



This manual contains important safety informations about installation and use of this equipment. Ignoring this informations could result in injuries or damages.



It is strictly forbidden to use this equipment with radioactive chemicals!



## OPERATING MANUAL FOR “DIN DIGITAL O<sub>2</sub>” CONTROLLER

Read carefully!



ENGLISH Version

R1-11-03



“DIN Digital” series instruments comply with the following European regulations:

EN60335-1 : 1995, EN55014, EN50081-1/2, EN50082-1/2, EN6055-2, EN60555,3

Based on directive CEE 73/23 c 93/68 (DBT Low voltage directive) and directive 89/336/CEE (EMC Electromagnetic Compatibility)



## GENERAL SAFETY GUIDELINES

### **Danger!**

In emergencies the instrument should be switched off immediately! Disconnect the power cable from the power supply!

When using instrument with aggressive chemicals observe the regulations concerning the transport and storage of aggressive fluids!

When installing outside European Community, always observe national regulations!

Manufacturer is not liable for any unauthorized use or misuse of this product that can cause injury or damage to persons or materials!

### **Caution!**

Instrument must be accessible at all times for both operating and servicing. Access must not be obstructed in any way!

Feeder should be interlocked with a no-flow protection device.

Instrument and accessories must be serviced and repaired by qualified and authorised personnel only!

Always read chemical safety datasheet!

Always wear protective clothing when handling hazardous or unknown chemicals!

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## Introduction

### GENERAL DESCRIPTION

"DIN Digital O<sub>2</sub>" measures and controls O<sub>2</sub> (0÷60mg/l) in industrial process. It is possible to set two ON/OFF setpoints and a current signal for connecting a chart recorder or a metering pump. It is possible to set the current output on 0÷20 or 4÷20 mA. LCD backlight display facilitates reading in high luminosity conditions. The instrument is cased into a plastic box for DIN mounting.

### CONTROL PANEL

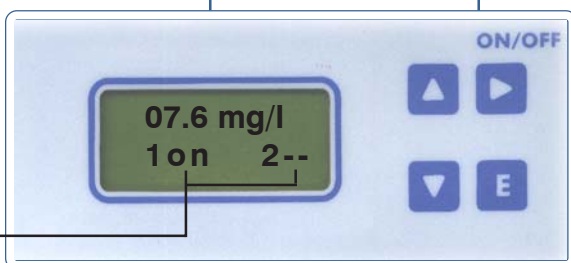
#### Display

LCD backlight display facilitates reading in high luminosity conditions. It provides constant indications regarding operating conditions and equipment status.

Setpoint Activity Status. Example: "1ON" means that setpoint 1 is active. "2--" means that setpoint 2 is off.

#### Keyboard

A convenient keypad allows easy and quick access to the menu for easy programming and calibrating operations.



"UP" key



"DOWN" key



"RIGHT" (ON/OFF - ESC) key



"ENTER" key

Into normal operating mode press "UP" or "DOWN" key for instrument's details.

Use keyboard (up, down, left and right) to make a selection or change set values. Press the "RIGHT" key to go back in previous menu or cancel entered data.

The "Enter" key confirms the selection.

Press "RIGHT" key for about 4 seconds to switch off the instrument (the display shows OFF). Repeat the sequence to return to the normal operating mode.

To reset the instrument (restore default settings) unplug power supply and keeping pressed "UP" and "DOWN" keys, plug in power supply. The instrument will show "Checksum Error- Press any key". Press any key to continue.

During normal operating mode press "UP" key to see environmental temperature.

**ELECTRICAL WIRINGS:**

**1-2:** Power Supply (24VAC).

**3-4:** Setpoint 1 output - free contact.

**5-6:** Setpoint 2 output - free contact.

**7-8:** Oxygen probe 7(Signal) ; 8(Polarization)

**9-10:** Temperature compensation probe. 9 (GND) ; 10 (NTC).

**11-12:** Current output (0÷20mA o 4÷20mA) proportional to read value. 11(-) ; 12 (+).

**13-14-15-16:** See the following paragraph.

**“SEPR” CONFIGURATION.**

The instrument is set to work without a proximity sensor. If needed, proximity sensor turns the instrument into stand-by mode if there isn't flow. Instrument's display shows “NO FLOW”.

Connect “SEPR” to blocks 13(blue), 15(black), 16(brown). Connect together block 14 with block 13.

To work without a “SEPR” and with the same functionality use blocks 15 and 16 as a free contact. Connect together block 14 with block 13.

Using “SEPR” or the free contact, two instruments can be controlled. Connect block 14 and 15 from master instrument to another instrument “DinDigital” (slave). Finally follows the previous described connections for the master instrument.

