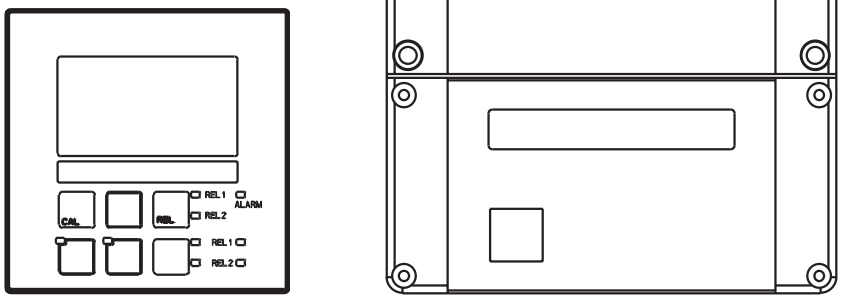
BA 199e10/07.02
51513955

Valid from software version:
2.40

Model 840 / 842
Transmitter for Dissolved Oxygen

Operating Instructions



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1 General information

1.1 Symbols used

Warning:

This symbol alerts to hazards which could cause serious injuries as well as damage to the equipment if ignored.

Caution:

This symbol alerts to possible faults which could arise from improper operation. They could cause damage to the equipment if ignored.

Note:

This symbol indicates important items of information.

Double insulation

Equipment protected by double insulation.

Alarm relay

Input

Output

1.2 Storage and transport

The packaging material used to store or transport the transmitter must provide shock protection. Optimal protection is provided by the original packaging materials.

Conformance with permissible ambient conditions (see Technical data) must be assured.

1.3 Unpacking

Make sure that the packaging and the contents are undamaged! Inform the post office or freight carrier of any damage. Damaged merchandise must be retained until the matter has been settled.

Check that the delivery is complete and agrees with the shipping documents and your order (refer to nameplate for type and version).

Keep the original packaging materials for future storage or shipping of the instrument.

If you have any questions, please contact your supplier of your Sales Office responsible for your area.

The delivery includes:

- Transmitter Model 840 or Model 842
- Operating Instructions BA 199e01
- Panel-mounted instrument:
  – 1 set of plug-in screw terminals
  – 2 clamping screws (see p. 11)
- Field instrument:
  – 1 plug-in screw terminal
  – 1 × cable gland Pg 7
  – 1 × cable gland Pg 16, reduced
  – 2 × cable glands Pg 13.5
  – 1 x NPT adapter set
  (optional for CSA versions)

1.4 Dismantling, packaging, disposal

For reuse at a later time, the measuring transmitter must be carefully packed. Optimum packaging is provided by the original packaging. When disposing of the equipment, observe local regulations.

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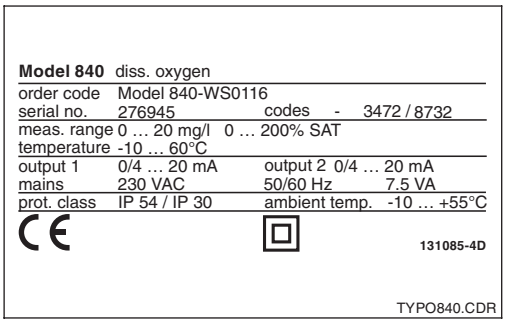
1.5 Product overview

You can recognise the device version from the order code or the nameplate. Sub “codes” are the release codes for Software upgrade shown for ChemoClean (left of diagonal line) or Plus packet (right of diagonal line).



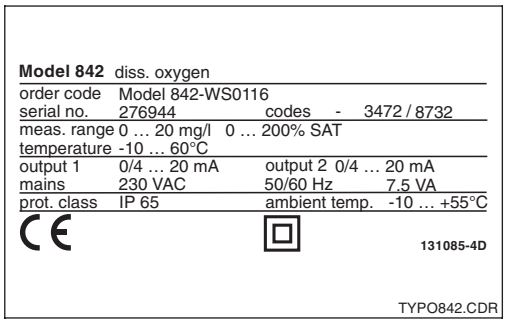


Fig. 1.1 Nameplate Model 840 (left)

Fig. 1.2 Nameplate Model 842 (right)

Model 840 / 842

Version

DX Basic functions, Sensor OOS 41 / 4 / 4HD
DS With Plus package, Sensor OOS 41 / 4 / 4HD
WX Basic function, Sensor OOS 31 / 71 / 3 / 3HD
WS With Plus package, Sensor OOS 31 / 71 / 3 / 3HD

Power supply

0 Power supply: 230 V AC
1 Power supply: 115 V AC
2 Power supply: 230 V AC, CSA Gen. Purp.
3 Power supply: 115 V AC, CSA Gen. Purp.
5 Power supply: 100 V AC
7 Power supply: 24 V AC, CSA Gen. Purp.
8 Power supply: 24 V AC / DC

Measurement output

0 1 output signal: Dissolved oxygen
1 2 output signals: Dissolved oxygen and temperature / set value

05 No additional contacts
10 2 contacts (limits / PID / timer)
15 4 contacts (limits / PID / timer / ChemoClean)
16 4 contacts (limits / PID / timer)
20 2 contacts with current input (limits / PID / timer)
25 4 contacts with cleaning, current input (limit / PID / ChemoClean)
26 4 contacts with timer, current input (limits / PID / timer)

Model840- | | | | |
Model842- | | | | |

complete order code

Additional version of Plus Package (version DS or WS):

- Current output table, fields O23x
- Monitoring for sensor and process, function group P
- Automatic start of cleaning function, field F8

2 Safety instructions

2.1 Intended application

The Model 840/842 transmitter is a field-tested and reliable measuring transmitter used to determine the oxygen concentration of liquid media.

The transmitter Model 840/842 is particularly suitable for use in the following areas:

- Sewage treatment plants
- Sewage treatment
- Drinking water
- Water conditioning and monitoring
- Surface water (rivers, lakes, oceans)
- Fish farming

2.2 General safety instructions

This device has been manufactured for safe operation according to the state of the art in engineering and conforms to the applicable regulations and European standards (see Technical data). It has been designed according to EN 61010-1 and has left the manufacturer's works in perfect condition.

However, if used improperly or for purposes other than the intended purpose, it may be dangerous, e.g. due to incorrect connection.

Warning:

- Operating this instrument in any way other than as described in these instructions may compromise the safety and function of the measuring system and is therefore impermissible.
- The notes and warnings in these installation and operating instructions must be strictly adhered to!

2.3 Installation, start-up, operation

Warning:

- This device may only be installed, connected electrically, commissioned, operated and serviced by properly trained personnel authorised by the system operator.
- The personnel must be familiar with these operating instructions and must adhere to the instructions described therein.
- Make sure that the power supply ratings match the data specified on the nameplate before you connect the instrument to a power source.
- A clearly identified mains disconnecting device must be installed close to the instrument.
- Live components can be touched through the vent slots in the housing and the openings on the rear of the housing. Do not insert any tools, wires or similar objects into these slits (only Model 840).
- Check that all connections have been properly made before powering up the system!
- Damaged equipment that may be dangerous must not be operated and should be clearly identified as being defective.
- Any troubleshooting of the measuring system is to be performed exclusively by authorised, trained personnel.
- If faults cannot be remedied, the instrument must be removed from service and secured to prevent accidental start-up.
- Repairs not described in these operating instructions may only be performed at the manufacturer's works or by your Service Organization.

2.4 Monitoring and safety features

Safety features

The transmitter is protected against external influences and damage by the following design measures:

- Rugged housing
- Degree of protection provided by enclosure: IP 65 (Model 842)
- UV resistance

Monitoring features

In the event of a system error or power failure, an alarm condition is signalled via a fault-signalling contact.

2.5 Immunity to interference

This instrument has been tested according to the applicable European standards for industrial applications with regard to electromagnetic compatibility. The transmitter is protected against external influences and damage by the following design measures:

- Cable screening
- Fault protection filters
- Fault protection condensers

Warning:

The specified immunity to interference only applies for devices connected as outlined in these operating instructions.

2.6 Declaration of conformity

The transmitter Model 840/842 complies with the legal demands of the harmonized European standards.
The manufacturer certfies the compliance with the standards by using the CE sign.

3 Installation

For a complete installation of the measuring point, proceed as follows:

- Installation or attachment of measuring transmitter (see Chap. 3.3)
- Selection and connection of cables and measuring cell (see Chap. 3.4, 3.5 and 9)
- Installation is followed by start-up (see Chap. 5).

3.1 Measuring system

The complete measuring system comprises:

Variant 1

- The transmitter Model 840 or Model 842 in DX or DS version
- An oxygen sensor OOS 4, OOS 4HD or OOS 41
- An immersion, flow or retractable assembly

Options:

- Extension cable OMK
- Junction box VBM

Variant 2

- The transmitter Model 840 or Model 842 in WX or WS version
- An oxygen sensor OOS 3, OOS 3S, OOS 3HD, OOS 31 or OOS 71
- An immersion, flow or retractable assembly

Options:

- Extension cable OMK
- Junction box VS

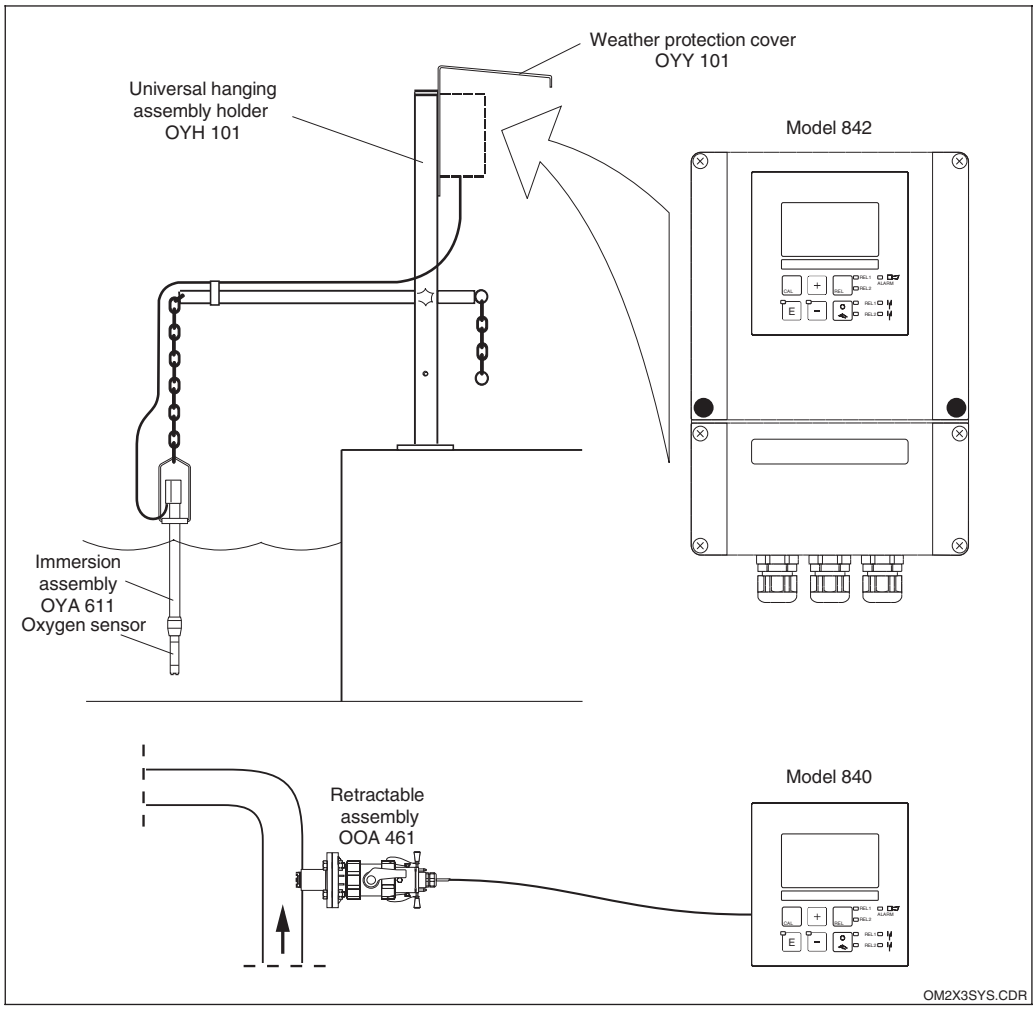


Fig. 3.1 Complete measuring system Model 840 / 842 with measuring cable, assembly and oxygen sensor

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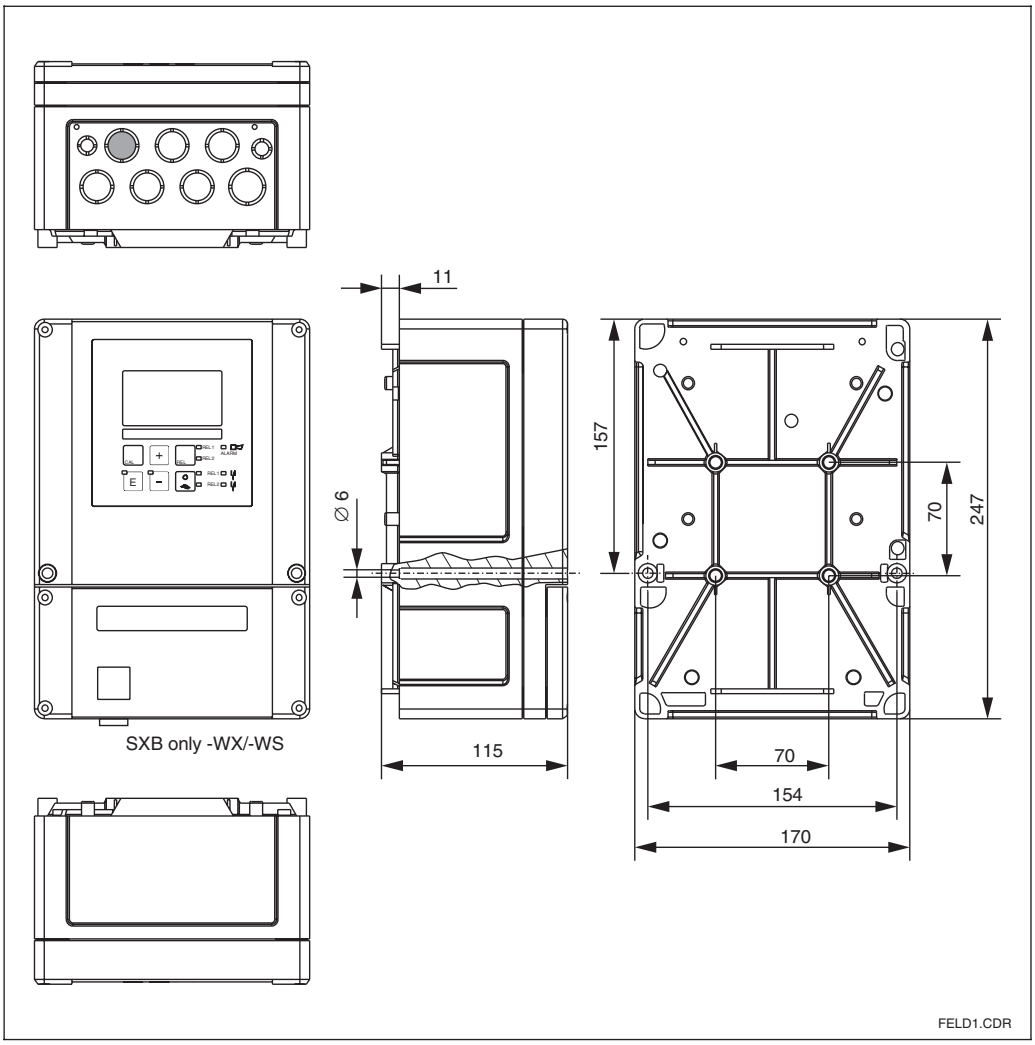
3.2 Dimensions



