humidity Analyzer
IM 11M12A01-05E for ZR202G Integrated-type Zirconia High temperature Humidity Analyzer

◆ Special descriptions in this manual

This manual generally describes the products and instruction manuals as given below.

Products
ZR202G: Integrated type converter
ZR402G: Separate type converter

Instruction manual
ZR402G Instruction Manual: IM 11M12A01-02E or IM 11M12A-03E

◆ Drawings in this manual

Drawings in this manual may be emphasized, abbreviated or partially omitted for easier explanation.

Screen images in this instruction manual are drawings to give you an idea of functions and operation; they may not be exactly the same as actual screen displays.

◆ Other items

The contents of this manual are subject to change without prior notice.
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1. Operation via HART Communicator

1.1 Conditions of Communication Line

1.1.1 Interconnection between ZR202G/ZR402G and HART Communicator

The HART Communicator can interface with the ZR202G/ZR402G from the control room, the ZR202G/ZR402G site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 250Ω between the connection and the receiving instrument. To communicate, it must be connected in parallel with the ZR202G/ZR402G, the connections are non-polarized. Figure 1.1 illustrates the wiring connections for direct interface at the ZR202G/ZR402G site. The HART Communicator can be used for remote access from any terminal strip as well.

![Interconnection Diagram](image)

**Figure 1.1 Interconnection Diagram**

1.1.2 Communication Line Requirements

Specifications for Communication Line:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load resistance:</td>
<td>250 to 550Ω (including cable resistance)</td>
</tr>
<tr>
<td>When multidrop mode, see Figure 1.2.</td>
<td></td>
</tr>
<tr>
<td>Minimum cable size:</td>
<td>24 AWG, (0.51 mm diameter)</td>
</tr>
<tr>
<td>Cable type:</td>
<td>Single pair shielded or multiple pair with overall shield</td>
</tr>
<tr>
<td>Maximum twisted-pair length:</td>
<td>6,500 ft (2,000 m)</td>
</tr>
<tr>
<td>Maximum multiple twisted-pair length:</td>
<td>3,200 ft (1,000 m)</td>
</tr>
<tr>
<td>Use the following formula to determine cable length for a specific application;</td>
<td></td>
</tr>
</tbody>
</table>

\[
L = \frac{65 \times 10^6}{(R \times C)} - \frac{(C + 10,000)}{C}
\]

where:  
\[
\begin{align*}
L &= \text{length in feet or meters} \\
R &= \text{resistance in ohms, current sense resistance} \\
C &= \text{cable capacitance in pF/ft or pF/m} \\
C_i &= 50,000 \text{ pF}
\end{align*}
\]
Figure 1.2  Load Resistance and Quantity of Devices in Multidrop Mode
2. Basic Operation of the HART Communicator (Model 275)

2.1 Keys and Functions

- LCD (Liquid crystal display) (21 characters x 8 lines)
- Communication Cable
- Function keys: Functions of the keys are indicated on the display.
- Hot key:
  - Call up Hot Key Menu as follows:
    1. Calibration
    2. Chng Wrt Protect
- Shift keys:
  - Use to enter alphabetic characters.
  - 1. Change the display contents.
  - 2. Move the position where a number or character is to be entered.
- Alphanumeric keys:
  - 1. Enter numbers and characters.
  - 2. Select the desired menu item with the corresponding number. (See 2.4 Entering, Setting and Sending Data)
  - Example:
    - Pressing \[ \text{calls up the display corresponding to the item pointed with the cursor.} \]
    - Pressing \[ \text{returns to the previous display. (See 2.3 Calling up Menu Address.)} \]
  - Example:
    - Pressing single key enters the number.
    - Pressing the key with shift key enters the alphabetic character.
      - (Press) (ENTER)
  - To enter 7, use: \[ ABC \rightarrow 7 \]
  - To enter C, use: \[ ABC \rightarrow C \]

Figure 2.1 HART Communicator
2.2 Display

The HART Communicator automatically searches for ZR202G/ZR402G on the 4 to 20 mA loop when it is turned on. When the HART Communicator is connected to the ZR202G/ZR402G, it displays “Online” menu as shown below.

(If ZR202G/ZR402G is not found, the communicator displays the message “No Device Found. Press OK....” Press the OK ‘F4’ function key and the main menu appears. Please retry after confirming the connection with the ZR202G/ZR402G.)

![Diagram of display with labels](image)

**Figure 2.2 Display**

- <1> ❤️ appears and flashes during communication between the HART Communicator and the ZR202G/ZR402G. At Burst mode*, ❤️ appears.
- <2> The current display menu title appears.
- <3> Each item in menu of <2> appears.
- <4> 🔽 and/or 🔼 appear when the items are scrolled out of the display.
- <5> On any given menu, the label appearing above a function key indicates the function of that key for the current menu.

Note: Refer to “3.4 Setting Parameters (5) Burst Mode”.
2. OPERATION VIA HART COMMUNICATOR

Function Key Labels

<table>
<thead>
<tr>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>HELP</td>
<td>ON/OFF</td>
<td>ABORT</td>
<td>OK</td>
</tr>
<tr>
<td>access on-line help</td>
<td>activates or deactivates a binary variable</td>
<td>terminate current task</td>
<td>acknowledge information on screen</td>
</tr>
<tr>
<td>RETRY</td>
<td>DEL</td>
<td>ESC</td>
<td>ENTER</td>
</tr>
<tr>
<td>try to re-establish communication</td>
<td>delete current character or Hot Key Menu item</td>
<td>leave value unchanged</td>
<td>accept user-entered data</td>
</tr>
<tr>
<td>EXIT</td>
<td>SEND</td>
<td>QUIT</td>
<td>NEXT</td>
</tr>
<tr>
<td>leave the current menu</td>
<td>send data to device, or mark data to send</td>
<td>terminate session because of a communication error</td>
<td>leave the current menu</td>
</tr>
<tr>
<td>YES</td>
<td>PGUP</td>
<td>PGDN</td>
<td>NO</td>
</tr>
<tr>
<td>answer to yes/no question</td>
<td>move up one help screen</td>
<td>move down one help screen</td>
<td>answer to yes/no question</td>
</tr>
<tr>
<td>ALL</td>
<td>PREV</td>
<td>NEXT</td>
<td>SKIP</td>
</tr>
<tr>
<td>include current Hot Key item on Hot Key Menu for all devices</td>
<td>go to previous message in a list of messages</td>
<td>go to next message in the list of messages</td>
<td>do not mark variable to be sent in off-line configuration</td>
</tr>
<tr>
<td>SAVE</td>
<td>EDIT</td>
<td>BACK</td>
<td>ONE</td>
</tr>
<tr>
<td>save information to communicator</td>
<td>edit a variable value</td>
<td>go back to menu from which HOME was pressed</td>
<td>include Hot Key item for one device</td>
</tr>
<tr>
<td>SEND</td>
<td>ADD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>send data to device, or mark data to send</td>
<td>add current item to Hot Key Menu</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.3 Calling Up Menu Addresses

3.1 Menu Tree shows the configuration of Online Menu which is needed for the operation with HART Communicator. The desired item can be displayed with ease by understanding the menu configuration.

When the HART Communicator is connected to the ZR202G/ZR402G, “Online” menu will be displayed after the power is turned on (See Figure 2.2). Call up the desired item as follows:

Key operation

There are two choices to select the desired menu item.
1. Use the \[\text{ }\] or \[\text{ }\] key to select the desired item, and then press the \[\text{ }\] key.
2. Press the number key displayed for the desired item.

• To return to the previous display, press the \[\text{ }\] key,

If EXIT, ESC and ABORT are displayed, press the desired function Key.

Example: Call up the “Tag” to change the tag number.

Check where “Tag” is located in the menu configuration. Then, call up “Tag” on the display according to the menu configuration.
ZR402G does not have this display.

---

**Display**

1. **Display 1** appears when the HART communicator is turned on. Select "Device setup".
   
   Display 1 is for the ZR202G only. If you use the ZR402G, Display 2 below will appear when the HART communicator is turned on.

2. **Display 2**
   
   Select "Basic setup".

3. **Display 3**
   
   Select "Tag".

4. The display for Tag setting appears.
   
   (The default value of "Tag" is blank.)
## 2.4 Entering, Setting and Sending Data

The data which are input with the keys are set in the HART Communicator by pressing **ENTER (F4)**. Then, by pressing **SEND (F2)**, the data are sent to the ZR202G/ZR402G. Note that the data are not set in the ZR202G/ZR402G if **SEND (F2)** is not pressed. All the data set with the HART Communicator is held in memory unless power is turned off, so every data can be sent to the ZR202G/ZR402G at one lot.

### Operation

Entering data on the “Tag” setting display.

On alphabetic characters, only capital letters can be used for setting Tag No. with HART Communicator.

**Example:** Set "FIC-1A".

Call up “Tag” setting display.