**The instrument has not fuse protection.**

**Some functions described into this manual may not be availables.**

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## Installation

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### VIEW ON MENU

Make connections and plug the instrument. Instrument's version message on display confirms that the instrument is on. The display shows also the probe reading status and if setpoints are active. Press "E" for about 4 seconds to enter into setup menu.

*Note: During setup the instrument is in "Stand-by" mode. If user doesn't press any key for one minute the instrument will return to normal working mode.*

To enter into setup menu, a password is needed. If this the first time that user enters into this menu or if the password is not changed, simply press "E". Use "UP" and "DOWN" keys to scroll.

"MAIN" menu is configured as follows:

**1)Setup:** This menu is divided into **1)Setpn ; 2)Calib ; 3)Delay.**

**2)Param:** This menu is divided into **1)New Pw ; 2)Stand.**

**3)Serv.:** service mode.

### SETTING SETPOINTS: 1)SETPN

"Out 1" and "Out 2" are relay's driven outputs. The instrument can be programmed to operate in "On/Off" mode or "Proportional" mode.

"Proportional" mode can be selected in % between 10 and 100.

Select "SETUP" from "MAIN" menu. Select "SETPN" and press "E". The display shows:

Setpoint  
1) Out 1

Pressing "UP" or "DOWN" key the display will show in succession:

Setpoint  
1) Out 1

Setpoint  
2) Out 2

Setpoint  
3) Out mA

Select the setpoint to set (Out 1 or Out 2) using "UP" and "DOWN" keys, press "E" to confirm. "Out mA" allows to set the current output based on two pH values. In the next example setpoint 1 (Out 1) has been set.

The instrument shows:

1a) ->OFF  
6mg/l

Pressing twice "RIGHT" key the display will show:

1b) ->ON  
2mg/l

"1a)" and "1b)" are working range values. Every range is set by a value that operates relay output. Using default values, the setpoint 1 will drive a pump for O<sub>2</sub> operation. The pump will switch on when mg/l value will be over than 2mg/l and it will switch off when pH value will be 6mg/l: **this is the "ON/OFF" working mode**. The difference between the two pH values (2mg/l and 6mg/l) is called "HYSTERESIS".

**PROPORTIONAL mode**. The output relay is modulated (ON/OFF) depending on mg/l values set in 1a) and 1b). Example: Proportional mode between 2mg/l(0%) and 6mg/l (100%). In this mode the relay will be on for values greater than 6mg/l. The relay will be off for values lower than 2mg/l. For values between 2mg/l and 6mg/l the relay will be on or off depending on calculated percentage. The calculation is based on a 100 seconds time. To set the PROPORTIONAL functioning mode change percentual value to "ON" and "OFF".

**It is not possible to enter mixed values (ex.: 100% for SP1 and ON for SP2). In this case it will not possible save them.**

**In proportional mode the instrument doesn't show % values for setpoints status but only if they are on or off.**

It is possible modify setpoint status (on,off, %) and setpoint values with RIGHT key on the function to modify and using "UP" and "DOWN" key to change the value. Enter the value and save by pressing "E" to save.

Repeat sequence for setpoint 2 (OUT2).

**Press "E" key to exit from setpoint setting. The display will show "SetPoint Saved" and it return to the previous menu.**

## **Out mA**

This function allows to program the current output for driving a metering pump or a chart recorder. It is possible to program in 0÷20mA mode or 4÷20mA mode in the working range between 0mg/l and 14mg/l. The current output and the working range may be modified. Example: it is possible to set 4mA at 2mg/l and 20mA at 6mg/l. In this case, if you connect a metering pump it will dose at the maximum flow at 10mg/l. The pump will reduce the flow when mg/l decreases and it will stop at 2mg/l. If you connect a chart recorder, a graphic curve will be printed. Use "UP" and "DOWN" keys to change these settings. Press "RIGHT" key to scroll through the options. Press "E" to confirm.

**EXAMPLES REPORTED HERE ARE INTENDED TO BE ONLY USED AS EXPLANATION PURPOSE**

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## SETUP

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### CALIBRATION: 2)CALIB

To work properly the instrument must have the “Zero” and “Slope” calibration. From “Setup” menu choose “Calib”. Display shows:

#### 1) Zero

This is the zero point of the instrument. ***It can be calibrated using a zero point solution.***

From “Zero” menu press “Enter” key. Display shows:

R 33,7 mg/l  
C 0,0 mg/l

“R” is the reading value, “C” the calibration value. It’s not necessary that “R” value matches the “C” value. Rinse the electrode with distilled water, expose it to air until it’s dry. Fill the zero point solution from the glass ampoule into a beaker. Put the probe head into solution and wait until the “R” reading value is stable. Press “Enter” key. A confirmation message will be displayed. Now the zero is calibrated.

#### 2) Slope

This is the instrument’s slope. The calibration procedure can be performed using two ways: “Exposed to air” method or “Buffer Solution” method.