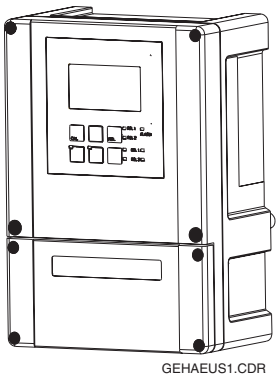
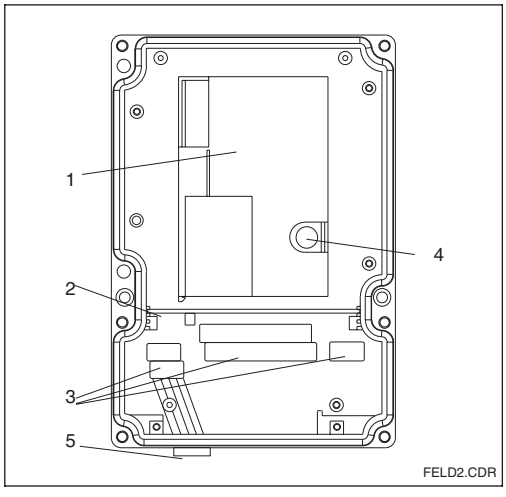


Fig. 3.3 Dimensions of Model 842

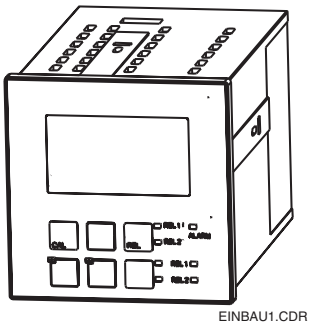
Note:

There is a hole in the punching for Pg 16 cable entry. It serves as a pressure balance during air freight dispatching. Make sure that there is no moisture penetrating into the housing before cable installation. After cable installation, the housing is completely tight.



Inner view Model 842
1 Removable electronics box
2 Partition plate
3 Terminal blocks
4 Fuse
5 Sensor plug-in

Fig. 3.2 (only for version WX/WS)



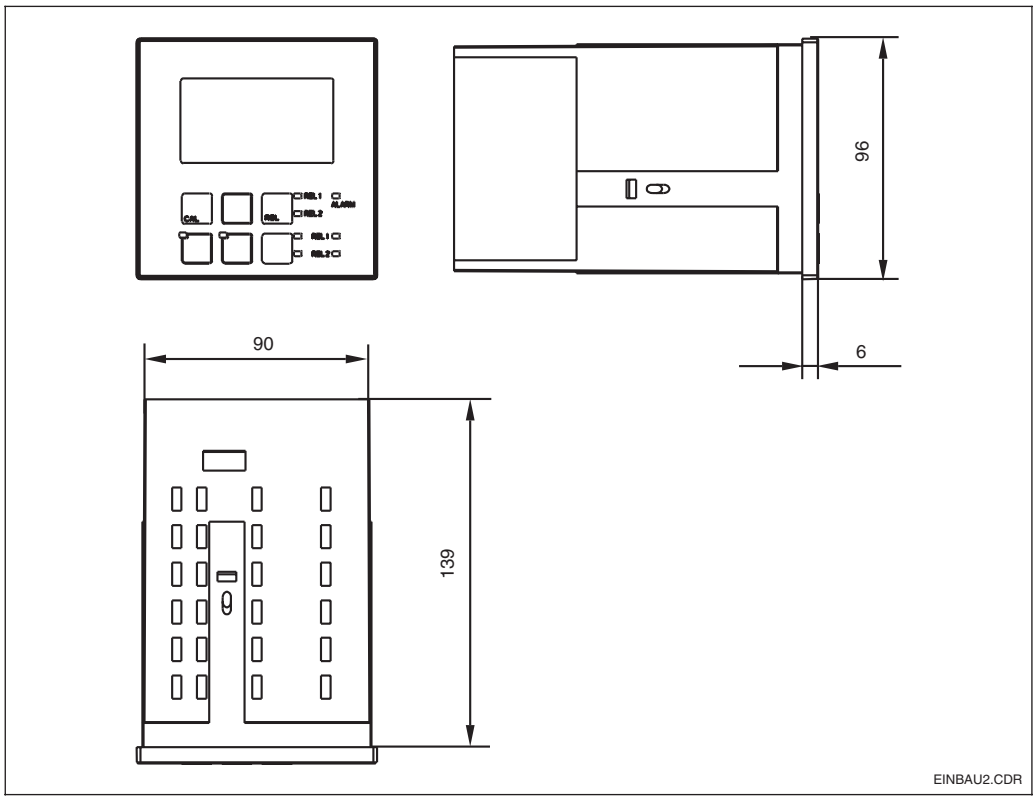


Fig. 3.4 Model 840, mounting version

3.3 Mounting

3.3.1 Field instrument

Several mounting options are available for the transmitter in the field instrument version:

- Post mounting on cylindrical pipes
- Post mounting on a square post
- Wall mounting with fastening screws

Weather protection cover OYY 101 can be used for outdoor installation in conjunction with all mounting variants. With direct weathering, use the weather protection cover.

Weather protection cover OYY 101

Weather protection cover for operation in the open, for installation on the field instrument; Material: Stainless steel 1.4301 (AISI 304)

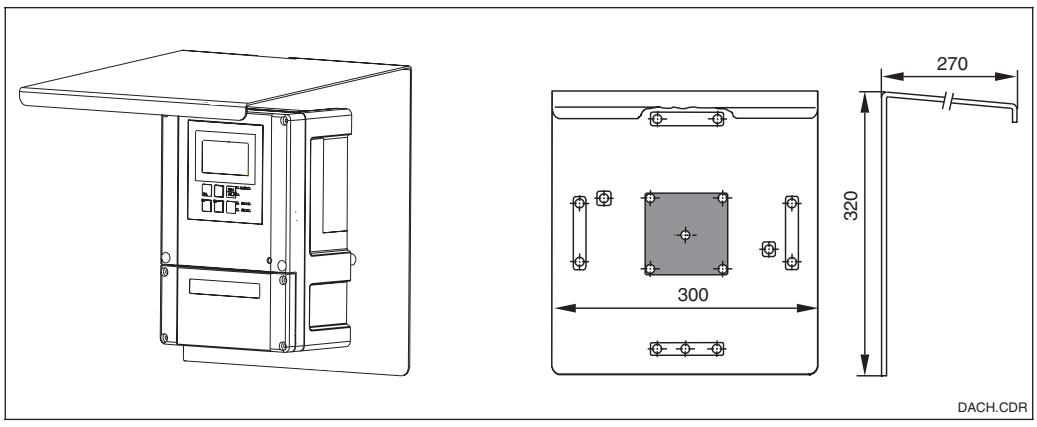


Fig. 3.5 Weather protection cover OYY 101 for field instruments

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Post mounting kit

Installation kit for installing the field housing on horizontal and vertical posts (max. dia. 60 mm);
Material: Stainless steel 1.4301 (AISI 304)

Universal mounting post OYY 102

Square pipe for installation of transmitters;
Material: Stainless steel 1.4301 (AISI 304)

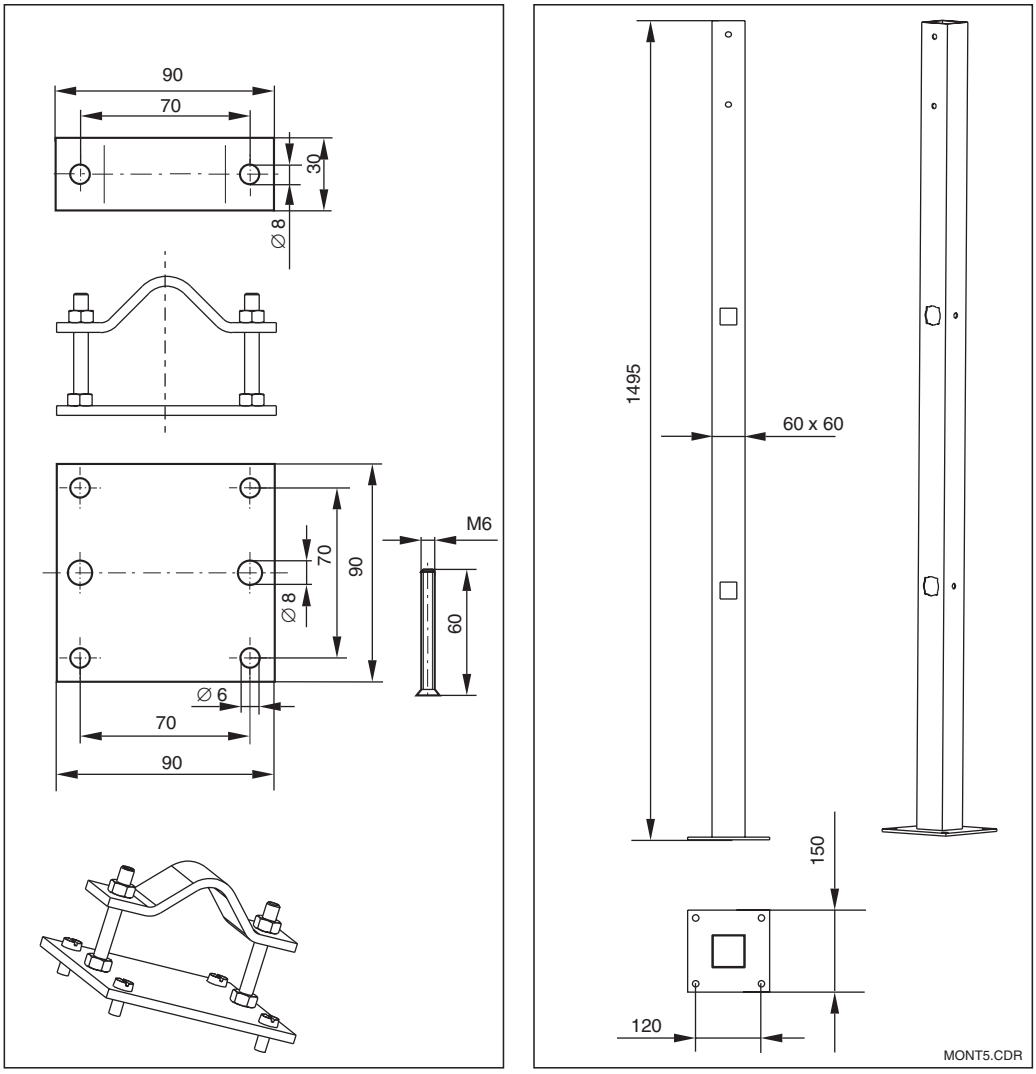
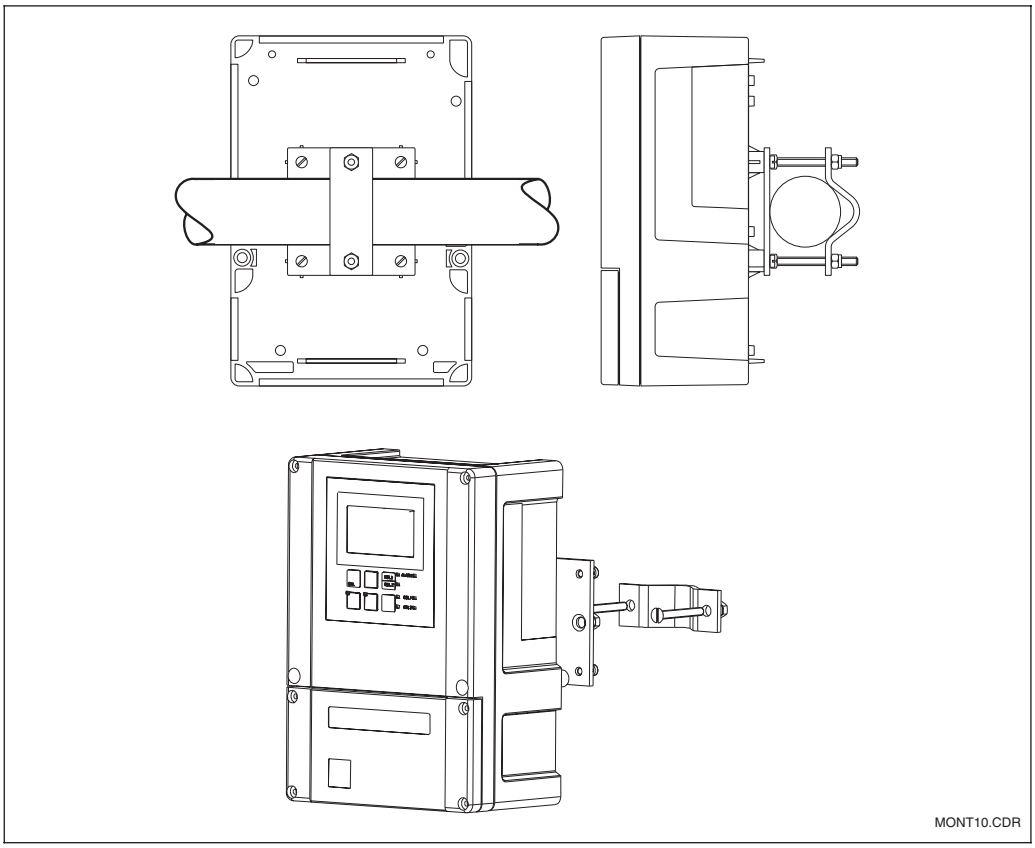