**ZR202G**

1. Device setup ---> 3.basic setup ---> 5.Tag

**ZR402G**

3.basic setup ---> 5.Tag

On the setting display shown above, enter the data as follows:

<table>
<thead>
<tr>
<th>Character to be entered</th>
<th>Operation</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>DEF 8</td>
<td>F</td>
</tr>
<tr>
<td>I</td>
<td>GHI 9</td>
<td>F I</td>
</tr>
<tr>
<td>C</td>
<td>ABC 7</td>
<td>F I C</td>
</tr>
<tr>
<td>-</td>
<td></td>
<td>F I C -</td>
</tr>
<tr>
<td>1</td>
<td>STU 1</td>
<td>F I C - 1</td>
</tr>
<tr>
<td>A</td>
<td>ABC 7</td>
<td>F I C - 1 A</td>
</tr>
</tbody>
</table>

**Note:**
- Capital letters are used for Tag No.
- Only alphabetic characters are allowed.
- All data are held in memory unless power is turned off.
- Data can be sent to ZR202G/ZR402G at one lot.
Display

1. ZR402G
   Tag: FLIC-IH
   HELP | DEL | ESC | ENTER

Operation

Press ENTER (F4) to set the data in the HART Communicator after entering the data.

2. ZR402G
   Basic setup
   Configuration
   PU range
   Assign TV & QV
   HELP | SEND | HOME

Press SEND (F2) to send the data to the ZR202G / ZR402G.

SEND (SEND) ☽ is flashing during communication.

SEND label changed to SAVE label, and the transmission is completed.
Press HOME (F3), and return "Online Menu".

Parameter setting on the indicator of ZR202G/ZR402G is prohibited during HART Communication.
3. Parameters

<table>
<thead>
<tr>
<th>IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>● The changed data with the HART Communicator is sent to ZR202G / ZR402G by pressing SEND (F2) of HART Communicator.</td>
</tr>
<tr>
<td>● If HART communication is performed while parameters are being set with the analyzer, the changed data may not be set correctly. In such a case, the analyzer provides the following displays:</td>
</tr>
<tr>
<td>ZR202G; Returns to the Basic panel display.</td>
</tr>
<tr>
<td>ZR402G; Returns to the Execution / Setup display and the word &quot;Communication&quot; appears in the bottom of the display. However, there is no effect when the analyzer is in the detailed-data display or trend graph display.</td>
</tr>
<tr>
<td>● If data settings were carried out simultaneously both in the analyzer and the HART Communicator, the set value on the HART Communicator may not match the actually set value.</td>
</tr>
</tbody>
</table>

3.1 Menu Tree

3.1.1 Menu Tree for Model ZR202G Integrated type Zirconia Oxygen Analyzer

The Online menu summary for Model ZR202G Integrated type Zirconia Oxygen Analyzer is shown below.


Online Menu

1 Device setup
2 PV
3 PV AO
4 PV LRV
5 PV URV

1 Process variables
1 View fld dev vars
1 Oxygen
2 Cell temp
3 CJ temp

2 View output vars
1 View PV-AO1
1 PV is
2 PV
3 PV % range
4 PV AO

2 View SV
1 SV is
2 SV

3 View TV
1 TV is
2 TV

4 View 4V
1 4V is
2 4V

3 View physical vars
1 Cell mV
2 TC mV
3 CJ mV

4 View Max&Min & Ave
1 Max Oxygen is (Method)
2 Min Oxygen is (Method)
3 Ave Oxygen

5 View other vars
1 Air ratio
2 Moisture
3 Heater duty

2 Diag/Service
1 Test device
1 Status
Status group 1
Status group 2
Status group 3
Status group 4
Status group 5
Operate mode 1

2 Self test
(Method)

3 Master test
(Method)

4 Set warning enbl
1 Warn enbl group1
2 Warn enbl group2
3 Warn enbl group3
4 Warn enbl group4

5 Read DI
1 DI 1
2 DI 2

6 Test DO
(Method)

7 Test Cal. DO
(Method)

2 Loop test
(Method)

3 D/A trim
(Method)

4 Scaled D/A trim
(Method)

5 Calibration
1 Manual calib.
(Method)

2 Semi-auto calib.
(Method)

3 Abort calib.
(Method)

4 Calib. constants
1 Cal zero(%) 2 Cal span (%) 3 Cell resp 4 Cell imp. 5 Cell robust

5 Calib. log
(Method)

to be continued next page
### Model ZR202G Integrated type Zirconia Oxygen Analyzer

#### 3. Parameters

<table>
<thead>
<tr>
<th>Online Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Device setup</td>
</tr>
<tr>
<td>2 PV</td>
</tr>
<tr>
<td>3 PV AO</td>
</tr>
<tr>
<td>4 PV LRV</td>
</tr>
<tr>
<td>5 PV URV</td>
</tr>
</tbody>
</table>

#### 3 Basic setup

1. **Tag**
2. **Configuration**
   - PV is
   - PV LRV
   - PV URV
   - PV PV Damp
   - Xfer fnctn
   - PV AO Alrm typ
3. **PV range**
4. **Assign other vars**
   - SV is
   - TV is
   - 4V is

#### 4 Detailed setup

1. **Sensors**
   - Oxygen
     - Oxygen Unit
     - Oxygen USL
     - Oxygen LSL
2. **Cell temp**
   - Unit
   - USL
   - LSL
3. **CJ temp**
   - Unit
   - USL
   - LSL
4. **Cell mV**
   - Unit
   - USL
   - LSL
5. **TC mV**
   - Unit
   - USL
   - LSL
6. **CJ mV**
   - Unit
   - USL
   - LSL

#### 2 Signal condition

1. **PV is**
2. PV
3. PV % range
4. PV LRV
5. PV URV
6. PV PV Damp
7. Xfer fnctn
8. PV AO Alrm typ

#### 3 Output condition

1. **Analog output**
   - Warm mode
   - Warm preset
   - Maint mode
   - Maint preset
   - Cal mode
   - Cal preset
   - Err mode
   - Err preset
   - Loop test
   - D/A trim
   - Scaled D/A trim

---

*to be continued next page*
### Model ZR202G Integrated type Zirconia Oxygen Analyzer 3 page of 4.

<table>
<thead>
<tr>
<th>Online Menu</th>
<th>4 Detailed setup</th>
<th>4 Input condition</th>
<th>5 Device information</th>
<th>6 Calib. condition</th>
<th>7 Alarm condition</th>
<th>8 Other condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Device setup</td>
<td>2 PV</td>
<td>3 PV AO</td>
<td>4 PV LRV</td>
<td>5 PV URV</td>
<td>1 Contact output 1</td>
<td>2 Contact output 1</td>
</tr>
<tr>
<td>1 Poll addr</td>
<td>2 HART output</td>
<td>1 Contact input 1</td>
<td>1 Active</td>
<td>2 Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Num req preams</td>
<td>3 Burst mode</td>
<td>2 Contact input 2</td>
<td>1 Active</td>
<td>2 Function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Burst option</td>
<td>4 Input condition</td>
<td>1 Universal rev</td>
<td>2 Fld dev rev</td>
<td>3 Software rev</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Relay</td>
<td>1 Function</td>
<td>1 Delay time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Function</td>
<td></td>
<td>6 Calib. condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Cal. span</td>
<td>2 Cal. zero</td>
<td>3 Calib mode</td>
<td>4 Calib point</td>
<td>5 Timing</td>
<td>1 Purge time</td>
<td>2 Calibration time</td>
</tr>
<tr>
<td>1 HiHi alarm</td>
<td>2 HiHi SP</td>
<td>3 Hi alarm</td>
<td>4 Hi SP</td>
<td>5 Lo alarm</td>
<td>6 Oxygen Lo SP</td>
<td>7 LoLo alarm</td>
</tr>
<tr>
<td>1 Date &amp; time</td>
<td>2 Oxygen alarm</td>
<td>1 Read date &amp; time</td>
<td>2 Write date &amp; time</td>
<td>(Method)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Ave time</td>
<td>2 Max &amp; Min &amp; Ave</td>
<td>1 Moisture Content</td>
<td>2 Theoretical air</td>
<td>(Method)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 MaxMin time</td>
<td>3 Fuel set</td>
<td>3 X value</td>
<td>4 ABS humidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Temp unit</td>
<td>4 Temp unit</td>
<td>1 Final assembly num</td>
<td>2 Distributor</td>
<td>3 Dev id</td>
<td>4 Write protect</td>
<td>5 Revision #’s</td>
</tr>
<tr>
<td>7 Alarm condition</td>
<td></td>
<td>1 Delay time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Oxygen alarm</td>
<td>1 HiHi alarm</td>
<td>2 HiHi SP</td>
<td>3 Hi alarm</td>
<td>4 Hi SP</td>
<td>5 Lo alarm</td>
<td>6 Oxygen Lo SP</td>
</tr>
<tr>
<td>1 Date &amp; time</td>
<td>2 Oxygen alarm</td>
<td>1 Read date &amp; time</td>
<td>2 Write date &amp; time</td>
<td>(Method)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Ave time</td>
<td>2 MaxMin time</td>
<td>1 Moisture Content</td>
<td>2 Theoretical air</td>
<td>(Method)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 MaxMin time</td>
<td>3 Fuel set</td>
<td>3 X value</td>
<td>4 ABS humidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Temp unit</td>
<td>4 Temp unit</td>
<td>1 Final assembly num</td>
<td>2 Distributor</td>
<td>3 Dev id</td>
<td>4 Write protect</td>
<td>5 Revision #’s</td>
</tr>
</tbody>
</table>

*to be continued next page*
3. Parameters


3.1.2 Menu Tree for Model ZR202G Integrated type Zirconia High Temperature Humidity Analyzer

The Online menu summary for Model ZR202G Integrated type Zirconia High Temperature Humidity Analyzer is shown below.