##### “Exposed to air” procedure.

From “Setup” menu choose “Calib”. Press “Up” or “Down” key until the display shows:

#### 2) Slope

Press “Enter” key. Display shows:

R 33,7 mg/l  
C 11,3 mg/l

“R” is the reading value, “C” the calibration value. It’s not necessary that “R” value matches the “C” value. Expose the probe to air and wait until “R” value is stable. Refer to table at page 11 to find the “C” value that matches with environment temperature. To see the temperature, during normal operating mode, press “UP” key. Enter this value by using “UP” and “DOWN” key. Press “Enter” to confirm and save parameters. Now the “Slope” is calibrated.

##### “Buffer solution” procedure.

From “Setup” menu choose “Calib”. Press “Up” or “Down” key until the display shows:

#### 2) Slope

Press “Enter” key. Display shows:

R 33,7 mg/l  
C 11,3 mg/l

“R” is the reading value, “C” the calibration value. It’s not necessary that “R” value matches the “C”



value. Rinse the electrode with distilled water, expose it to air until it's dry. Use a buffer solution with a value near the working range. Put probe's head into the buffer solution and wait a stable reading. Enter the buffer solution value into "C" field using "UP" or "DOWN" key. Press "Enter" to save calibration value. A confirmation message will be displayed. Now the "Slope" is calibrated.

### **DELAY: 3) Delay**

It's possible to set an activation delay for each output when the instrument reaches the setpoint values. Default value is set to 0. Select "DELAY" from "SETUP" menu. The instrument will show:

OUT1  
10 Sec.

Press "RIGHT" key. The instrument will show:

OUT2  
5 Sec.

Delay time can be set from 0 (no delay) to 60 seconds. Press "E" to confirm. The display will show the confirmation message "DELAYS SAVED".

### **PASSWORD SETUP: 1) New Pw**

To avoid undesired access to the instrument a 4 number password may be set. Using "UP" or "DOWN" keys, from "Param" menu choose "1) New Pw", press "E" to confirm. The display shows:

NEW PW  
-> 0 0 0 0

Use "UP" and "DOWN" keys to modify the first digit. Use "RIGHT" key to go on the next digit. Press "E" to confirm. The instrument will show the new password for 2 seconds and then will return to the main menu.

### **STANDBY SETUP: 2) Stand**

For a good electrodes polarization a delayed startup (every time the instrument is powered) may be set. Select "2)STAND" from "Param" menu. The display will show:

STANDBY  
-> 02 Sec.

It is possible to set the delay using "UP" and "DOWN" keys. The time can be set between 0 (no delay) to 60 seconds. Press "E" to confirm. The display will show the confirmation message "Stand-by Saved" for 2 seconds.

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## SERV.

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### MANUAL WORKING MODE: 3) Serv.

This function allows to manual control the external relays contact (SP1 / SP2).

The display will show 1 or 2 to show the selected setpoint/output. The output status can be set "ON" or "OFF" using "UP" key for SP1 and "DOWN" key for SP2. "ON" is the status of N.O contact closed and N.C. contact open. "OFF" is the status of N.O. contact open and N.C. contact closed.

### ERROR MESSAGES

If the display shows an error message, use the following table:

<i>ERROR 1:</i>	<i>Buffer solution error during calibration. Try again using a different buffer solution.</i>
<i>ERROR 2:</i>	<i>Buffer solution read error during calibration. Try again using a different buffer solution.</i>
<i>ERROR 3:</i>	<i>N/A</i>
<i>ERROR 4:</i>	<i>Offset error. Verify sample and repeat procedure.</i>
<i>ERROR 5:</i>	<i>Slope error. Verify sample and repeat procedure.</i>

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## ENVIRONMENTAL TABLE FOR GAIN CALIBRATION

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Temperature (°C)	mg O <sub>2</sub> /l ("C" Value to enter)
0	14,2
1	13,8
2	13,4
3	13,1
4	12,7
5	12,4
6	12,1
7	11,8
8	11,5
9	11,2
10	10,9
11	10,7
12	10,4
13	10,2
14	10,0
15	9,8
16	9,6
17	9,4
18	9,2
19	9,0
20	8,8
21	8,7
22	8,5
23	8,4
24	8,3
25	8,1
26	8,0
27	7,9
28	7,8
29	7,6
30	7,5

*Table of oxygen saturation at an atmospheric pressure of 1013 bar.  
Values taken from "Deutsche Einheitsverfahren zur Wasseruntersuchung", System No G2*



*When dismantling an instrument please separate material types and send them according to local recycling disposal requirements. We appreciate your efforts in supporting your local Recycle Environmental Program. Working together we'll form an active union to assure the world's invaluable resources are conserved.*