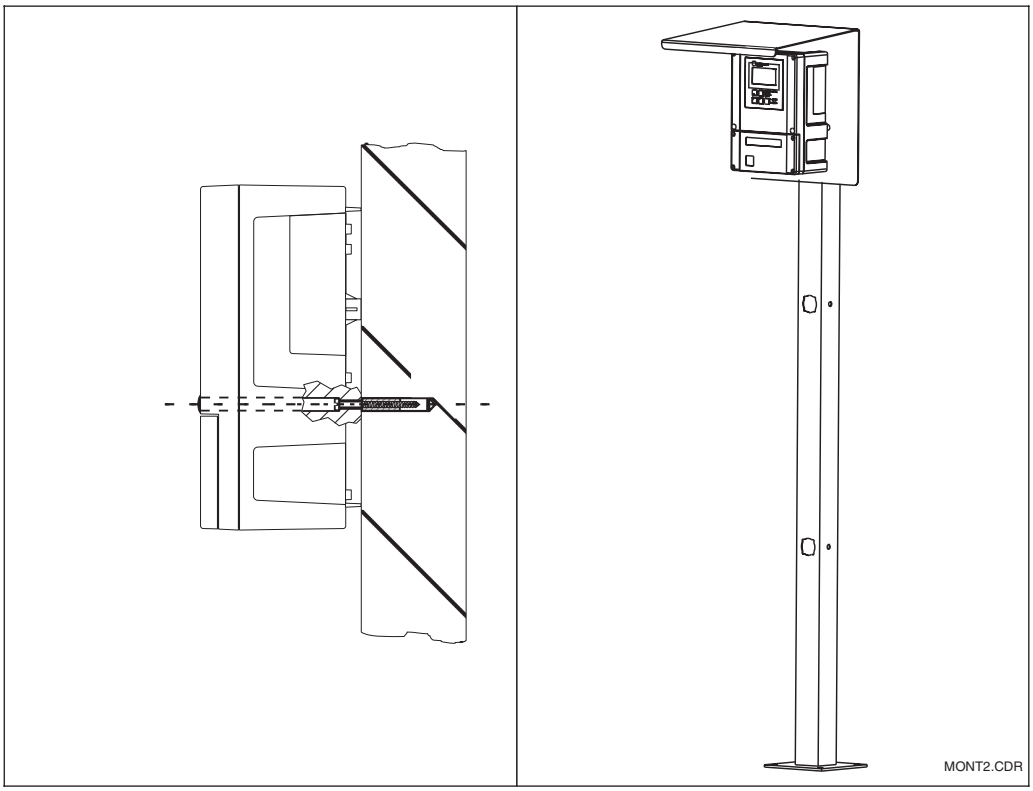
Fig. 3.6 Left: Mounting kit for post mounting on cylindrical pipes

Right: Four edged mounting post OYY 102

3.3.2 Mounting examples



Field instrument:
Fig. 3.7 Pipe mounting



Field instrument:

Left:
Wall mounting

Right:
Mounting with universal post and weather
Fig. 3.8 protection cover

M842E03.CHP

3.3.3 Panel-mounted instrument

The instrument is attached using the supplied tensioning screws (see Fig. 3.9).
The required overall installation depth is approx. 165 mm.

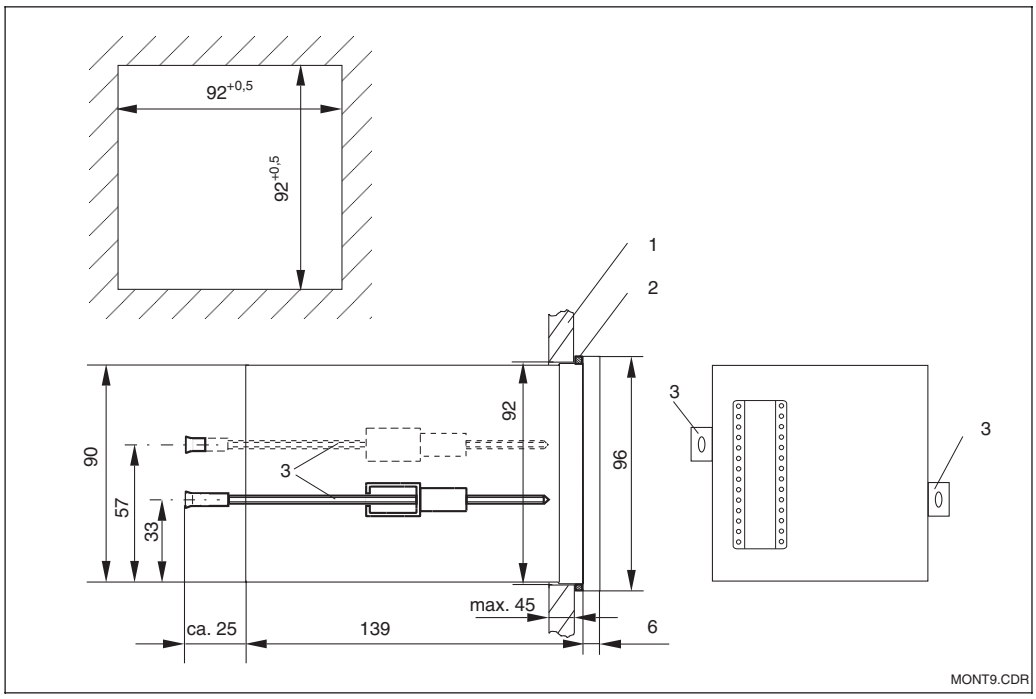


Fig. 3.9 Fixing the installation instrument
1 Front of the control cabinet
2 Seal
3 Clamping screws

3.4 Electrical connection

Connection diagram Model 840 / 842 in DX or DS version

The connection diagram depicted in Fig. 3.10 shows the connections when using an oxygen sensor of type OOS 4, OOS 4HD or OOS 41.

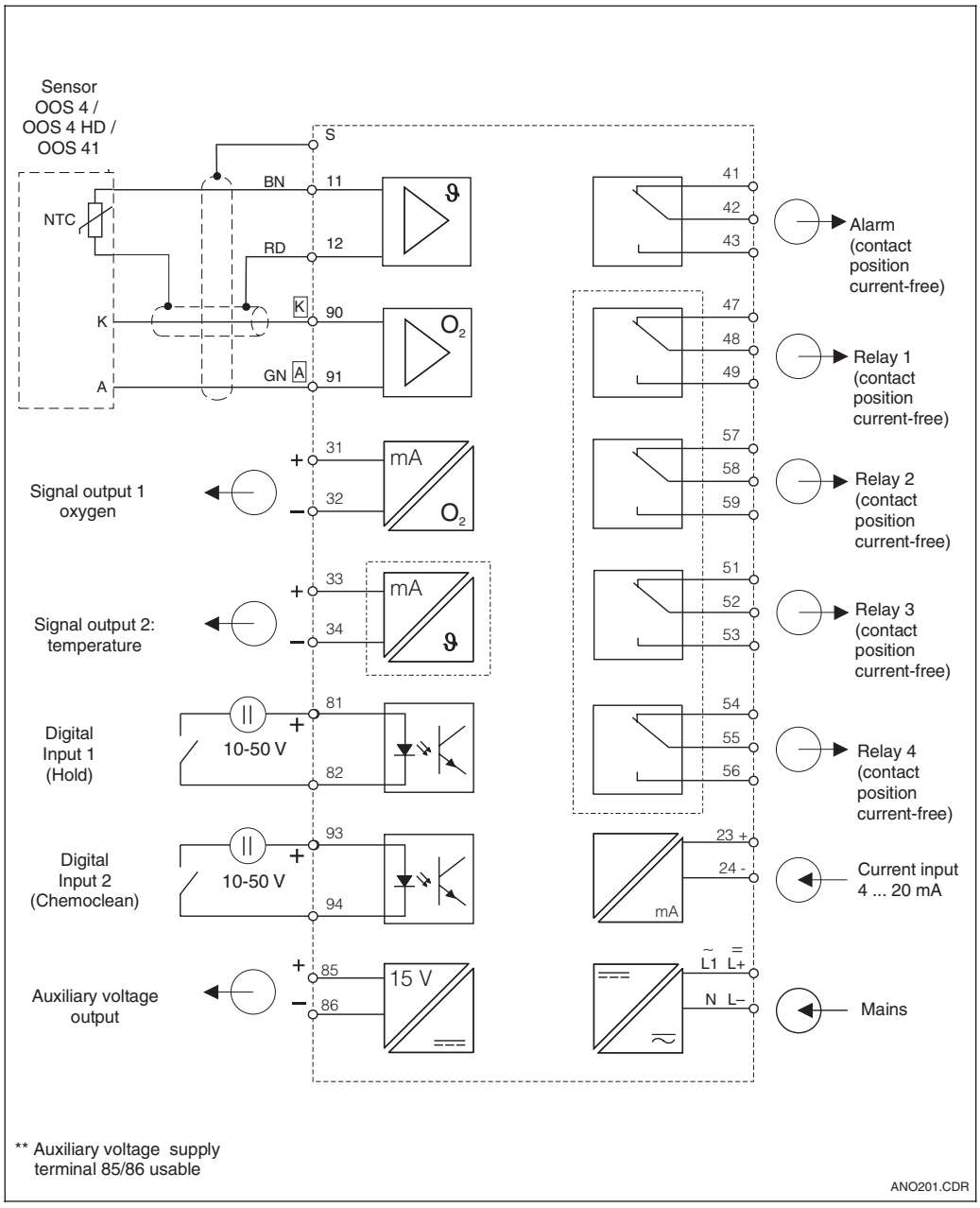


Fig. 3.10 Electrical connection of Model 840 / 842 in DX or DS version with full wiring

Note:

- The instrument has protection class II and is generally operated without protective earth connection.
- Mains supply voltage fluctuations should not exceed ten percent of the nominal supply voltage.
- 24V AC/DC models must be supplied from an energy limiting SELV source in accordance with dir. IEC 1010.1 Annex H.

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Connection diagram Model 840 / 842 in WX or WS version

The connection diagram in Fig. 3.11 shows the connections when using an oxygen sensor of type OOS 3, OOS 3 S, OOS 3HD, OOS 31 or OOS 71.

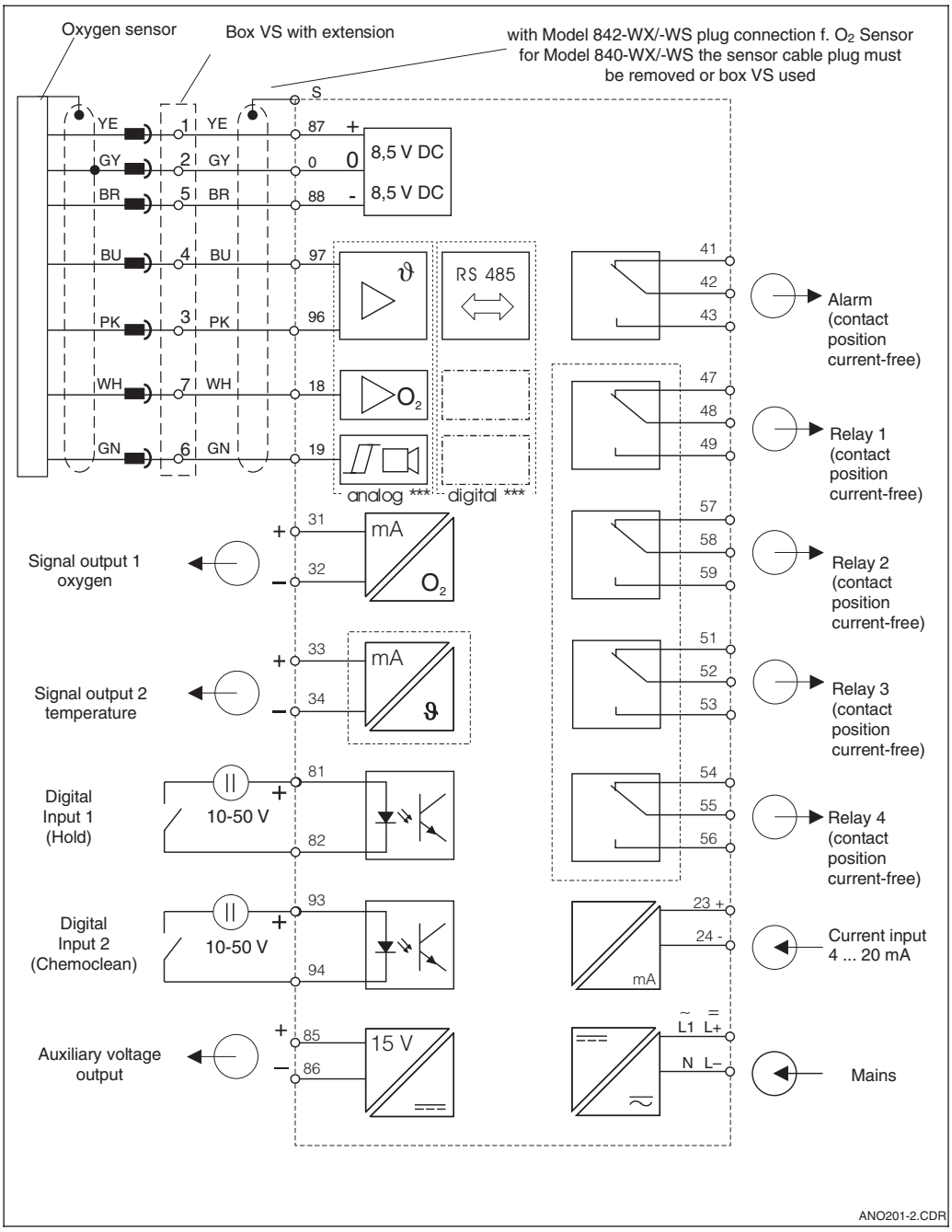

Fig. 3.11 Electrical connection of Model 840 / 842 in WX or WS version with full wiring

** Auxiliary voltage supply terminal 85/86 usable

*** analogue: with OOS 3, 3-S, 3HD
digital: with OOS 31, 71

Instrument connections for field instrument Model 842 in DX or DS version

For connection, the measuring cables are introduced through the cable glands on the field instrument and connected according to the diagrams in Figs. 3.10, and 3.12.