**Model ZR202G Integrated type Zirconia High Temperature Humidity Analyzer 1page of 4.**

### Online Menu

1. **1 Device setup**
   - 2 PV
   - 3 PV AO
   - 4 PV LRV
   - 5 PV URV

2. **1 Process variables**
   - View fld dev vars
     - 1 Oxygen
     - 2 Humidity
     - 3 Mixing
     - 4 Cell temp
     - 5 CJ temp
   - View output vars
     - 1 View PV-AO1
       - 1 PV is
       - 2 PV
       - 3 PV % range
       - 4 PV AO
     - 2 View SV
       - 1 SV is
       - 2 SV
     - 3 View TV
       - 1 TV is
       - 2 TV
     - 4 View 4V
       - 1 4V is
       - 2 4V
   - View physical vars
     - 1 Cell mV
     - 2 TC mV
     - 3 CJ mV
   - View Max&Min&Ave
     - 1 Oxygen Max&Min&Ave
       - 1 Max oxygen is
       - 2 Min oxygen is
       - 3 Ave oxygen
     - 2 Humid Max&Min&Ave
       - 1 Max humidity is
       - 2 Min humidity is
       - 3 Ave humid
     - 3 Mixing Max&Min&Ave
       - 1 Max mixing is
       - 2 Min mixing is
       - 3 Ave mixing
   - View other vars
     - 1 Temp
     - 2 Press
     - 3 RH%
     - 4 Dew-P
     - 5 Heater duty

3. **2 Diag/Service**
   - Test device
     - 1 Status
       - Status group 1
         - Status group 2
         - Status group 3
         - Status group 4
         - Status group 5
         - Operate mode
     - 2 Self test
       - (Method)
     - 3 Master test
       - (Method)
     - 4 Set warning enbl
       - 1 Warn enbl group 1
         - 2 Warn enbl group 2
         - 3 Warn enbl group 3
         - 4 Warn enbl group 4
     - 5 Read DI
       - 1 DI 1
       - 2 DI 2
     - 6 Test DO
       - (Method)
     - 7 Test Cal. DO
       - (Method)

4. **to be continued next page**

---

**Online Menu**

1. **1 Device setup**
2. **2 PV**
3. **3 PV AO**
4. **4 PV LRV**
5. **5 PV URV**

**1 Process variables**

1. **View fld dev vars**
   - 1 Oxygen
   - 2 Humidity
   - 3 Mixing
   - 4 Cell temp
   - 5 CJ temp

2. **View output vars**
   - 1 View PV-AO1
     - 1 PV is
     - 2 PV
     - 3 PV % range
     - 4 PV AO
   - 2 View SV
     - 1 SV is
     - 2 SV
   - 3 View TV
     - 1 TV is
     - 2 TV
   - 4 View 4V
     - 1 4V is
     - 2 4V

3. **View physical vars**
   - 1 Cell mV
   - 2 TC mV
   - 3 CJ mV

4. **View Max&Min&Ave**
   - 1 Oxygen Max&Min&Ave
     - 1 Max oxygen is
     - 2 Min oxygen is
     - 3 Ave oxygen
   - 2 Humid Max&Min&Ave
     - 1 Max humidity is
     - 2 Min humidity is
     - 3 Ave humid
   - 3 Mixing Max&Min&Ave
     - 1 Max mixing is
     - 2 Min mixing is
     - 3 Ave mixing

5. **View other vars**
   - 1 Temp
   - 2 Press
   - 3 RH%
   - 4 Dew-P
   - 5 Heater duty

**2 Diag/Service**

1. **Test device**
   - 1 Status
   - 2 Self test
   - 3 Master test
   - 4 Set warning enbl
     - 1 Warn enbl group 1
       - 2 Warn enbl group 2
       - 3 Warn enbl group 3
       - 4 Warn enbl group 4
   - 5 Read DI
     - 1 DI 1
     - 2 DI 2
   - 6 Test DO
     - (Method)
   - 7 Test Cal. DO
     - (Method)
3. Parameters


Online Menu

1 Device setup
2 PV
3 PV AO
4 PV LRV
5 PV URV

3 Basic setup

1 Tag
2 Configuration
3 PV range
4 Assign other vars

4 Detailed setup

1 Sensors
2 Configuration
3 PV range
4 Assign other vars

5 Calibration
1 Manual calib.
2 Semi-Auto calib.
3 Abort calib.
4 Calib. constants
1 Cal zero(%)
2 Cal span(%)
3 Cell resp
4 Cell imp.
5 Cell robus
5 Calib. log

1 Tag
2 Configuration
3 PV range
4 Assign other vars

1 Sensors
2 Configuration
3 PV range
4 Assign other vars

1 Oxygen
2 Oxygen Unit
3 Oxygen USL
4 Oxygen LSL

2 Humidity
1 Humidity
2 Humidity Unit
3 Humidity USL
4 Humidity LSL

3 Mixing ratio
1 Mixing
2 Mixing Unit
3 USL
4 LSL

4 Cell temp
1 Cell temp
2 Unit
3 USL
4 LSL

5 CJ temp
1 CJ temp
2 CJ temp Unit
3 USL
4 LSL

6 Cell mV
1 Cell mV
2 Cell mV Unit
3 Cell mV USL
4 Cell mV LSL

7 TC mV
1 TC mV
2 TC mV Unit
3 TC mV USL
4 TC mV LSL

8 CJ mV
1 CJ mV
2 CJ mV Unit
3 CJ mV USL
4 CJ mV LSL

2 Signal condition
1 PV is
2 PV

to be continued next page

Online Menu
1 Device setup
  1 PV
  3 PV AO
  4 PV LRV
  5 PV URV

4 Detailed setup
3 Output condition
1 Analog output
  1 Warm mode
  2 Warm preset
  3 Maint mode
  4 Maint preset
  5 Cal mode
  6 Cal preset
  7 Err mode
  8 Err preset
  9 Loop test
  10 D/A trim
  11 Scaled D/A trim

2 HART output
  1 Poll addr
  2 Num req preams
  3 Burst mode
  4 Burst option

3 Contact output
  1 Contact output 1
  2 Contact output 2

4 Input condition
1 Contact input 1
  1 Active
  2 Function

2 Contact input 2
  1 Active
  2 Function

5 Device information
1 Tag
  2 Descriptor
  3 Message
  4 Date
  5 Final assembly num
  6 Distributor
  7 Dev id
  8 Write protect
  9 Revision #s

1 Universal rev
  2 Fld dev rev
  3 Software rev

6 Calib. condition
1 Cal. span
  2 Cal. zero
  3 Calib mode
  4 Calib point
  5 Timing

1 Purge time
  2 Calibration time
  3 Auto calib. timing

7 Alarm condition
1 Delay time

2 Oxygen alarm
  1 HiHi alarm
  2 HIHi SP
  3 Hi alarm
  4 Hi SP
  5 Lo alarm
  6 Oxygen Lo SP
  7 LoLo alarm
  8 LoLo SP
  9 Hysteresis

to be continued next page
3. Parameters


3.1.3 Menu Tree for Model ZR402G Separate type Zirconia Oxygen Analyzer

The Online menu summary for Model ZR402G Separate type Zirconia Oxygen Analyzer is shown below.

- Model ZR402G Separate type Zirconia Oxygen Analyzer 1 page of 4.
**Model ZR402G Sparate type Zirconia Oxygen Analyzer 1page of 4.**

### Online Menu

#### 1 Process variables
- **1 View fld dev vars**
  - 1 Oxygen
  - 2 Cell temp
  - 3 CJ temp

- **2 View output vars**
  - 1 View PV-AO1
    - 1 PV is
    - 2 PV
    - 3 PV % range
    - 4 PV AO
  - 2 View SV-AO2
    - 1 SV is
    - 2 SV
    - 3 SV % range
    - 4 SV AO
  - 3 View TV
    - 1 TV is
    - 2 TV
  - 4 View 4V
    - 1 4V is
    - 2 4V

- **3 View physical vars**
  - 1 Cell mV
  - 2 TC mV
  - 3 CJ snsr

- **4 View Max& Min&Ave**
  - 1 Max Oxygen is (Method)
  - 2 Min Oxygen is (Method)
  - 3 Ave Oxygen

- **5 View other vars**
  - 1 Air ratio
  - 2 Moisture
  - 3 Heater duty

#### 2 Diag/Service

- **1 Test device**
  - 1 Status
    - Status group 1
    - Status group 2
    - Status group 3
    - Status group 4
    - Status group 5
    - Operate mode 1
  - 2 Self test (Method)
  - 3 Master test (Method)
  - 4 Set warning enbl
    - Warn enbl group1
    - Warn enbl group2
    - Warn enbl group3
    - Warn enbl group4
  - 5 Read DI
    - 1 DI1
    - 2 DI2
  - 6 Test DO (Method)
  - 7 Test Cal. DO (Method)

- **2 Fix analog output**
  - 1 Manual calib. (Method)
  - 2 Semi-auto calib. (Method)
  - 3 Abort calib. (Method)
  - 4 Calib. constants
    - 1 Cal zero(%)
    - 2 Cal span(%)
    - 3 Cell resp
    - 4 Cell imp.
    - 5 Cell robus
  - 5 Calib. log (Method)

***to be continued next page***
3. Parameters

Model ZR402G Sparate type Zirconia Oxygen Analyzer 3 page of 4.

4 Detailed setup

3 Output condition

1 Analog output
   6 AO added damp
   7 Xfer funcn
   8 SV AO Alrm typ

2 HART output
   1 Poll addr
   2 Num req prems
   3 Burst mode
   4 Burst option

3 Contact output
   1 Contact output1
      1 Relay
      2 Function
   2 Contact output2
      1 Relay
      2 Function
   3 Contact output3
      1 Relay
      2 Function
   4 Contact output4
      1 Function

4 Input condition

1 Contact input 1
   1 Active
   2 Function

2 Contact input 2
   1 Active
   2 Function

5 Device information

1 Tag
2 Descriptor
3 Message
4 Date
5 Final asmbly num
6 Distributor
7 Dev id
8 Write protect
9 Revision #’s
   1 Universal rev
   2 Fld dev rev
   3 Software rev

6 Calib. condition

1 Cal span
2 Cal zero
3 Calib mode
4 Calib point
5 Timing
   1 Purge time (Method)
   2 Calibration time (Method)
   3 Auto calib. timing (Method)

7 Blow condition

1 Blow mode
   (Method)
2 Blow purge time (Method)
3 Blow back time (Method)
4 Atuo blow timing (Method)

8 Alarm condition

1 Delay time
2 Oxygen alarm
   1 HiHi alarm
   2 HiHi SP
   3 Hi alarm

to be continued next page
### 3. Parameters

**Model ZR402G Separate type Zirconia Oxygen Analyzer 4 page of 4.**

<table>
<thead>
<tr>
<th>4 Detailed setup</th>
<th>9 Other condition</th>
<th>4 Hi SP</th>
<th>5 Lo alarm</th>
<th>6 Oxygen Lo SP</th>
<th>7 LoLo alarm</th>
<th>8 LoLo SP</th>
<th>9 Hysteresis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 Date &amp; Time</td>
<td>2 Write date &amp; time (Method)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 Max &amp; Min &amp; Ave</td>
<td>1 Ave time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 Fuel set</td>
<td>2 MaxMin time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 Temp unit</td>
<td>1 Moisture Content</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 Theoretical air</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 X value</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 ABS humidity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**5 Review**

Device info
Calib info
Output info
Contact info
Others info

### 3.1.4 Menu Tree for Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer

The Online menu summary for Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer is shown below.

- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer 1 page of 4.
| 1 Process variables | 1 View fld dev vars | 1 Oxygen  
2 Humidity  
3 Mixing  
4 Cell temp  
5 CJ temp |
|---------------------|---------------------|------------------|
| 2 View output vars | 1 View PV-AO1 | 1 PV is  
2 PV  
3 PV % range  
4 PV AO |
|                     | 2 View SV-AO2 | 1 SV is  
2 SV  
3 SV % range  
4 SV AO |
|                     | 3 View TV | 1 TV is  
2 TV |
|                     | 4 View 4V | 1 4V is  
2 4V |
| 3 View physical vars | 1 Cell mV  
2 TC mV  
3 CJ snsr |
| 4 View Max& Min&Ave | 1 Oxygen Max& Min&Ave | 1 Max oxygen is  
2 Min oxygen is  
3 Ave oxygen (Method) |
|                     | 2 Humid Max& Min&Ave | 1 Max humidity is  
2 Min humidity is  
3 Ave humid (Method) |
|                     | 3 Mixing Max& Min&Ave | 1 Max mixing is  
2 Min mixing is  
3 Ave mixing (Method) |
| 5 View other vars | 1 Temp  
2 Press  
3 RH%  
4 Dew-P  
5 Heater duty |
| 2 Diag/Service | 1 Status | Status group 1  
Status group 2  
Status group 3  
Status group 4  
Status group 5  
Operate mode 1 |
|                   | 2 Self test | (Method) |
|                   | 3 Master test | (Method) |
|                   | 4 Set warning enbl | Warn enbl group1  
Warn enbl group2  
Warn enbl group3  
Warn enbl group4 |
|                   | 5 Read DI | 1 DI  
2 DI |
|                   | 6 Test DO | (Method) |
|                   | 7 Test Cal. DO | (Method) |
|                   | 2 Fix analog output | (Method) |
|                   | 3 Trim analog output | (Method) |

*to be continued next page*
3. Parameters

- **Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer 2 page of 4.**

<table>
<thead>
<tr>
<th>3 Basic setup</th>
<th>4 Calibration</th>
</tr>
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<tbody>
<tr>
<td>1 Tag</td>
<td>1 Manual calib. (Method)</td>
</tr>
<tr>
<td></td>
<td>2 Semi-auto calib. (Method)</td>
</tr>
<tr>
<td></td>
<td>3 Abort calib. (Method)</td>
</tr>
<tr>
<td></td>
<td>4 Calib. constants</td>
</tr>
<tr>
<td></td>
<td>1 Cal zero(%)</td>
</tr>
<tr>
<td></td>
<td>2 Cal span(%)</td>
</tr>
<tr>
<td></td>
<td>3 Cell resp</td>
</tr>
<tr>
<td></td>
<td>4 Cell imp.</td>
</tr>
<tr>
<td></td>
<td>5 Cell robust</td>
</tr>
<tr>
<td>2 Configuration</td>
<td>5 Calib. log (Method)</td>
</tr>
<tr>
<td>3 PV range</td>
<td>5 Blow back</td>
</tr>
<tr>
<td></td>
<td>1 Start blow back (Method)</td>
</tr>
<tr>
<td></td>
<td>2 Abort blow back (Method)</td>
</tr>
</tbody>
</table>

| 4 SV range |
| 1 SV is |
| 2 SV LRV |
| 3 SV URV |
| 4 AO added damp |
| 5 Xfer fnctn |
| 6 SV AO Alrm typ |

| 5 Assign TV & QV |
| 1 TV is |
| 2 4V is |

| 4 Detailed setup |
| 1 Sensors |
| 1 Oxygen |
| 2 Oxygen Unit |
| 3 Oxygen USL |
| 4 Oxygen LSL |
| 2 Humidity |
| 1 Humidity |
| 2 Humidity Unit |
| 3 Humidity USL |
| 4 Humidity LSL |
| 3 Mixing ratio |
| 1 Mixing |
| 2 Mixing Unit |
| 3 USL |
| 4 LSL |
| 4 Cell temp |
| 1 Cell temp |
| 2 Unit |
| 3 USL |
| 4 LSL |
| 5 CJ temp |
| 1 CJ temp |
| 2 CJ temp Unit |
| 3 USL |
| 4 LSL |
| 6 Cell mV |
| 1 Cell mV |
| 2 Cell mV Unit |
| 3 Cell mV USL |
| 4 Cell mV LSL |
| 7 TC mV |
| 1 TC mV |
| 2 TC mV Unit |
| 3 TC mV USL |

*to be continued next page*
### Detailed setup

#### 2 Signal condition

<p>| | | | | |</p>
<table>
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<tr>
<td>1</td>
<td>PV range</td>
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<tr>
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<td>PV is</td>
<td>PV</td>
<td>PV % range</td>
<td>PV LRV</td>
</tr>
<tr>
<td>2</td>
<td>SV range</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SV is</td>
<td>SV</td>
<td>SV % range</td>
<td>SV LRV</td>
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#### 3 Output condition

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<tr>
<td>1</td>
<td>Analog output</td>
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</tr>
<tr>
<td></td>
<td>Warm mode</td>
<td>Warm preset</td>
<td>Maint mode</td>
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<td>2</td>
<td>HART output</td>
<td>Poll addr</td>
<td>Num req preams</td>
</tr>
<tr>
<td>3</td>
<td>Contact output</td>
<td>Contact output1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Relay</td>
<td>Function</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Input condition</td>
<td>Contact input</td>
<td></td>
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<tr>
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<td>1 Active</td>
<td>Function</td>
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<tr>
<td>5</td>
<td>Device information</td>
<td>Tag</td>
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<tr>
<td></td>
<td>Descriptor</td>
<td>Message</td>
<td>Date</td>
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to be continued next page
# Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer 4 page of 4.