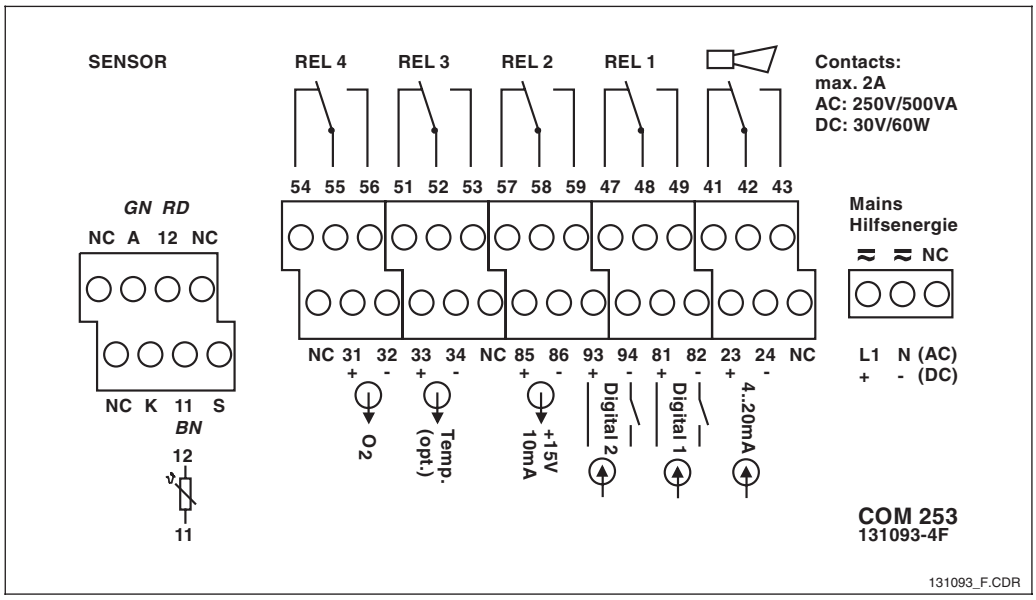

Fig. 3.12 Connection box sticker for field instruments Model 842 in DX or DS versions

Note:

NC: Do not connect!

Instrument connections for installed instrument Model 840 in DX or DS version

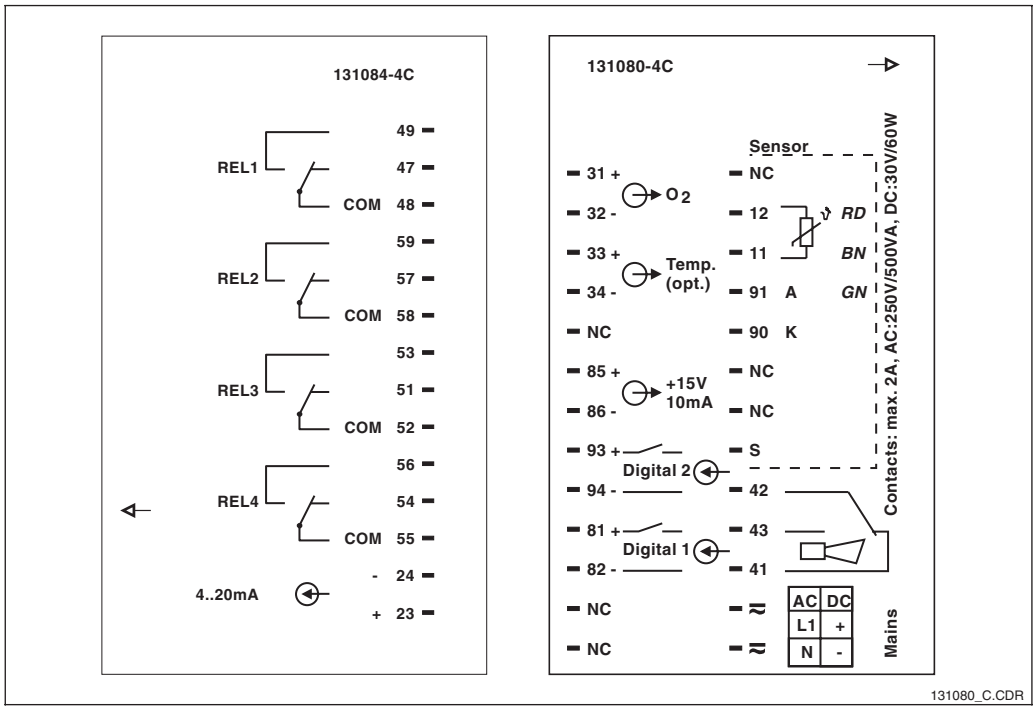

Fig. 3.13 Connection box sticker for installation instruments Model 840 in DX or DS versions

M842E03.CHP

Instrument connections for field instrument Model 842 in WX or WS version

For connection, the measuring cables are introduced through the cable glands on the field instrument and connected according to the diagrams in Figs. 3.11, and 3.14. The sensor is plugged in from the outside (7-pin socket SXB).

Note:

Please label the sensor terminal block with the enclosed sticker.

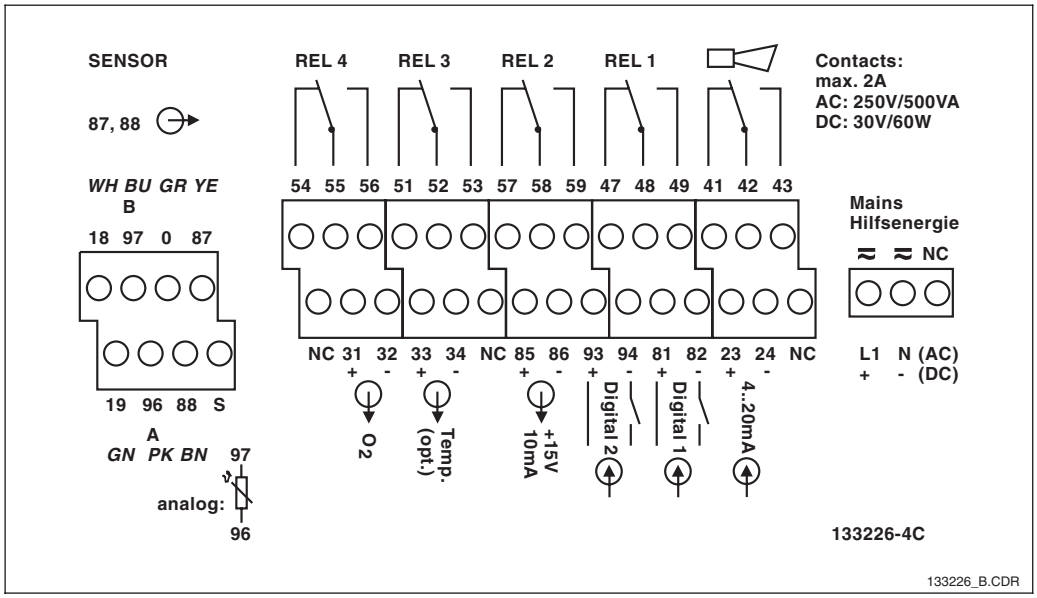

Fig. 3.14 Connection box sticker for field instruments Model 842 in WX/WS versions

Instrument connections for installed instrument Model 840 in WX or WS version

For connection to the Model 840-WX/WS, the sensor plug must be removed and directly attached to the litz wires. If the connection plug is to stay as an isolatable connection, a junction box VS can be inserted between the sensor and the instrument.

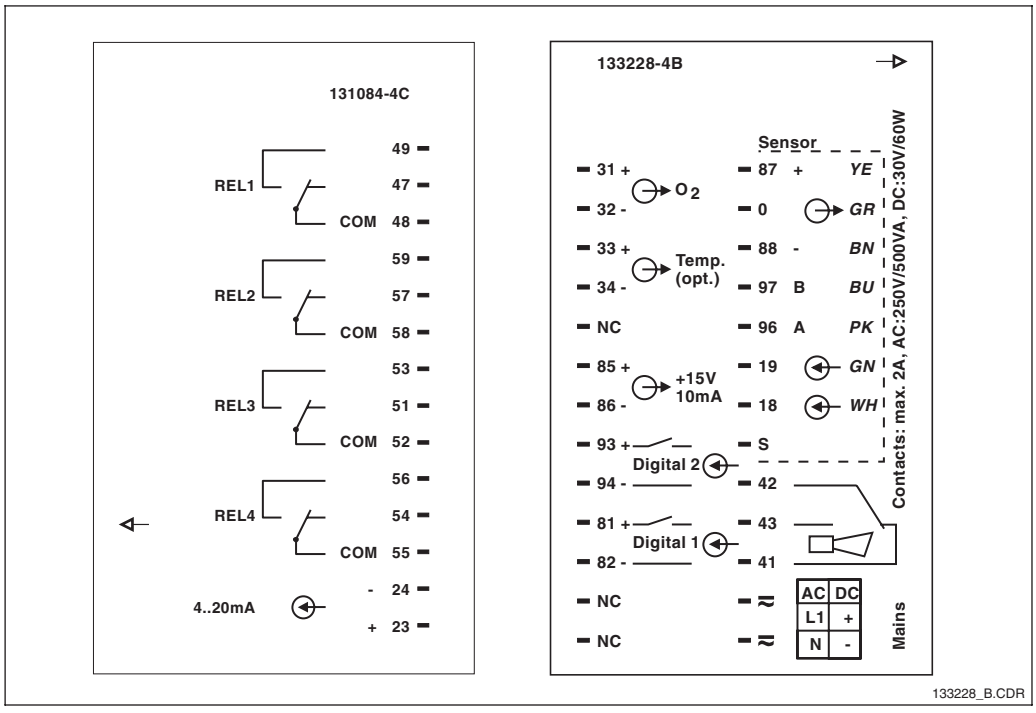

Fig. 3.15 Connection box sticker for installation instruments Model 840 in WX/WS versions

3.5 Sensor installation and measuring cable connection

Measuring cable connection

The terminal block is located in a separate connection compartment which is accessible by opening the plastic cover. Remove the pre-pressed knock-outs for cable entry.

The oxygen sensor is connected via a special screened, multi-core cable. To extend the measuring cable, use junction box and extension cable.

Note:

- Protect connectors, cable ends and terminals against moisture to prevent inaccurate measurement!
- For further information on cables and junction boxes refer to chap. 9 Accessories.

Sensor type	Sensor cable	Extension
OOS 4 / 4HD / 41	OMK/OYK 71 prepared	VBM junction box + OYK 71 cable
OOS 3 / 3S / 3HD	OMK with SXP plug	VS junction box + OMK cable
OOS 31 / 71	OMK with SXP plug	VS junction box + OMK cable
OOS 31 / 71 with TOP 68 connection	OYK 71 with SXP plug	VS junction box + OMK cable

Maximum cable length	
OOS 4 / 4HD / 41	max. 50 m with CMK cable
OOS 3 / 3S / 3HD / 31 / 71	100 m with OMK cable

Structure and preparation of the sensor cable (OOS 4 / 4HD / 41)