## 3. Parameters

<table>
<thead>
<tr>
<th>6 Calib. condition</th>
<th>9 Revision #s</th>
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<tbody>
<tr>
<td>1 Cal span</td>
<td>1 Universal rev</td>
</tr>
<tr>
<td>2 Cal zero</td>
<td>2 Fld dev rev</td>
</tr>
<tr>
<td>3 Calib mode</td>
<td>3 Software rev</td>
</tr>
<tr>
<td>4 Calib point</td>
<td></td>
</tr>
<tr>
<td>5 Timing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Purge time</td>
</tr>
<tr>
<td></td>
<td>2 Calibration time (Method)</td>
</tr>
<tr>
<td></td>
<td>3 Auto calib. timing (Method)</td>
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<table>
<thead>
<tr>
<th>7 Blow condition</th>
<th>1 Blow mode</th>
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<tbody>
<tr>
<td>2 Blow purge time</td>
<td>(Method)</td>
</tr>
<tr>
<td>3 Blow back time</td>
<td>(Method)</td>
</tr>
<tr>
<td>4 Auto blow timing</td>
<td>(Method)</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>8 Alarm condition</th>
<th>1 Delay time</th>
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</thead>
<tbody>
<tr>
<td>2 Oxygen alarm</td>
<td>1 HiHi alarm</td>
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<tr>
<td></td>
<td>2 HiHi SP</td>
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<tr>
<td></td>
<td>3 Hi alarm</td>
</tr>
<tr>
<td></td>
<td>4 Hi SP</td>
</tr>
<tr>
<td></td>
<td>5 Lo alarm</td>
</tr>
<tr>
<td></td>
<td>6 Oxygen Lo SP</td>
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<tr>
<td></td>
<td>7 LoLo alarm</td>
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<tr>
<td></td>
<td>8 LoLo SP</td>
</tr>
<tr>
<td></td>
<td>9 Hysteresis</td>
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<thead>
<tr>
<th>3 Humidity alarm</th>
<th>1 HiHi alarm</th>
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</thead>
<tbody>
<tr>
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<td>2 HiHi SP</td>
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<td>3 Hi alarm</td>
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<td>4 Hi SP</td>
</tr>
<tr>
<td></td>
<td>5 Lo alarm</td>
</tr>
<tr>
<td></td>
<td>6 Lo SP</td>
</tr>
<tr>
<td></td>
<td>7 LoLo alarm</td>
</tr>
<tr>
<td></td>
<td>8 LoLo SP</td>
</tr>
<tr>
<td></td>
<td>9 Hysteresis</td>
</tr>
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<table>
<thead>
<tr>
<th>4 Mixing alarm</th>
<th>1 HiHi alarm</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>3 Hi alarm</td>
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<td></td>
<td>4 Hi SP</td>
</tr>
<tr>
<td></td>
<td>5 Lo alarm</td>
</tr>
<tr>
<td></td>
<td>6 Lo SP</td>
</tr>
<tr>
<td></td>
<td>7 LoLo alarm</td>
</tr>
<tr>
<td></td>
<td>8 Mixing LoLo SP</td>
</tr>
<tr>
<td></td>
<td>9 Mixing Hysteresis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9 Other condition</th>
<th>1 Date &amp; Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Read date&amp;time</td>
<td>(Method)</td>
</tr>
<tr>
<td>2 Write date&amp;time</td>
<td>(Method)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Max&amp;Min&amp;Ave</th>
<th>1 Ave time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MaxMin time</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 Exhaust gas</th>
<th>1 Gas temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Gas press</td>
<td></td>
</tr>
</tbody>
</table>

| 4 Temp unit       |               |
| 5 Press unit      |               |

## 5 Review

- Device info
- Calib info
- Output info
- Contact info
- Others info

---

ZR402Humidity-4.EPS
3.1.5 Menu Tree for Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option

The Online menu summary for Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option is shown below.

- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 1 page of 5.
- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 2 page of 5.
- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 3 page of 5.
- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 4 page of 5.
- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 5 page of 5.
## 3. Parameters

**Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 1 page of 5.**

### Online Menu

| 1 Process variables | 1 View fld dev vars | 1 Oxygen  
1 Oxygen  
2 Humidity  
3 Mixing  
4 Cell temp  
5 CJ temp  
6 AI temp  
2 View output vars | 1 View PV-AO1 | 1 PV is  
1 PV is  
2 PV  
3 PV % rnge  
4 PV AO  
2 View SV-AO2 | 1 SV is  
2 SV  
3 SV % rnge  
4 SV AO  
3 View TV | 1 TV is  
2 TV  
4 View 4V | 1 4V is  
2 4V  
3 View physical vars | 1 Cell mV  
2 TC mV  
3 CJ snsr  
4 AI mA  
4 View Max&Min&Ave | 1 Oxygen Max&Min&Ave | 1 Max oxygen is (Method)  
2 Min oxygen is (Method)  
3 Ave oxygen  
2 Humid Max&Min&Ave | 1 Max humidity is (Method)  
2 Min humidity is (Method)  
3 Ave humid  
3 Mixing Max&Min&Ave | 1 Max mixing is (Method)  
2 Min mixing is (Method)  
3 Ave mixing  
5 View other vars | 1 Temp  
2 Press  
3 RH%  
4 Dew-P  
5 Heater duty  
2 Diag/Service | 1 Status | Status group 1  
Status group 2  
Status group 3  
Status group 4  
Status group 5  
Operate mode 1  
2 Self test  
3 Master test  
4 Set warning enbl | (Method)  
(Method)  
Warn enbl group1  
Warn enbl group2  
Warn enbl group3  
Warn enbl group4  
5 Read DI | 1 DI1  
2 DI2  

---

*to be continued next page*
Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 2 page of 5.

- 6 Test DO (Method)
- 7 Test Cal. DO (Method)
- 2 Fix analog output (Method)
- 3 Trim analog output (Method)
- 4 Calibration
  - 1 Manual calib. (Method)
  - 2 Semi-auto calib. (Method)
  - 3 Abort calib. (Method)
  - 4 Calib. constants
    - 1 Cal zero(%) (Method)
    - 2 Cal span(%) (Method)
    - 3 Cell resp (Method)
    - 4 Cell imp. (Method)
    - 5 Cell robust (Method)
- 5 Calib. log (Method)
- 5 Blow back
  - 1 Start blow back (Method)
  - 2 Abort blow back (Method)

3 Basic setup

- 1 Tag (Method)
- 2 Configuration (Method)
- 3 PV range
  - 1 PV is
  - 2 PV LRV
  - 3 PV URV
  - 4 AO added damp
  - 5 Xfer fnctn
  - 6 PV AO Alrm typ
- 4 SV range
  - 1 SV is
  - 2 SV LRV
  - 3 SV URV
  - 4 AO added damp
  - 5 Xfer fnctn
  - 6 SV AO Alrm typ
- 5 Assign TV & QV
  - 1 TV is
  - 2 4V is

4 Detailed setup

- 1 Sensors
  - 1 Oxygen
  - 1 Oxygen
  - 2 Oxygen Unit
  - 3 Oxygen USL
  - 4 Oxygen LSL
  - 2 Humidity
  - 1 Humidity
  - 2 Humidity Unit
  - 3 Humidity USL
  - 4 Humidity LSL
  - 3 Mixing ratio
  - 1 Mixing
  - 2 Mixing Unit
  - 3 USL
  - 4 LSL
  - 4 Cell temp
  - 1 Cell temp
  - 2 Unit
  - 3 USL
  - 4 LSL
  - 5 CJ temp
  - 1 CJ temp
  - 2 CJ temp Unit
  - 3 USL
  - 4 LSL
- 6 AI temp
  - 1 AI temp

To be continued next page
Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 3 page of 5.

2 AI temp Unit
3 USL
4 AI temp LSL

1 Cell mV
2 Cell mV Unit
3 Cell mV USL
4 Cell mV LSL

1 TC mV
2 TC mV Unit
3 TC mV USL
4 TC mV LSL

1 CJ snsr
2 CJ snsr Unit
3 USL
4 LSL

1 AI mA
2 AI mA Unit
3 AI mA USL
4 AI mA LSL

2 Signal condition
1 PV is
2 PV
3 PV % range
4 PV LRV
5 PV URV
6 AO added damp
7 Xfer fnctn
8 PV AO Alrm typ

1 SV is
2 SV
3 SV % range
4 SV LRV
5 SV URV
6 AO added damp
7 Xfer fnctn
8 SV AO Alrm typ

3 Output condition
1 Warm mode
2 Warm preset
3 Maint mode
4 Maint preset
5 Cal/Bl mode
6 Cal/Bl preset
7 Err mode
8 Err preset
9 Fix analog output (Method)
10 Trim analog output (Method)

1 Poll addr
2 Num req preams
3 Burst mode
4 Burst option

3 Contact output
1 Contact output1
2 Contact output2
1 Relay
2 Function

4 Detailed setup

to be continued next page
Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 4 page of 5.

4 Detailed setup

4 Input condition

1 Contact input 1
1 Active
2 Function

2 Contact input 2
1 Active
2 Function

3 Analog input
1 AI urv
2 AI lrv
3 AI Hi SP

5 Device information

1 Tag
2 Descriptor
3 Message
4 Date
5 Final asmbly num
6 Distributor
7 Dev id
8 Write protect
9 Revision #s

1 Universal rev
2 Fld dev rev
3 Software rev

6 Calib. condition

1 Cal span
2 Cal zero
3 Calib mode
4 Calib point

5 Timing
1 Purge time
2 Calibration time
3 Auto calib. timing

7 Blow condition

1 Blow mode

2 Blow purge time
3 Blow back time
4 Auto blow timing

8 Alarm condition

1 Delay time
1 HiHi alarm
2 HiHi SP
3 Hi alarm
4 Hi SP
5 Lo alarm
6 Oxygen Lo SP
7 LoLo alarm
8 LoLo SP
9 Hysteresis

3 Humidity alarm
1 HiHi alarm
2 HiHi SP
3 Hi alarm
4 Hi SP
5 Lo alarm
6 Lo SP
7 LoLo alarm
8 LoLo SP
9 Hysteresis

4 Mixing alarm
1 HiHi alarm
2 Mixing HiHi SP
3 Hi alarm

to be continued next page
3. Parameters

- Model ZR402G Separate type Zirconia High Temperature Humidity Analyzer with Temperature Analog input option 5 page of 5.
3.2 Setting Parameters

(1) PV selection

(Refer to Section 8.1, "Current Output Setting," in the ZR202G Instruction Manual.)
(Refer to Section 8.1, "Current Output Setting," in the ZR402G Instruction Manual.)

NOTE
For the oxygen analyzer, the PV (Analog Output 1) is for oxygen concentration (fixed), so parameter setting is not required.

Call up "PV range" display.
ZR202G
1. Device setup ---> 3. Basic setup ---> 3. PV range
ZR402G
3. Basic setup ---> 3. PV range

Display Operation

1
ZR402G: PV range
1 PV is
2 PV LRU 0 %
3 PV URU 25 %
5 Xfer fnctn Linear
HELP SAVE HOME

Select "PV is".

2
ZR402G: WARN-Loop should be removed from automatic control

Press OK (F4).

3
ZR402G: PV is Humidity

Press OK (F4).

4
ZR402G: PV is Humidity
1 Oxygen conc.
2 Humidity conc.
3 Mixing ratio

Select the desired item for the PV (Analog Output 1). An example of selecting item "3" (Mixing ratio) is shown on the left. The ZR202G and ZR402G outputs change.
(2) PV LRV input

(Refer to Section 8.1.1, "Minimum/Maximum Setting," in the ZR202G Instruction Manual.)

(Refer to Section 8.1.1, "Minimum/Maximum Setting," in the ZR402G Instruction Manual.)

**Example: To set PV LRV for 10%**

Set "PV URV", "SV LRV" and "SV URV" using the same procedures as the following as required. For the ZR202G, no SV-range settings are required.

Call up "PV range" display.

**ZR202G**

1. Device setup ---> 3. Basic setup ---> 3. PV range

**ZR402G**

3. Basic setup ---> 3. PV range

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Display" /></td>
<td><strong>Select &quot;PV LRV&quot;.</strong></td>
</tr>
<tr>
<td><img src="image2.png" alt="Display" /></td>
<td>'10' Enter &quot;10&quot; and press ENTER (F4).</td>
</tr>
<tr>
<td><img src="image3.png" alt="Display" /></td>
<td>Press SEND (F2).</td>
</tr>
</tbody>
</table>
(3) Calibration condition setting

(Refer to Section 9.2.1, "Calibration Setting," in the ZR202G Instruction Manual.)
(Refer to Section 9.2.1, "Calibration Setting," in the ZR402G Instruction Manual.)
Set parameters to carry out calibration.

Example: To set the zero gas concentration at 0.98% O₂, the calibration mode to automatic calibration, and the "purge time" to five minutes

Set other items as necessary.

Call up "Calib. condition" display.
ZR202G
ZR402G
5. Detailed setup ---> 6. Calib. condition

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
</table>
| 1       | ZR402G: Calib. condition
    1 Cal span 21.00 %
    2 Cal zero 1.00 %
    3 Calib mode Manual
    4 Calib point Both
    5 Timing [HELP] [DEL] [ESC] [ENTER] |
|         | VWX 2     |
| 2       | ZR402G: Cal zero 1.00 %
    2.98 [ENTER] |
|         | "0.98" F1 (ENTER) |
| 3       | ZR402G: Calib. condition
    1 Cal span 21.00 %
    2 Cal zero 0.98 %
    3 Calib mode Manual
    4 Calib point Both
    5 Timing [HELP] [SEND] [HOME] |
|         | YZ/ 3     |
| 4       | ZR402G: Calib mode
    Manual Manual
    Semi-Auto Auto [ESC] [ENTER] |
|         | F4 (ENTER) |
| 5       | ZR402G: Calib. condition
    1 Cal span 21.00 %
    2 Cal zero 0.98 %
    3 Calib mode Auto
    4 Calib point Both
    5 Timing [SEND] [HOME] |
|         | MNO 5     |

to be continued next page
Set the purge time.
Select "Purge time".

Press OK (F4).

Select "Yes".

Enter "5" and press ENTER (F4).

Press ENTER (F4).

Press OK (F4).

Set the purge time.
(4) Blow back condition setting

(The ZR202G does not have this function.)

(Refer to Section 10.2.1, "Blow back Setup," in the ZR402G Instruction Manual.)

Set parameters to carry out blowback.

Example: To set the mode to automatic and the starting date to June 21, 2000

Set other items as necessary

Call up "Blow condition" display.

ZR402G

5. Detailed setup ---> 7. Blow condition

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ZR402G: Blow condition</td>
<td>STU 1 Set the blow back mode. Select &quot;Blow mode&quot;.</td>
</tr>
<tr>
<td>2 ZR402G: Blow mode</td>
<td>F4 Enter Select &quot;Auto&quot; and press ENTER (F4).</td>
</tr>
<tr>
<td>3 ZR402G: Blow condition</td>
<td>JKL 4 Set the automatic blow back timing. Select &quot;Auto blow timing&quot;.</td>
</tr>
<tr>
<td>4 ZR402G: Blow back timing</td>
<td>F4 Press OK (F4).</td>
</tr>
<tr>
<td>5 ZR402G: Do you want to set new value?</td>
<td>STU 1 Select &quot;Yes&quot;.</td>
</tr>
<tr>
<td>6 ZR402G: Please set interval day</td>
<td>F4 Press ENTER (F4).</td>
</tr>
</tbody>
</table>

to be continued next page
3. Parameters

7. ZK402G:
Please set interval
hour: 0 h
0

HELP  [DEL]  [ABORT]  [ENTER]

Press ENTER (F4).

8. ZK402G:
Please set start
date: 01/01/00
01/01/00

HELP  [DEL]  [ABORT]  [ENTER]

Enter month/day/year with two digits for each. For example, enter "062100" for June 21, 2000.

Press ENTER (F4)

9. ZK402G:
Please set start
hour: 0 h
0

HELP  [DEL]  [ABORT]  [ENTER]

Press ENTER (F4).

10. ZK402G:
Please set start
minute: 0 min
0

HELP  [DEL]  [ABORT]  [ENTER]

Press ENTER (F4).

11. ZK402G:
New interval:
30 d 0 h
New start date:
06/21/00 0:00
Pressing 'OK' will send them.

HELP  [DEL]  [ABORT]  [OK]

New settings will appear on the display.
Press OK (F4)

12. ZK402G:
Blow condition
1 Blow mode Auto
2 Blow purge time
3 Blow back time
4 Auto blow timing

HELP  [DEL]  [SEND]  [HOME]
(5) Trim Analog Output

The following shows analog-output adjustment procedures.

**Example: To trim PV (Analog Output 1)**

Call up the "Blow condition" display.

**ZR202G**


**ZR402G**

2. Diag / Service ---> 3. Trim analog output

---

**Display**

<table>
<thead>
<tr>
<th>1</th>
<th>ZR402G: (\text{WARN-Loop should be removed from automatic control})</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>ZR402G: (\text{Connect reference meter})</td>
</tr>
<tr>
<td>3</td>
<td>ZR402G: (\text{Select analog output to trim PV} )</td>
</tr>
<tr>
<td>4</td>
<td>ZR402G: (\text{Select analog output units mA})</td>
</tr>
<tr>
<td>5</td>
<td>ZR202G (\text{ZR402G})</td>
</tr>
<tr>
<td>6</td>
<td>ZR402G: (\text{Enter meter value} )</td>
</tr>
</tbody>
</table>

**Operation**

1. Press \(\text{OK (F4)}\).
2. Connect the ammeter (± 1 mA is measurable), and press \(\text{OK (F4)}\).
3. Select "PV" and press \(\text{ENTER (F4).}\) This display does not appear when using the ZR202G.
4. Press \(\text{EXIT (F4).}\) This display does not appear when using the ZR202G.
5. Press \(\text{OK (F4), and ZR202G / ZR402G outputs the output signal of 0%}.\)
6. Enter the read value 4.002 of the ammeter, and press \(\text{ENTER (F4).}\) (The output of ZR202G / ZR402G changes.)

---

\(\text{F00017.EPS}\)

**to be continued next page**
3. Parameters

7. **ZR402G:**

Fld dev output 4.00 mA equal to reference meter?

1. **Yes**
2. **No**

Because the reading on the ammeter is 4.000 mA, select **YES** and press **ENTER (F4)**. If the reading is not 4.000 mA, select item **2. NO**. Repeat steps 5 and 6 until the ammeter reads 4.000mA.

8. **ZR202G**

Press **OK (F4)**, and ZR202G / ZR402G output signal of 100%.

9. **ZR402G:**

Enter meter value

19.998

"199.998" (ENTER)

Ammeter reading: 19.998

Carry out the same procedures as those described under 5 and 6.

10. **ZR402G:**

Fld dev output 20.00 mA equal to reference meter?

1. **Yes**
2. **No**

Ammeter reading: 20.000

Returning fld dev to original output appears.

11. **ZR402G:**

NOTE-Loop may be returned to automatic control

Press **OK (F4)**.
(6) Burst Mode

The ZR202G / ZR402G continuously sends the data stored in it when the burst mode is set "On". Either one of measured value, % output value, or 4 to 20 mA output value can be selected and sent. The data is sent intermittently as a digital signal at 75 ms intervals when the ZR202G / ZR402G is set in the burst mode. Therefore, communication by the HART simultaneous communicator is also possible.

Setting of Burst Mode
Call up "Burst option" display.