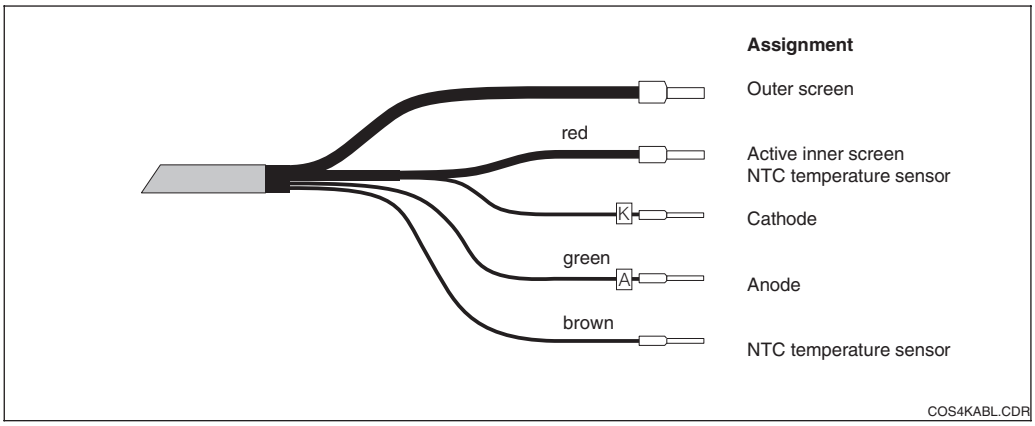

Fig. 3.16 Structure of the special measuring cable OMK / OYK 71

Preparation of the sensor connector (OOS 3 / 3S / 3HD / 31 / 71) with OMK cable

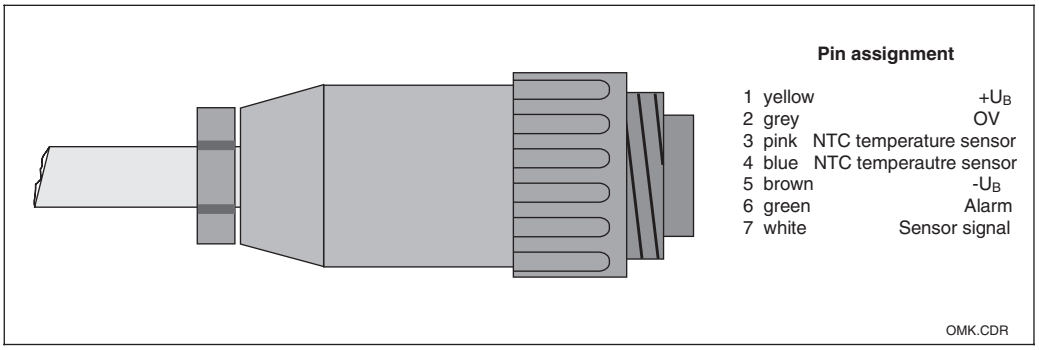

Fig. 3.17 Production of a sensor plug with special measuring cable OMK

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4 Operation

4.1 Operator interface

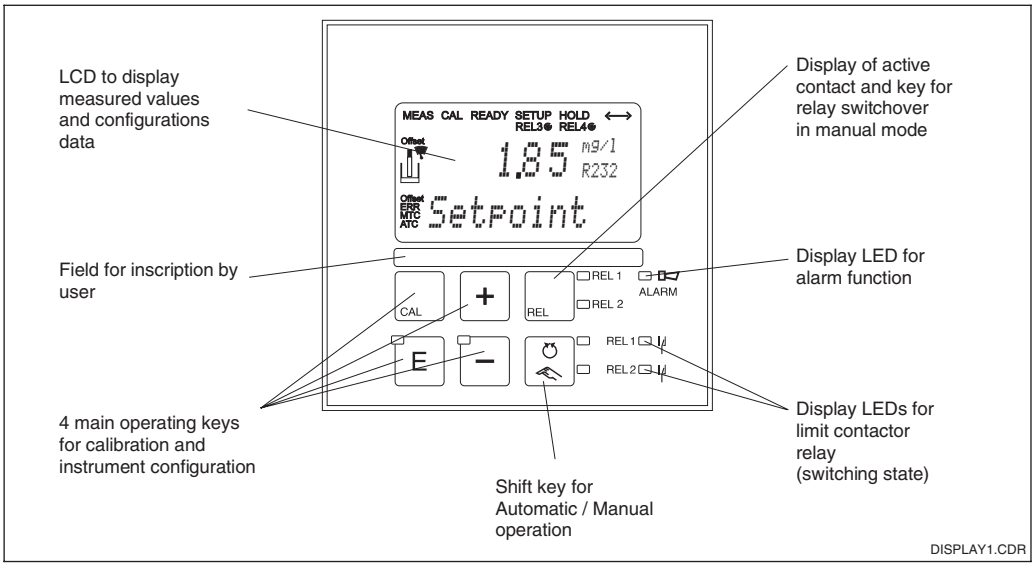


Fig. 4.1 Operating elements

4.2 Display

LED indicators

Display of current operating mode »Auto« (green LED) or »Manual« (yellow LED)

REL

Display of controlled relay in »Manual« mode (red LED)

REL 1
REL 2

Display of working state of relays 1 and 2
LED green: Measured value within allowed limits, relay inactive
LED red: Measured value outside allowed limits, relay active

ALARM

Alarm display e.g. when limit values constantly exceeded,
Temperature sensor failure or system error

Liquid crystal display

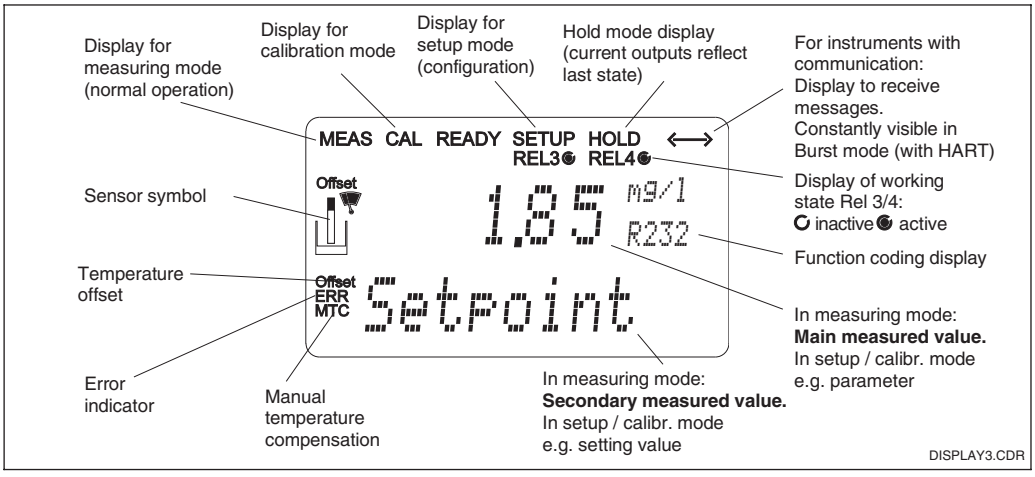
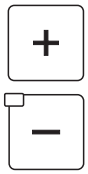
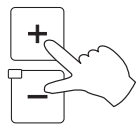
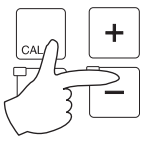
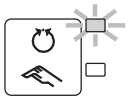
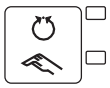


Fig. 4.2 Liquid crystal display

4.3 Key functions

	**CAL key** When the CAL key is pressed, the instrument prompts for the calibration access code: Code 22 for calibration Code 0 or any code for calibration data checking. Press the CAL key to acknowledge the calibration data or to proceed within the calibration menu.
	**ENTER key** The ENTER key has the following functions: Opens the Setup menu in Measurement mode Saves (confirms) entered data in Setup mode. Moving on within the function groups.
	**PLUS key and MINUS key** The PLUS and MINUS keys have the following functions: Selection of function groups Setting parameters and numeric values Relay operation in manual mode (see Chap. 4.4). Pressing the **PLUS key** allows you to switch between the current output in % and mA. **Repeatedly pressing the PLUS key** displays the following settings in sequence as secondary measured values: 1. Temperature display in °F 2. Hides the temperature display 3. - 5. Measured value display in mg/l, % SAT, hPa 6. Sensor current in nA/mV 7. Current input signal in % 8. Current input signal in mA 9. Return to basic setting **Repeatedly pressing the MINUS key** shows errors: 1. The current errors are displayed one after the other (max. 10) 2. After all the errors are displayed, the standard display is unhidden. In function group F, you can define an alarm for each error code separately.
	**REL key** The REL key toggles between the relay and manual cleaning start in manual mode. In automatic mode you can output the corresponding switch-on points (limit contactor) ot set points (PID controller) when pressing the REL key. Pressing the PLUS key allows you to display the settings of the following relay. Press the REL key to return to measuring mode (automatic return after 30s).
	**AUTO key** Pressing the AUTO key switches between the automatic and manual modes.
	**Escape function** Pressing the PLUS and MINUS keys simultaneously returns the display to the main menu. Press the PLUS and MINUS keys again to return to measuring mode.
	**Locking the keypad** Pressing the PLUS and ENTER keys simultaneously for minimum 3s locks the keypad against unintentional entries. However, all settings can still be read. The code prompt displays the code 9999.
	**Unlocking the keypad** Pressing the CAL and MINUS keys simultaneously for minimum 3s unlocks the keypad. The code prompt displays the code 0:

4.4 Auto / manual mode of operation

	**Auto mode** In this mode, the relays are controlled by the transmitter.
	**REL key** In manual mode, the REL key is used to select one of the relays or the cleaning function present in the instrument.
	**Switch to manual mode** Switch to manual mode for relay setting by pressing the following key combination:
	Press AUTO key.
	Enter code 22. Confirm with ENTER key.
	Select relay or function. Press the REL key to toggle between the relays. The display shows the selected relay and the switching status (ON / OFF) in the second line. In measuring mode, the measuring value is continuously displayed (e.g. for monitoring during dosage).
	Set the relays. Switch on by pressing PLUS, switch off by pressing MINUS. The relay remains in its switched state until it is switched over again.
	Press the AUTO key to return to the measuring mode. All relais are controlled by the transmitter again.

Note:

- Enable the manual mode by entering access code “22”.
- The operating mode remains in effect even after a power failure.
- The manual mode takes precedence over any other automatic function (hold).
- Hardware locking in the manual mode is not possible.
- The manual settings remain in effect until they are actively reset.
- Error code E102 is signalled in the manual mode.

4.5 Operating concept

4.5.1 Operating modes

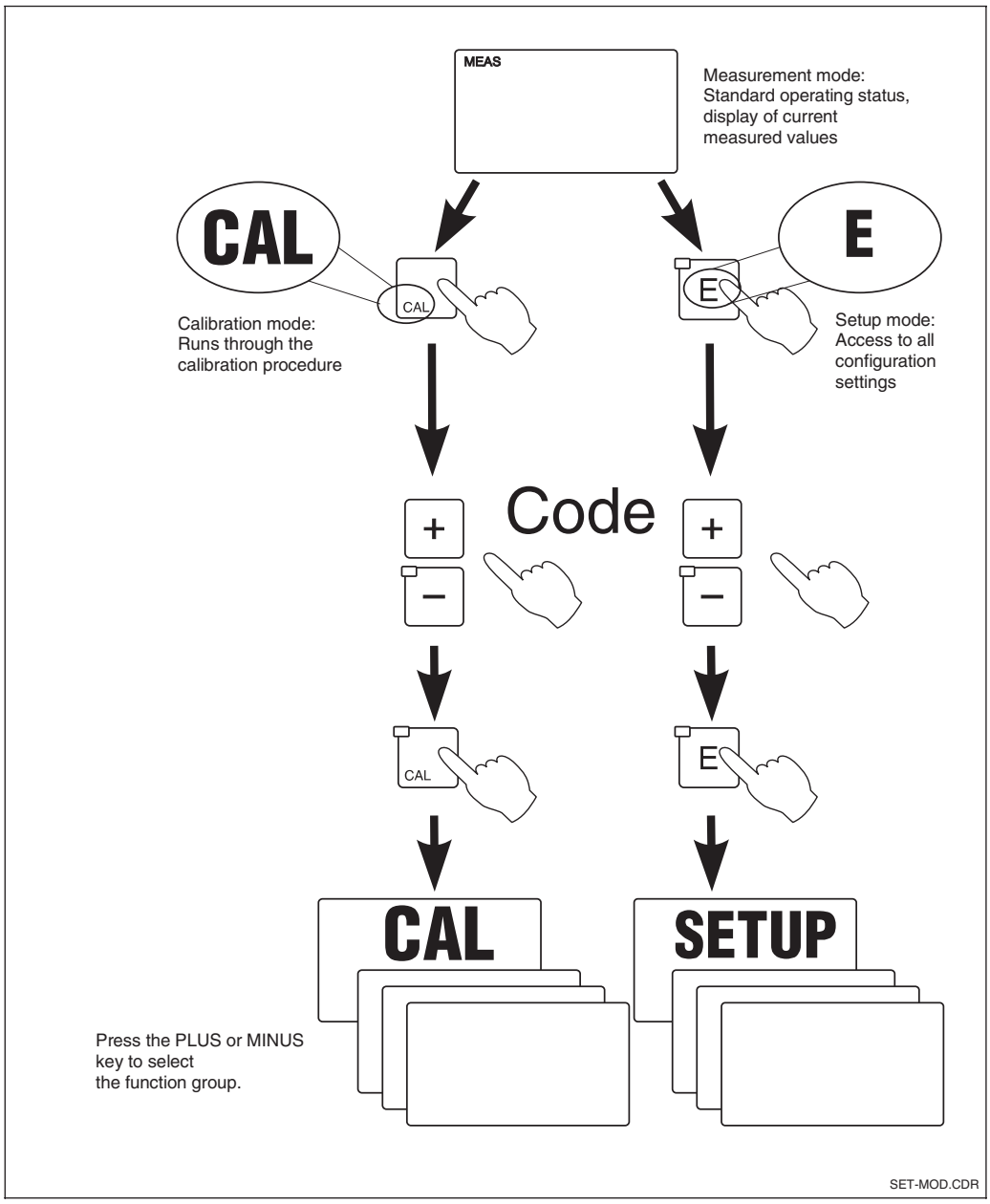


Fig. 4.3 Description of possible operating modes

Note:

- If you do not press a key in Setup mode for approx. 15 mins., the system automatically jumps back to Measuring mode. An active Hold function (Hold at Setup) is then reset.

4.5.2 Access codes

All instrument access codes are fixed, i.e. they cannot be modified. When the instrument requests the access codes, it recognises the difference between codes (cf. Fig. 5.3):

- **CAL key + Code 22:** Access to Calibration and Offset menus.
- **ENTER + Code keys 22:** Access to the Configuration menus, allowing configuration and user-specific settings.
- **PLUS + ENTER + Code keys 9999:** Locks the keypad.
- **CAL + MINUS + Code keys 0:** Unlocks the keypad.
- **CAL or ENTER + Code keys**: Access to Read mode, i.e. all settings can be read but not changed.

4.5.3 Menu structure

The configuration and calibration functions are arranged in a menu structure by function groups.

The function groups are selected in the setup mode with the PLUS and MINUS keys. The ENTER key is used to move from one function to the next within a function group.
The PLUS and MINUS keys are used for option selection and editing. Selections must be confirmed by pressing the ENTER key. This also moves the cursor to the next function.
Pressing the PLUS and MINUS keys (Escape function) at the same time terminates programming (return to main menu).

Note:

- If a change is made but not confirmed by pressing the ENTER key, the previous setting is retained.
- See the appendix of these operating instructions for an overview of the menu structure.

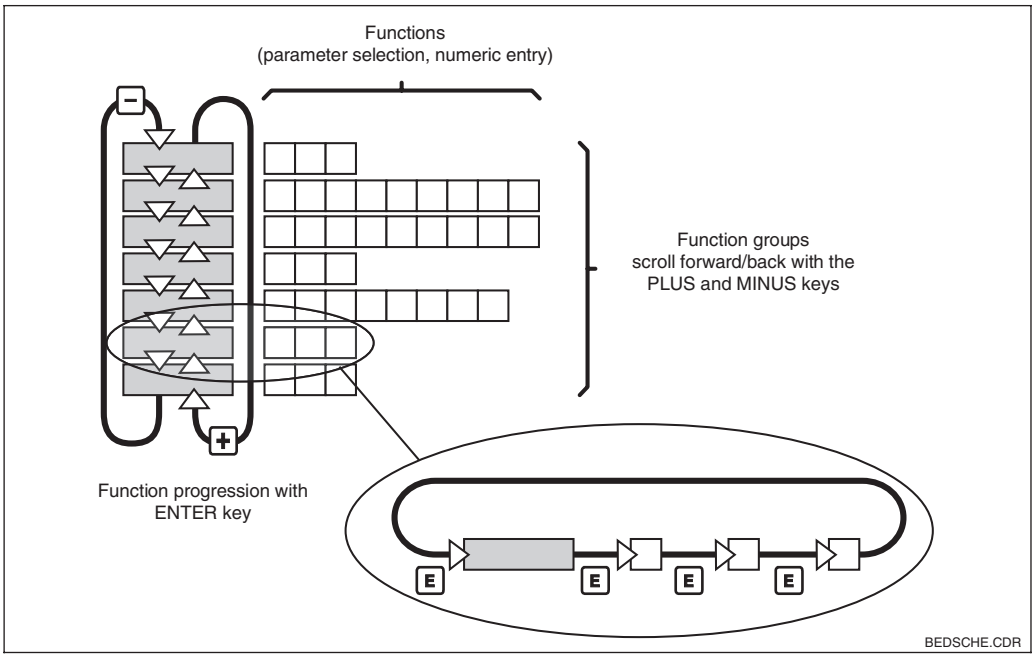


Fig. 4.4 Schematic diagram of the menu structure

4.5.4 Hold function: “freezes” the outputs

The current output is “frozen” in the setup mode and during calibration, i.e. the last current value is constantly output. HOLD appears on the display. In case of steady control (4... 20 mA) on current output 2, it is set to 0/4 mA during Hold.

Note:

- Hold settings can be found in Chap. 5.6, function S2.
- During hold, all contacts will go to their normal positions.
- An active hold has priority over all other automatic functions.
- With every hold, the I component of the controller is set to zero.
- A possibly accumulated alarm delay is reset to “0".
- The hold function can also be activated externally via the hold input (see wiring diagram in Fig. 3.10; digital input 1).
- The manual hold (field S3) remains active even after a power failure.

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5 Instrument configuration

After power-up, the instrument performs a self-test and then enters the measuring mode.

Now it can be configured and calibrated for the first time. The values set by the user are kept even in the event of a power failure.

The following function groups are available on the transmitter (the groups that are only available on the Plus package are marked accordingly in the function descriptions):

Setup mode

➜ SETUP 1 (A)	see Chap. 5.2.1
➜ SETUP 2 (B)	see Chap. 5.2.2
➜ CURRENT INPUT (Z)	see Chap. 5.3
➜ CURRENT OUTPUT (O)	see Chap. 5.4
➜ ALARM (F)	see Chap. 5.5.1
➜ CHECK (P)	see Chap. 5.5.2
➜ RELAY (R)	see Chap. 5.6
➜ SERVICE 1 (S)	see Chap. 5.7
➜ SERVICE 2 (E)	see Chap. 5.8
➜ INTERFACE (I)	see Chap. 5.8

Calibration mode

➜ CALIBRATION (C)	see Chap. 5.10

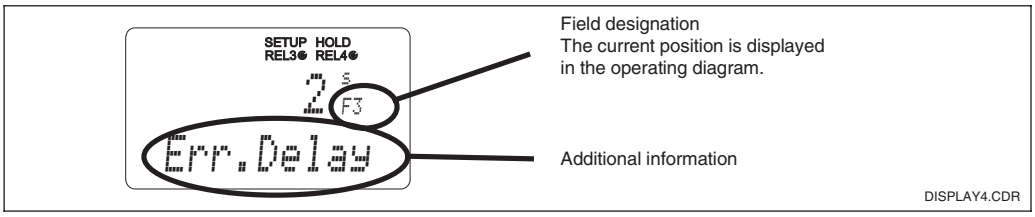

Fig. 5.1

To help you to select and find function groups and functions, each function is displayed with a field designation. The structure of this designation is given in Fig. 5.2.
The first column indicates the function group as a letter (see group designations). The functions in the individual groups are counted from the top to the bottom and from the left to the right.

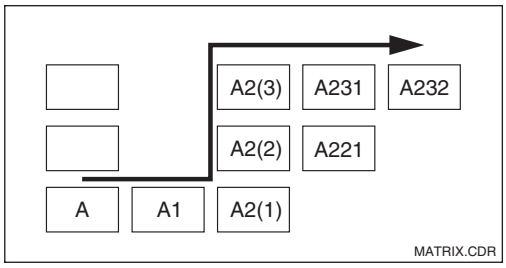

Fig. 5.2 Field designation

Factory settings

When the instrument is switched on for the first time, the factory settings are in effect. The following table provides an overview of all major settings. Please refer to the description of the individual functions in chapter 5 for all other factory settings (the factory settings are printed in **bold**).

Function	Factory setting
Measurement type	Oxygen concentration in mg/l Temperature in °C
Automatic pressure compensation *	Off (only with version WX or WS)
Altitude	0 m above sea level
Salinity	0.0% salt concentration
Current outputs 1 and 2*	4 ... 20 mA
Current output 1: measured value at 4 mA signal current	0.00 mg/l 0.000 mg/l (only with sensor OOS71)
Current output 1: measured value at 20 mA signal current	10.00 mg/l 10.000 mg/l (only with sensor OOS71)
Current output 2: temperature value at 4 mA signal current*	0.0°C
Current output 2: temperature value at 20 mA signal current*	40.0°C
Alarm contact	Steady contact
Alarm delay	Setting in minutes
Error current for alarm	22 mA
Check functions *	Off. Can be switched on as required.
Setpoint for oxygen	5.00 mg/l 5.000 mg/l (only with sensor OOS 71)
Language	English

Alarm contacts

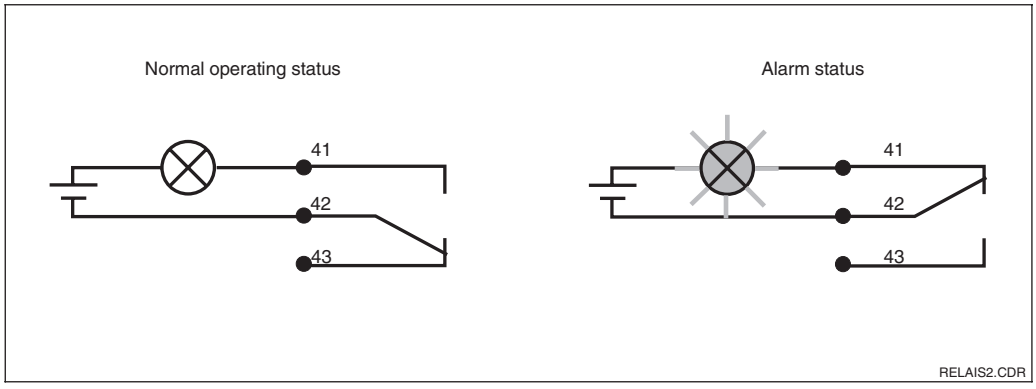

Fig. 5.3 Recommended fail-safe circuit for the alarm contact

Normal operating status:

- Instrument in operation
- No error message available (Alarm LED off)

→ Releay picked up
→ Contact 42/43 closed

Alarm state:

- Error message available (Alarm LED red) or
- Instrument defective or voltage-free (Alarm LED off)

→ Releay dropped out
→ Contact 41/42 closed

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5.1 Start-up

After switching the instruement on, make the following settings to the specified function groups:

- **Function group SERVICE (S)**
  S1: Select language and exit function group.
- **Function group SETUP 1 (A)**
  Adjust all the parameters in this group; see Chap. 5.2.1.
- **Function group SETUP 2 (B)**
  Adjust all the parameters in this group; see Chap. 5.2.2.

Other configuration options are explained in the chapters to follow for each menu.

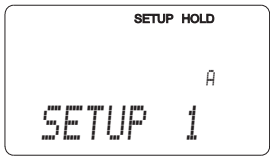
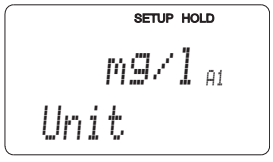
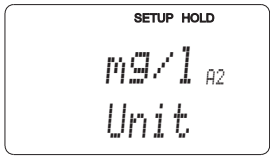
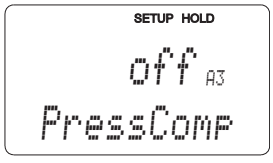
5.2 System configuration

The system is configured using the function groups SETUP 1 and SETUP 2. The measurement type and electrode are selected here, and the settings for temperature measurement are made.

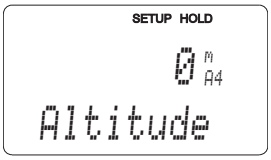
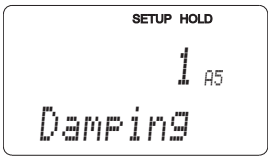
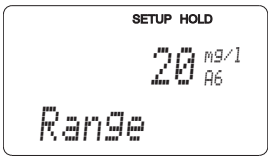
All the parameters in these two function groups are to be configured to avoid measuring errors or failure to measure at all.

5.2.1 Setup 1 (Oxygen)

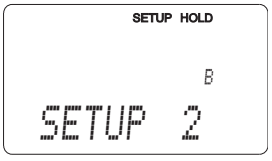
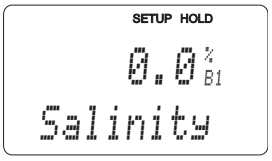
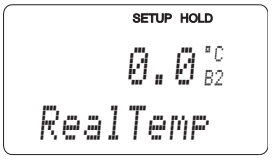
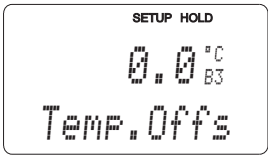
For access to the SETUP menu, please enter Code 22.

Coding	Field	Selection or range Factory setting (bold)	Display	Info
A	**Function group SETUP 1**			Initial display in function group SETUP 1.
A1	Select operating mode	**mg/l** %Sat hPa		mg/l=Oxygen concentration %Sat=Oxygen saturation index hPa=Oxygen partial pressure ⚠ Warning! **If the operating mode changes, all the user settings are reset automatically (to the basic settings).** If the oxygen value only needs **to be read** switch displays using the PLUS key.
A2	Select display unit	**mg/l** ppm ppb		
A3	Switch automatic pressure compensation on or off	**off** on		Field only available with WX or WS versions. The **absolute** air pressure is measured. Compensation takes account of both the location height dependent and the weather dependent proportion of the air pressure.

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

Coding		Field	Selection or range Factory setting (bold)	Display	Info
	A4	Enter altitude	**0 m** 0 ... 4000 m		Only available if the pressure compensation in A2 is switched off or not available.
	A5	Enter measured value damping	**1** 1 ... 60		Measured value damping causes averaging over the specified number of individual measured values. This is used for example, to stabilise the display if the measurement is unstable. There is no loss if "1" is entered.
	A6	Enter oxygen measuring range	**20 mg/l** 60 mg/l **200 % Sat** 600 % Sat **400 hPa** 1200 hPa		**Sensor OOS 4 / 4HD / 41 / 71**: Measuring range must be 0-20 mg/l (0-200 % Sat, 0-400 hPa). **Sensor OOS 3 / 3S / 3HD / 31:** Both measuring ranges possible.

5.2.2 Setup 2 (Temperature)

Coding		Field	Selection or range Factory setting (bold)	Display	Info
B		**Function group SETUP 2**			Initial display in function group SETUP 2.
	B1	Salinity	**0.0 %** 0.0 ... 4.0 %		
	B2	Enter correct process temperature	**current meas. value** –10 ... 60.0 °C		The display value can be edited. You can make an adjustment of max. ± 5 °C. Due to the high accuracy, adjustment is not usually necessary.
	B3	Displays temperature difference (offset)	**Current offset** 5.0 ... 5.0 C		The offset is the difference between measured and entered temperature.

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

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5.3 Current input

This function group offers two independent application solutions, provided that the current output of an external measured quantity, e.g. flow meter, is connected to the 4 … 20 mA input of Model 840 / 842. The following assignments then apply:

	Flow in main stream	Current signal in mA	**Current input signal in %**
Lower range limit current input	Lower setting value flow meter	**4**	**0**
Upper range limit current input	Upper setting value flow meter	**20**	**100**

5.3.1 Monitoring the flow rate in the main stream

This arrangement is highly practical when the sample stream flowing through the flow assembly (e.g. OOA 250) is totally independent of the flow rate in the main stream. This permits the signalling of an alarm state in the main stream (flow rate too low or totally stopped) and trigger a dosing switch-off, even if the measuring water stream is retained due to the installation configuration.

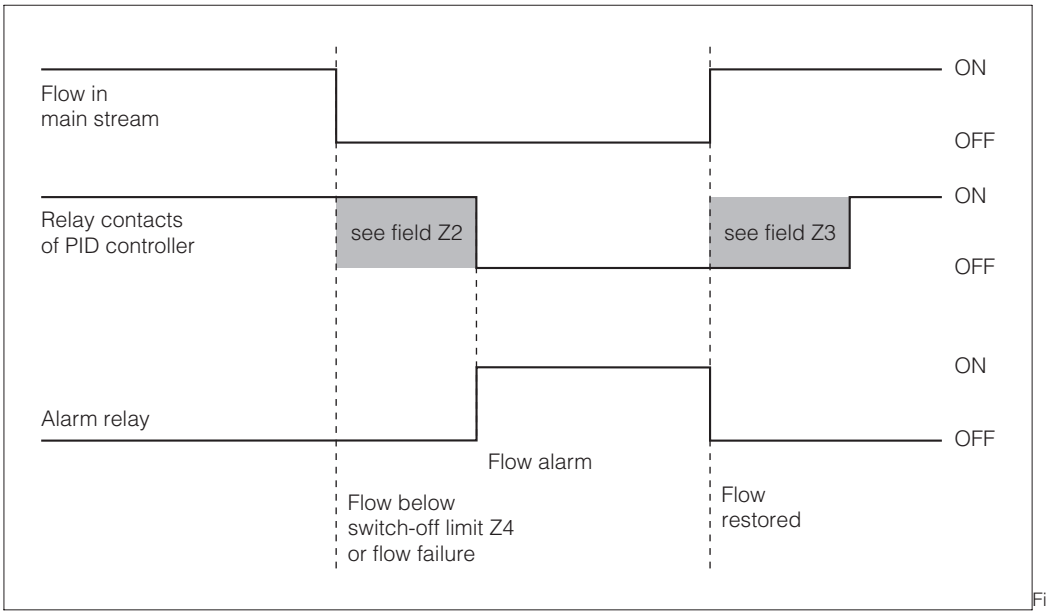

Fig. 5.4 Alarm signalling and dosing switch-off by the main stream

5.3.2 Feedforward control to PID controller

In processes with very short response times it may be practical to apply the flow rate to the controller, if the flow rate fluctuates, in order to optimise the control process.