ZR202G
2. HART output ---> 4. Burst option

ZR402G
4. Detailed setup ---> 3. Output condition ---> 2. HART output --->
4. Burst option

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Burst option</strong></td>
<td>(ENTER)</td>
</tr>
<tr>
<td>% range/current</td>
<td>(F4)</td>
</tr>
<tr>
<td>Process vars/crnt</td>
<td></td>
</tr>
</tbody>
</table>

Set data to be sent.
- Measured value (PV)
- % output value (% range/current)
- 4 to 20 mA output value (Process vars/crnt)

Call up "Burst mode" display.
1. HART output --- 3. Burst mode

1. ZR202G:
   Burst mode
   Off
   On

Set "On" and press ENTER (F4).

2. ZR402G:
   HART output
   1 Poll addr
   2 Num req frames
   3 Burst mode
   4 Burst option

Press SEND (F2).
(7) Multidrop Mode

Field devices in multidrop mode refer to the connection of several field devices on a communication single line. Up to 15 field devices can be connected when set in the multidrop mode. To activate multidrop communication, the field device address must be changed to a number from 1 to 15. This change deactivates the 4 to 20 mA output and turns it 4 mA.

Setting of Multidrop Mode

Call up "Poll addr" display.

ZR202G


2. HART output ---> 1. Poll addr

ZR402G


Display

Operation

"1" (ENTER) (SEND)

Set the polling address (a number from 1 to 15) and press ENTER (F4). Then Press SEND (F2).

1

(HOME)

Return "Online Menu" with HOME (F3).

2

Select "Utility".

3

to be continued next page
4. Select "Configure Communication".

5. Select "Polling".


1. If "Never Poll" is set in "Polling" when the address is set "Online Menu" cannot be called up and displayed. Be sure to set "Digital Poll" in "Polling" after setting the polling address.

2. When the same polling address is set for two or more field devices in multidrop mode, communication with these field devices is disabled.

Example: Communication when set in the multidrop mode.

Display

1. The HART Communicator searches for the field device is set in the multidrop mode when the HART Communicator is turned on. When the HART Communicator is connected to the field device, the tag will be displayed (display 1).

2. After that, normal communication with the selected field device is possible. However, the communication speed is slow in this case (display 2).

3. To communicate with another field device, call up display 3, and select "Online".

Operation

(1) The HART Communicator searches for the field device is set in the multidrop mode when the HART Communicator is turned on. When the HART Communicator is connected to the field device, the tag will be displayed (display 1).

(2) Select desired field device. After that, normal communication with the selected field device is possible. However, the communication speed is slow in this case (display 2).

(3) To communicate with another field device, call up display 3, and select "Online".

(4) Display1 will appear. Repeat the above operation.
3. Parameters

Releasing from Multidrop Mode
First, call up the "Poll adrr" display, and set the address to 0.

Second, call up the "Polling" display, and set "Never Poll".

![NOTE]
If the above releasing method is carried out in the reverse order "Online Menu" cannot be called up.

(8) Software Write Protect

ZR202G/ZR402G configured data is saved by the write protect function. Write protect status is set to YES when 8 alphanumerics are entered in the New password field and transferred to the ZR202G/ZR402G. In write protect YES status, the transmitter ZR202G/ZR402G does not accept parameter changes. When the 8 alphanumeric string entered in the New password field is also entered in the Enable write field and transferred to the transmitter, it will be possible to change transmitter parameters during a 10 minute period.

To change the transmitter from Write protect YES status back to Write protect NO status, enter 8 spaces in the New password field after Write protect has been released using enable write.

Setting Password
Example: Set the password to 1234

Call up "Chng Wrt protect" display.

Hot key ---> 2.chng Wrt protect

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
</table>
| 1 ZR402G: Chng Wrt Protect
  1 New Wrt Protect
  2 Enable wrt 10min
  3 New Password
  4 Software seal Keep
  HELP EXIT | Select the "New password". |
| 2 ZR402G: Enter new password to change state of write protect:
  1234 DEL X81 ENTER | '1 2 3 4' '1 2 3 4' (ENTER) |
| 3 ZR402G: Re-enter new password within 30 seconds:
  1234 DEL X81 ENTER | "1 2 3 4 '"1 2 3 4' (ENTER) |
| 4 ZR402G: It changed the state of protection related password. | (OK) |

to be continued next page
Chng Wrt Protect
1 Write Protect Yes
2 Enable w/rt 10min
3 New Password
4 Software seal Keep

SAVE
3. Parameters

Changing Password

Example: To change the password from 1234 to 6789A

Call up "Chng Wrt protect" display.

Hot key ---> 2.chng Wrt protect

---

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chng Wrt Protect</td>
<td>Select the &quot;Enable wrt 10min&quot;.</td>
</tr>
<tr>
<td>2. Enter current password to enable to write for 10 minutes:</td>
<td>Set the old password &quot;1234&quot; and press ENTER (F4).</td>
</tr>
<tr>
<td>3. Released the write protection for 10 minutes.</td>
<td>Press OK (F4).</td>
</tr>
<tr>
<td>4. If you want to release completely, you have to change password to all of spaces.</td>
<td>Press OK (F4).</td>
</tr>
<tr>
<td>5. Chng Wrt Protect</td>
<td>Select the &quot;New password&quot;.</td>
</tr>
<tr>
<td>6. Enter new password to change state of write protect:</td>
<td>Set new password &quot;6789A&quot; and press ENTER (F4).</td>
</tr>
<tr>
<td>7. Re-enter new password within 30 seconds:</td>
<td>Reenter new password &quot;6789A&quot; and press ENTER (F4).</td>
</tr>
</tbody>
</table>

---

to be continued next page
1. Enable Wrt 10 min releases Write Protect status for 10 minutes. While Write Protect status is released, enter a new password in the New Password field. It will not be possible to set a new password when 10 minutes have elapsed.
2. To release Write Protect status completely, enter 8 spaces in the New Password field according to the instructions given in Changing the Password. This causes Write Protect status to change from YES to NO.

"Joker password" and "Software Seal"
When you forget the password that has been registered, it is possible to release the mode for 10 minutes by using a joker password. Enter YOKOGAWA to release Write protect status for 10 minutes. If this joker password is used, the status shown in the parameter "Software seal" is changed from "Keep" to "Break". Press Hot key and select "2. Wrt Protect menu". Current status is shown in "4 Software seal". This status will be returned from "Break" to "Keep" by registering a new password.

(9) Hardware Write Protect
This function prohibits parameter changes through a slide switch on a Main board assembly. In the case the hardware write protection switch is set to YES, none of the communication method including the handheld terminal such as model 275 is allowed for the alteration of parameters. The write protection switch is factory set to NO (L position in the figure below).

<table>
<thead>
<tr>
<th>Switch position</th>
<th>Write protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>NO</td>
</tr>
<tr>
<td>H</td>
<td>YES</td>
</tr>
</tbody>
</table>
3.3 Calibration

(Refer to Chapter 9, "Calibration," in the ZR202G Instruction Manual.)

(Refer to Chapter 9, "Calibration," in the ZR402G Instruction Manual.)

The following shows manual calibration procedures using the HART communicator.

Call up "Calibration" display.


Display

1. ZR402G:
   Calibration:
   1 Span
   2 Skip
   3 Abort

Operation

   STU
   1

Select the "Span".

F4

(OK)

Check the span gas concentration and press OK (F4).

STU

1

Do you want to set new value?:
   1 Yes
   2 No

ABORT ENTER

To change the span gas concentration, select "Yes" then set a new value.
If you do not want to change the value, select "No." An example of selecting "No" is shown on the left.

Flow the specified span gas, then press OK (F4). When the automatic calibration unit is connected, the solenoid valve for the span gas will be opened automatically.

STU

1

Please open span gas valve, set the flow of span gas to 600ml/min

ABORT ENTER

F4

(OK)

The O2 value will be updated when you select the "Update o2 value". Select "Cal done" after the o2-value reading has stabilized.

VWX

2

Select "Cal done".

STU

1

Select the "Zero".

to be continued next page
Check the zero gas concentration and press OK (F4).

To change the zero gas concentration, press "Yes" and set a new value. If you do not want to change the value, select "No".

Flow the specified zero gas, then press OK (F4). When the automatic calibration unit is connected, the solenoid valve for the zero gas will be opened automatically.

The o2 value will be updated when you select the "Update o2 value". Select "Cal done" after the o2-value reading has stabilized.

Calibration is complete and the purge time begins.

To cancel the Purge time, select "Abort calib.".

When you press "Yes", the purge time is canceled.
3. Parameters

3.4 Blow back (ZR402G only)

(The ZR202G does not have this function.)

(Refer to Section 10.2, "Blow back," in the ZR402G Instruction Manual.)

The following shows the blow-back procedure with the HART communicator. Blow back is carried out only when semi-auto is selected in the Blow back mode and one of the contact outputs is set for the blow back function. Refer to Section 4.2, "Blow back," in the Instruction Manual for more details. The ZR202G does not have the blow back function.

Call up "Blow back" display.

2. Diag / Service --> 5. Blow back

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>STU 1</td>
</tr>
<tr>
<td>2</td>
<td>STU 1</td>
</tr>
<tr>
<td>3</td>
<td>F4</td>
</tr>
</tbody>
</table>

Select the "Start blow back".

Check the Blow back time and Purge time, and press OK (F4).

Select "Yes" and press ENTER (F4). Blow back will start.
3.5 Self Diagnostics

Self-diagnostics of the transmitter and check of incorrect data setting can be carried out with the HART communicator. There are two methods for self-diagnosis of the transmitter, self-diagnosis for every transmission and manually executing the SELF TEST command. When an error message appears, follow "ERROR MESSAGES".