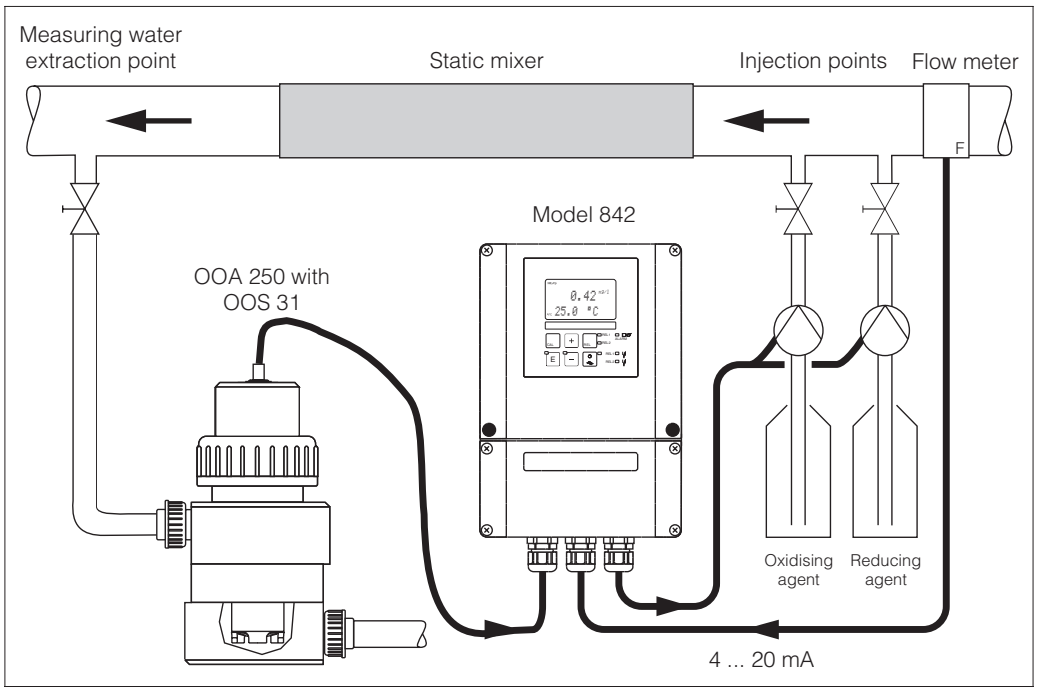

Fig. 5.6 Arrangement example for feedforward control of the flow rate in the main stream to the PID controller(s)

Feedforward control is a multiplying function as depicted in the below figure (factory setting as example):

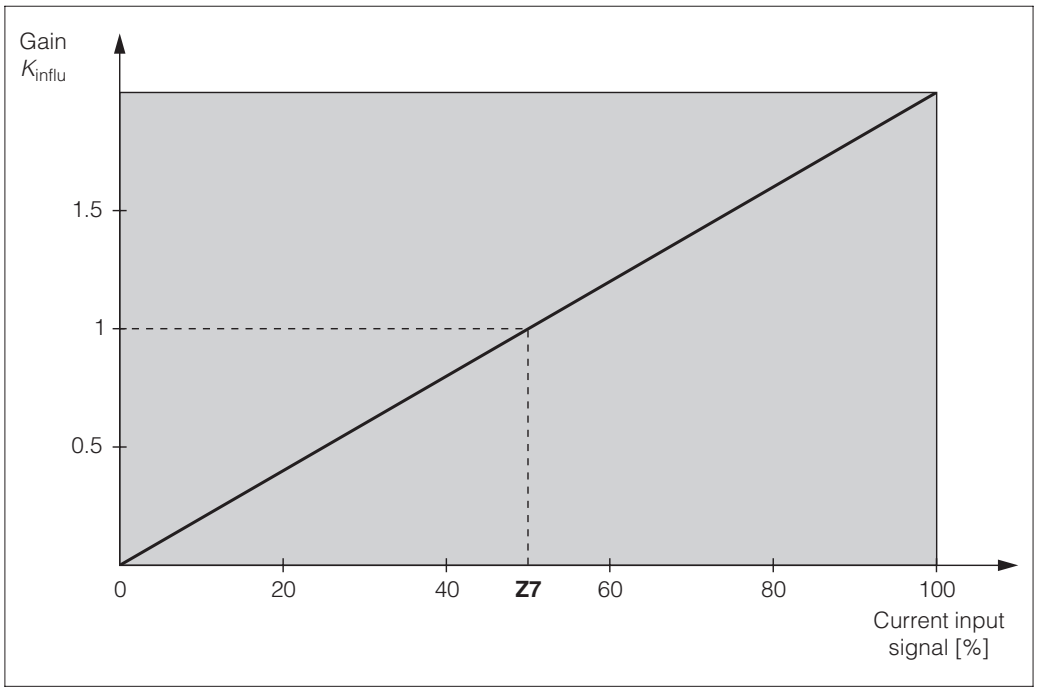

Fig. 5.5 Multiplying feedforward control

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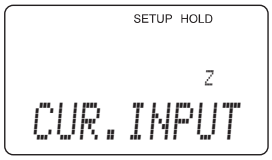
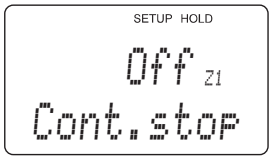
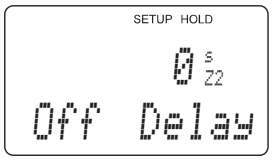
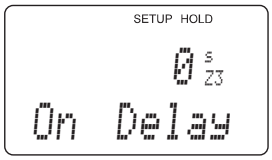
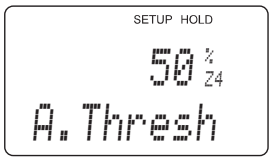
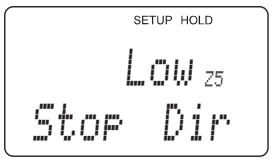
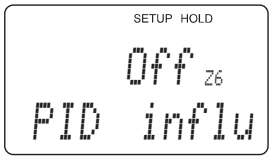
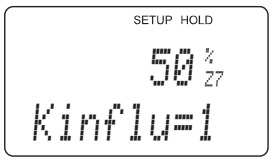
Coding	Field	Selection or range Factory setting (bold)	Display	Info
Z	**Function group CURRENT INPUT**			Initial display in function group CURRENT INPUT.
Z1	Select flow rate monitoring of main stream (with controller switch-off)	**Off** Input		Only switch on when flow meter is connected in main stream. When Z1 = Off, fields Z2 to Z5 do not exist.
Z2	Enter delay for controller switch-off by current input	**0 s** 0 ... 2000 s		Short-term flow rate undershots can be suppressed by delay and will not cause controller switch-off.
Z3	Enter delay for controller switch-on by current input	**0 s** 0 ... 2000 s		With oxygen monitoring, a delay up until reception of a representative measured value is preferred after a long flow rate failure.
Z4	Enter switch-off threshold for current input	**50%** 0 ... 100%		0 … 100% corresponds to 4 … 20 mA at current input. Note the measured value allocation to the current output of the flow meter.
Z5	Select orientation stop for current input	**Low** High		If the value entered in Z4 is exceeded low or high, the controller switches off.
Z6	Select feedforward control for PID controller	**Off** lin = linear		When Z6 = Off, Z7 does not exist. Basic = Feedforward control only affects the basic load (alternatively dosage in proportion to quantity, if common PID control is not possible, e.g. due to sensor defect)
Z7	Enter value for feedforward control at which modulation gain = 1	**50%** 0 ... 100%		When the value is set, the controller manipulated value with feedforward control on is identical to feedforward control off.

5.4 Current outputs

The function group CURRENT OUTPUT is used to configure the individual outputs. Either a linear (O3 (1)) or, in conjunction with the Plus package (DS or WS version) a user-defined current output characteristic can be entered (O3 (3)). Furthermore, a current output value can be simulated to check the current outputs (O3 (2)).

Note!

Switching with lin/sim/Tab resets the current output setting to the default setting.

Example of a user-defined current output table

Between two table value pairs, the distance Δ signal **per mA** must be greater than:

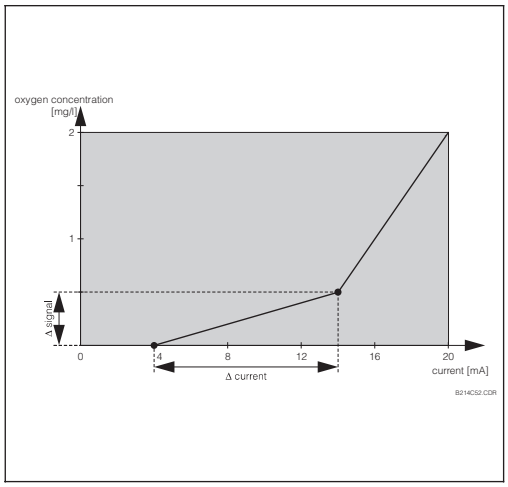


Fig. 5.7 User-defined current output characteristic

	Measuring range	Minimum distance per mA
Oxygen	0...20 mg/l	0.13 mg/l
	0...60 mg/l	0.38 mg/l
	0...200 %SAT	1.30 %SAT
	0...600 %SAT	3.80 %SAT
	0...400 hPa	2.50 hPa
	0...1200 hPa	7.50 hPa
Temperature	10...60 °C	0.45 °C

First enter the current output configuration you require in the following blank table. Ensure the required minimum distance by calculating the resulting signal distance **per mA**. Then enter the result in the instrument.

	Current output 1			**Current output 2**		
Value pair	**Oxygen [mg/l; % Sat; hPa]**	**Current [mA]**	**Distance per mA**	**Tempe-rature [°C; °F]**	**Current [mA]**	**Distance per mA**
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

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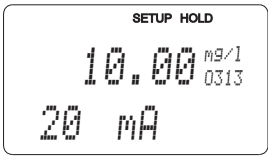
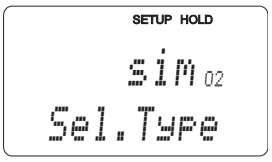
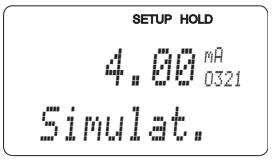
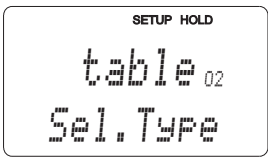
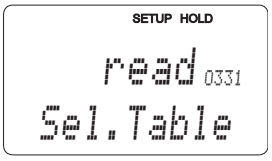
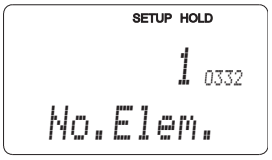
Coding	Field	Selection or range Factory setting (bold)	Display	Info
O	**Function group CURRENT OUTPUT**		SETUP HOLD 0 OUTPUT	Initial display in function group CURRENT OUTPUT.
O1	**Select current output**	**Out1** *Out2*	SETUP HOLD Out1 01 Sel.Out	Output 2 with appropriate version. You can select a separate characteristic for each output.
O2	**Select measured quantity for 2nd current output**	**°C** mg/l Contr	SETUP HOLD °C 02 Sel. Out2	Selection of Curr (= current output 2) in field R237 is only possible, if field O_2 = Contr is selected.
O3 (1)	**Enter or output linear characteristic**	**lin** = **linear** (1) sim = Simulation (2) *Tab = Table (3)*	SETUP HOLD lin 03 Sel.Type	The characteristic can have a positive or negative slope at the measured value output. At set value output (O2 = Contr), the increasing current corresponds to an increasing set value.
O311	Selection of current range	**4-20** 0–20	SETUP HOLD 4-20 0311 Sel.Range	
O312	0/4 mA value; enter corresponding O_2 or temperature value	**Version DX/DS:** **0.00 mg/l** 0.00 ... 20.00 mg/l **0.0 %SAT** 0.0 ... 200.0 %SAT **0 hPa** 0 ... 400 hPa **WX/WS with OOS 3 / 3S/ 3HD / 31:** **0.00 mg/l** 0.00 ... 60.00 mg/l **0.0 % Sat** 0.0 ... 600.0 % Sat **0 hPa** 0 ... 1200 hPa **WX/WS with OOS 71:** **0.000 mg/l** 0.000 ... 20.000 mg/l **0.0 % Sat** 0.0 ... 200.0 % Sat **0 hPa** 0 ... 400 hPa **0.0 C** -10.0 ... 60.0 C	SETUP HOLD 0.00 mg/l 0312 0/4 mA	Enter the O_2 or temperature value here of the min. current value (0/4 mA) at the transmitter output. Minimum amount between 0/4 mA and 20 mA value: see field O313.