For ERROR and ALARM messages, and troubleshooting procedures, refer to Chapter 12, "Troubleshooting" of the ZR202G/ZR402G Instruction Manual.

Diagnostic by "Self test"

ZR202G

1. Device setup ---> 2. Diag / Service ---> 1. Test device

ZR402G

2. Diag / Service ---> 1. Test device

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="VWX2" alt="Display" /></td>
<td>Select the &quot;Self test&quot;.</td>
</tr>
<tr>
<td><img src="F4" alt="Display" /></td>
<td>If there is no error detected, &quot;Self test OK&quot; will be displayed. Press OK (F4). When an error occurs, an error message appears and the results of self-diagnostics appear in the &quot;Status&quot;.</td>
</tr>
<tr>
<td><img src="STU1" alt="Display" /></td>
<td>Call up &quot;Status&quot;.</td>
</tr>
<tr>
<td><img src="F030501.EPS" alt="Display" /></td>
<td>The status menu is separated 5 groups. About items of each group, see &quot;Alarm/Error Messages and Display on the Analyzer&quot;.</td>
</tr>
</tbody>
</table>

Select the desired group.

If there is no error, the result of diagnostics is indicated as "OFF". If "ON" is indicated, a countermeasure for that error is necessary.
### Table 3.1 Alarm/Error Messages and Analyzer Display

<table>
<thead>
<tr>
<th>Display on the HART Communicator</th>
<th>Detail</th>
<th>ZR202G Display</th>
<th>ZR402G Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell failure</td>
<td>Abnormal cell voltage</td>
<td>Err-01 Error 1</td>
<td></td>
</tr>
<tr>
<td>Cell HT too high</td>
<td>Detector heater temperature exceeds high-limit.</td>
<td>Err-02 Error 2</td>
<td></td>
</tr>
<tr>
<td>Cell HT too low</td>
<td>Detector heater temperature falls below low-limit.</td>
<td>Err-02 Error 2</td>
<td></td>
</tr>
<tr>
<td>EEPROM failure</td>
<td>Abnormal memory in the electrical circuit.</td>
<td>Err-03 Error 3</td>
<td></td>
</tr>
<tr>
<td>ADC failure</td>
<td>Abnormal AD converter in the electrical circuit.</td>
<td>Err-04 Error 4</td>
<td></td>
</tr>
<tr>
<td>Excess input TC</td>
<td>Thermocouple voltage exceeds the input range.</td>
<td>AL-11 Alarm 11</td>
<td></td>
</tr>
<tr>
<td>Excess input CJ</td>
<td>The input signal from the cold junction exceeds the input range.</td>
<td>AL-10 Alarm 10</td>
<td></td>
</tr>
<tr>
<td>Excess input AI</td>
<td>The input signal from the temperature transmitter is out of the input range.</td>
<td>*Note 1 Alarm 12</td>
<td></td>
</tr>
<tr>
<td>CJ temp too high</td>
<td>Cold junction temperature exceeds high-limit.</td>
<td>AL-10 Alarm 10</td>
<td></td>
</tr>
<tr>
<td>CJ temp too low</td>
<td>Cold junction temperature falls below low-limit.</td>
<td>AL-10 Alarm 10</td>
<td></td>
</tr>
<tr>
<td>Low battery</td>
<td>Backup battery voltage is low.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cal, zero error</td>
<td>Zero-point compensation ratio is outside normal range.</td>
<td>AL-06 Alarm 6</td>
<td></td>
</tr>
<tr>
<td>Cal, span error</td>
<td>Span compensation ratio is outside normal range.</td>
<td>AL-07 Alarm 7</td>
<td></td>
</tr>
<tr>
<td>Cal, stabl error</td>
<td>Cell voltage is not stable during calibration.</td>
<td>AL-08 Alarm 8</td>
<td></td>
</tr>
<tr>
<td>Cell Imp too high</td>
<td>The cell impedance exceeds 10 kΩ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AO is holding</td>
<td>Analog Output is holding.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AO1 is testing</td>
<td>Analog Output 1 is loop testing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AO2 is testing</td>
<td>Analog Output 2 is loop testing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cal, gas too low</td>
<td>Calibration gas pressure signal is input to contact input.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changing AO range</td>
<td>Range changing signal is input to contact input.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process gas fail</td>
<td>Process gas fail signal is input to contact input.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO1 is active</td>
<td>Active Contact Output 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO2 is active</td>
<td>Active Contact Output 2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO3 is active</td>
<td>Active Contact Output 3.</td>
<td>*Note 1</td>
<td></td>
</tr>
<tr>
<td>DO4 is active</td>
<td>Active Contact Output 4.</td>
<td>*Note 1</td>
<td></td>
</tr>
</tbody>
</table>

*Note 1: The ZR202G does not have these functions.*
4. Maintenance

4.1 Test Output

(Refer to Section 7.8, "Checking Current Loop," in the ZR202G Instruction Manual.)
(Refer to Section 7.10, "Checking Current Loop," in the ZR402G Instruction Manual.)

Example: To output 12mA for Analog Output 1

Call up "Fix analog output" display.

ZR202G

1. Device setup ---> 2. Diag / Service ---> 2. Loop test

ZR402G

2. Diag / Service ---> 2. Fix analog output

Display

1. ZR402G:
   \text{MANH-Loop should be removed from automatic control}

   \text{OK}

   \text{(OK)}

2. ZR402G:
   \text{Select analog output to trim}

   \text{SU}

   \text{SU}

   \text{OK}

   \text{(OK)}

3. ZR402G:
   \text{Select analog output units mA}

   \text{EXIT}

4. ZR402G:
   \text{Choose analog output level}

   \text{YZ/3}

   \text{EXIT}

5. ZR402G:
   \text{Enter desired analog output value}

   \text{12}

   \text{ENTER}

   \text{(ENTER)}

6. ZR402G:
   \text{Field dev. PU 80 is fixed at 12.00 mA}

   \text{OK}

   \text{(OK)}

Press \text{OK (F4)}. When using ZR202G, press \text{ENTER (F4)} to skip to display 4 below.

Select an analog output to trim. An example of selecting PV (Analog Output 1) is shown on the left.

Press \text{EXIT (F4)}.

Select "3. Other"

Enter "12" and press \text{ENTER (F4)}.

A 12-mA output is provided. Press \text{OK (F4)} to return the analog output to its original value.

to be continued next page
4.2 Read DI

(Refer to Section 7.9, "Checking Contact I/O" in the ZR202G Instruction Manual.)
(Refer to Section 7.11, "Checking Contact I/O" in the ZR402G Instruction Manual.)

The following shows the procedures for checking the input contact open/closed status.

Call up "Read DI" display.

ZR202G


ZR402G

2. Diag / Service ---> 1. Test device ---> 5. Read DI

<table>
<thead>
<tr>
<th>Display</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="F040201.EPS" alt="Display 1" /></td>
<td>Both Input Contact 1 and 2 are &quot;Open&quot;.</td>
</tr>
<tr>
<td><img src="F040201.EPS" alt="Display 2" /></td>
<td>When you close Input Contact 1, the display changes to indicate that DI1 is &quot;Closed&quot;.</td>
</tr>
</tbody>
</table>
4.3 Test DO

The following shows the procedures for checking the output contact open/closed status.
(Refer to Section 7.9, "Checking Contact I/O" in the ZR202 Instruction Manual.)
(Refer to Section 7.11, "Checking Contact I/O" in the ZR402G Instruction Manual.)

Prior to carrying out this test, refer to the Contact Check section in the Instruction Manual.

Call up "Test DO" display.

ZR202G


ZR402G

2. Diag / Service ---> 1. Test device ---> 6. Test DO

Display Operation

1. ZR402G:
   Performing Loop should be removed from automatic control
   (OK)
   Press OK (F4).

2. ZR402G:
   Test DO:
   1. DO1
   2. DO2
   3. DO3
   4. DO4
   5. Exit
   (ENTER)
   Select an Output Contact to be tested.
   An example of selecting DO1 is shown on the left. After selecting the Output Contact, press ENTER (F4).

3. ZR402G:
   Test DO1:
   1. OPEN
   2. CLOSE
   3. EXIT
   (ENTER)
   Select "1. OPEN", then the Output Contact is "Open".

4. ZR402G:
   DO1 is OPEN
   Press OK
   (OK)
   Press OK (F4).
4.4 Test Cal. DO

The following shows the procedures for checking the automatic calibration solenoid valve.

(Refer to Section 7.9, "Checking Contact I/O" in the ZR202G Instruction Manual.)

(Refer to Section 7.11, "Checking Contact I/O" in the ZR402G Instruction Manual.)

Call up "Test Cal. DO" display.

ZR202G


ZR402G


Display | Operation
---|---
1 | Press OK (F4).

Select the solenoid valve output to be checked. An example of selecting the valve for ZERO calibration gas is shown on the left. After selecting the valve, press ENTER (F4).

When you select "2. ON", the solenoid valve for the zero calibration gas becomes active.

Press OK (F4).
## Revision Record

Manual Title : Model EXAxt ZR Series HART Protocol  
Manual Number : IM 11M12A01-51E

<table>
<thead>
<tr>
<th>Edition</th>
<th>Date</th>
<th>Remark (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Sept. 2000</td>
<td>Newly published</td>
</tr>
</tbody>
</table>