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

Coding	Field	Selection or range Factory setting (bold)	Display	Info
O313	20 mA value; enter correspond-ing O_2 or temperature value	**Version DX/DS:** **10.00 mg/l** 0.00 ... 20.00 mg/l **100.0 %SAT** 0.0 ... 200.0 %SAT **200 hPa** 0 ... 400 hPa **WX/WS with OOS 3 / 3S / 3HD / 31:** **10.00 mg/l** 0.0 ... 60.0 mg/l **100.0 % Sat** 0.0 ... 600.0 % Sat **200 hPa** 0 ... 1200 hPa **WX/WS with OOS 71:** **10.000 mg/l** 0.000 ... 20.000 mg/l **100.0 % Sat** 0.0 ... 200.0 % Sat **200 hPa** 0 ... 400 hPa **40.0 C** -10.0 ... 60.0 C		Enter the O_2 or temperature value here of the max. current value (20 mA) at transmitter output. Minimum amount between 0/4 mA and 20 mA value must be: Oxygen: **Version DX/DS:** 0.2 mg/l / 2 %SAT / 4 hPa **WX/WS with OOS 3/3S/3HD/31** 0.6 mg/l / 6 %SAT / 12 hPa **WX/WS with OOS 71:** 0.2 mg/l / 2 %SAT / 4 hPa Temperature: **all versions:** 7 °C
O3 (2)	**Simulate current output**	lin = linear (1) **sim** = **Simulation** (2) *Tab = Table (3)*		The simulation is only exited by selecting O3(1) or O3(3).
O321	Enter simulation value	**current value** 0.00 ... 22.00 mA		The current value entered here is output through the current output.
O3 (3)	***Enter current output table***	lin = linear (1) sim = Simulation (2) ***Tab*** = ***Table*** *(3)*		*Values can be added or changed at a later time. The entered values are sorted automatically by ascending current value.*
O331	*Selection of table option*	***read*** *edit*		
O332	*Enter number of table value pairs*	**1** 1 ... 10		*Enter the number of x and y value pairs (measured value and associated current value).*

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

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Coding	Field	Selection or range Factory setting (bold)	Display	Info
O333	*Select table value pairs*	***1*** *1 ... Number of table value pairs* *asign*	SETUP HOLD 1 0333 Sel.Elem.	*The function chain O333 ... O335 is run through the appropriate number of times according to the value O332. “asign” appears as the last step. After confirmation the system jumps to O336.*
O334	*Enter x value*	***Version DX/DS:*** ***0.00 mg/l*** *0.00 ... 20.00 mg/l* ***0.0 %SAT*** *0.0 ... 200.0 %SAT* ***0 hPa*** *0 ... 400 hPa* ***WX/WS with OOS 3 / 3S / 3HD / 31*** ***0.00 mg/l*** *0.00 ... 60.00 mg/l* ***0.0 % Sat*** *0.0 ... 600 % Sat* ***0 hPa*** *0 ... 1200 hPa* ***WX/WS with OOS 71:*** ***0.000 mg/l*** *0.000 ... 20.000 mg/l* ***0.0 % Sat*** *0.0 ... 200.0 % Sat* ***0 hPa*** *0 ... 400 hPa* ***0.0 C*** *-10.0 ... 60.0 C*	SETUP HOLD 0.00 µS/cm 0334 Meas.val.	*x value = measured value set by user (O_2 value).*
O335	*Enter y value*	***0.00 mA*** *0.00 ... 20.00 mA*	SETUP HOLD 0.00 mA 0335 mA value	*y value = current value belonging to O334 set by user.*
O336	*Message if table status is OK*	***yes*** *no*	SETUP HOLD yes 0336 Status ok	*Back to O3.* *If status = “no”, set table correctly (all previous settings are kept) or back to measurement mode (table will be deleted).*

5.5 Monitoring functions

The monitoring functions are used to define various alarms and to set output contacts. Each individual error can be defined to be effective or not (at the contact or as an error current). An alarm condition can be defined to activate a cleaning function (F8).

5.5.1 Alarm

Coding	Field	Selection or range Factory setting (bold)	Display	Info
F	**Function group ALARM**		SETUP HOLD F ALARM	Alarm function settings.
F1	Selection of contact type	**Stead** = **steady contact** Fleet = fleeting contact	SETUP HOLD Stead F1 Cont.Type	The contact type selected here only applies to the alarm contact.
F2	Selection of time unit	**min** s	SETUP HOLD min F2 Time Unit	This field is not available for certain errors, see chap. 7.
F3	Enter alarm delay	**0 min (s)** 0 ... 2000 min (s)	SETUP HOLD 0 s F3 Err.Delay	You can use F2 to select whether the alarm delay in entered in s or min.
F4	Selection of error current	**22 mA** 2.4 mA	SETUP HOLD 22mA F4 Err.Curr	This selection must be made even if all errors are suppressed in F5. If “0-20 mA” was selected in O311, “2.4 mA” may not be used.
F5	Select error	**1** 1 ... 255	SETUP HOLD 1 F5 Sel.Error	All errors can be selected in which an alarm message should occur. The errors are selected via the error number. For individual error numbers please refer to the table in Chap. 7.4. All errors which are not edited stay at the default.
F6	Make alarm contact effective for selected errors	**yes** no	SETUP HOLD yes F6 Rel.Assg	If you choose “no”, all the other alarm settings lose their effect (e. g. alarm delay). The settings themselves are retained. This setting **only** applies to the error selected in F5. As of setting E080 **no!**

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Coding	Field	Selection or range Factory setting (bold)	Display	Info
F7	Set error current to be effective for selected error	**no** yes	SETUP HOLD no F7 Curr.Assg	The error current selected in F4 becomes effective or is suppressed in case of error. This setting **only** applies to the error selected in F5.
F8	Automatic start of cleaning function?	**no** yes	SETUP HOLD no F8 CleanTrig	This field is not available for certain errors, see chap. 7.
F9	Select next error or jump back to menu	**next** = **next error** <—-R	SETUP HOLD next F9 Select	With next to F5, with <—-R to F.

5.5.2 Check

The function group CHECK is only accessible for instruments equipped with the Plus packet.

This function group is used to select and configure the monitoring functions.

Note:

All the monitoring functions are off in the factory setting.

The Sensor Check System adapts to the current application conditions by adding and setting suitable functions.

Alarm threshold monitoring
For oxygen measurement **without** entry control (ventilation) sensor errors lead to a measured value error, but have no impact on the process medium (Examples: monitoring measurement in surface waters or in water-works). Sensor errors normally cause high or low readings that are implausible. This is detected and signalled by user-definable alarm thresholds.

Controller monitoring
For oxygen measurement **with** simultaneous entry control, sensor errors not only lead to incorrect measured vallues but also have a direct impact on the state of the process medium. Particulary in the case of oxygenation control in sewage treatement works, the risk exists due to the control loop that the ventilation does not switch on if the measured value is constantly too high. Through a too low oxgen supply, a considerable risk is created for the microbes and their cleaning performance. Also, a measured value which is permanently too low due to the uninterrupted operation of the ventilation units leads to increased operating costs. Such cases are recognised and signalled using freely settable monitoring times for the maximum permitted controller switch-on and switch-off periods.

Sensor activity monitoring
The process medium can also have an effect on the sensor leading to incorrect measured values. The collection of solid matter at the sensor or a strong coating on the sensor membrane can lead to a strongly-dealyed or completely passive measuring signal. Constant monitoring of the signal activity recognises and signals such passivation.

The SCS monitoring functions at a glance

	Functional description	Setting possibility	Alarm event	Application
Alarm threshold monitoring (P1 ... P4)	freely adjustable lower alarm threshold (AT) freely adjustable upper alarm threshold (AT)	off	–	Applications **with** or **without** oxygenisation control
		only lower AT	lower AT reached or dropped below	
		only upper AT	upper AT reached or exceeded	
		lower and upper AT	lower AT reached or dropped below or upper AT reached or exceeded	
Controller monitoring (CC: Controller Check, P5 ... P8)	Switch-on period monitoring Switch-off period monitoring	off	–	Applications **with** oxygenisation control
		on	Set maximum period for permanent switch-on or switch-off exceeded	
Sensor activity monitoring (AC: Alternation Check, P5 ... P8)	Monitoring for signal change	off	–	Applications **with** or **without** oxygenisation control
		on	Change within 1 hour < ±0.1 mg/l or ±1%SAT or ±2 hPa	

Troubleshooting
You can find further information on troubleshooting for recognised errors and process alarms in Chapters 7.3 and 7.4.

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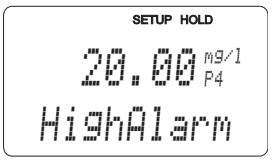
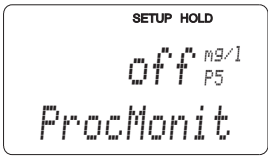
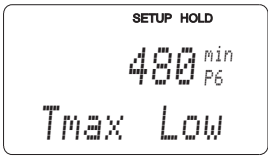
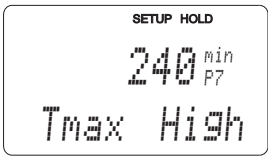
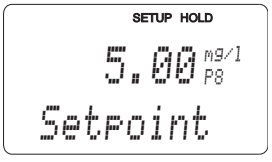
Coding	Field	Selection or range Factory setting (bold)	Display	Info
P	***Function group CHECK***		SETUP HOLD P CHECK	*Settings for sensor and process monitoring.*
P1	*Select alarm threshold monitoring*	***off*** *Low* *High* *Lo+Hi = low and high* *Low!* *High!* *LoHi!"*	SETUP HOLD off P1 A.Thresh	
P2	*Enter alarm delay*	***0 min (s)*** *0 ... 2000 min (s)*	SETUP HOLD 0 min P2 Err.Delay	*Depending on the unit selected in F2, the alarm delay is entered in s or min.* *Undershooting or exceeding according to Fields P3/P4 triggers an alarm only after this delay has elapsed.*
P3	*Enter lower alarm threshold*	***Version DX/DS:*** ***0.00 mg/l*** *000 ... 19.00 mg/l* ***0.0 %SAT*** *0.0 ... 190.0 %SAT* ***0 hPa*** *0 ... 380 hPa* ***WX/WS with OOS 3 / 3S / 3HD / 31:*** ***0.00 mg/l*** *0.00 ... 59.00 mg/l* ***0.0 % SAT*** *0.0 ... 590.0 % SAT* ***0 hPa*** *0 ... 1180 hPa* ***WX/WS with OOS 71*** ***0.000 mg/l*** *0.000 ... 19.000 mg/l* ***0.0 % SAT*** *0.0 ... 190.0 % SAT* ***0 hPa*** *0 ... 380 hPa*	SETUP HOLD 0.00 mg/l P3 LowAlarm	

Coding	Field	Selection or range Factory setting (bold)	Display	Info
P4	*Enter upper alarm threshold*	***Version DX/DS:*** ***20.00 mg/l*** *1.00 ... 20.00 mg/l* ***200.0 %SAT*** *0.0 ... 200.0 %Sat* ***400 hPa*** *20 ... 400 hPa* ***WX/WS with OOS 3 / 3S / 3HD / 31:*** ***20.00 mg/l*** *1.00 ... 60.00 mg/l* ***200.0 % Sat*** *10.0 ... 600.0 % Sat* ***400 hPa*** *20 ... 1200 hPa* ***WX/WS with OOS 71:*** ***20.000 mg/l*** *0.010 ... 20.000 mg(l* ***200.0 % Sat*** *0.5 ... 200.0 % Sat* ***400 hPa*** *20 ... 400 hPa*		
P5	*Select process monitoring*	***off*** *AC* *CC* *AC+CC* *AC!* *CC!* *ACCC!*		*AC = Sensor activity check* *CC = Controller check* *AC checking limits:* *±0.1 mg/l or ±1 %Sat* *or ±2 hPa in 1 h*
P6	*Enter maximum permitted time for lower limit violation*	***480 min*** *0 ... 2000 min*		*Only needs to be set when Controller Check (CC) in Field P5 is switched on.*
P7	*Enter maximum permitted time for upper limit violation*	***240 min*** *0 ... 2000 min*		*Only needs to be set when Controller Check (CC) in Field P5 is switched on.*
P8	*Enter limit value*	***Version DX/DS:*** ***5.00 mg/l*** *0.00 ... 20.00 mg/l* ***50.0 %SAT*** *0.0 ... 200.0 %Sat* ***200 hPa*** *0 ... 400 hPa* ***WX/WS with OOS 3 / 3S / 3HD / 31:*** ***5.00 mg/l*** *0.00 ... 60.00 mg/l* ***50,0 % Sat*** *0.0 ... 600.0 % Sat* ***200 hPa*** *0 ... 1200 hPa* ***WX/WS with OOS 71:*** ***1.000 mg/l*** *0.000 ... 20.000 mg(l* ***10,0 % Sat*** *0.0 ... 200.0 % Sat* ***20 hPa*** *0 ... 400 hPa*		*Limit value for checking acc. to Fields P6 and P7.* ***Note*** ***For external control by a process check system with an external setpoint, make sure the setting in Field P8 agrees.***

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5.6 Relay contact configuration

The function group RELAYS is only accessible for instruments equipped with the Plus packet.

The relay contacts described below can be selected and configured as required (max. four contacts depending on options installed):

- Limit contactor for measured oxygen value: R2 (1)
- Limit contactor for temperature: R2 (2)
- P(ID) controller: R2 (3)
- Timer for cleaning function: R2 (4)
- ChemoClean function: R2 (5)

5.6.1 Limit contactor for measured oxygen value and temperature

The transmitter has several possibilities for using a relay contact.
Switch-on and switch-off points and pickup and dropout delays can be defined for the limit contactor. Moreover, an alarm threshold can be set to issue an error message and to start a cleaning function.
These functions may be used for oxygen and temperature measurement.

Please refer to Fig. 5.5 for a graphic representation of the contact states of any relay or alarm contact.

When the measured value increases (max function), the relay contact is closed at time t_2 when the switch-on point has been exceeded (t_1) and the pickup delay ($t_2 - t_1$) has expired. When the alarm threshold (t_3) is reached and the alarm delay ($t_4 - t_3$) also has expired, the alarm contact is switched.
When the measured value decreases, the alarm contact is reset when the measured value drops below the alarm threshold (t_5). The relay contact is also reset (t_7, after the dropout delay $t_7 - t_6$).
When the pickup and dropout delays are set to 0 s, the switch-on and switch-off points are identical to the contact switching points. Settings analogous to the max function can also be made for a min function.

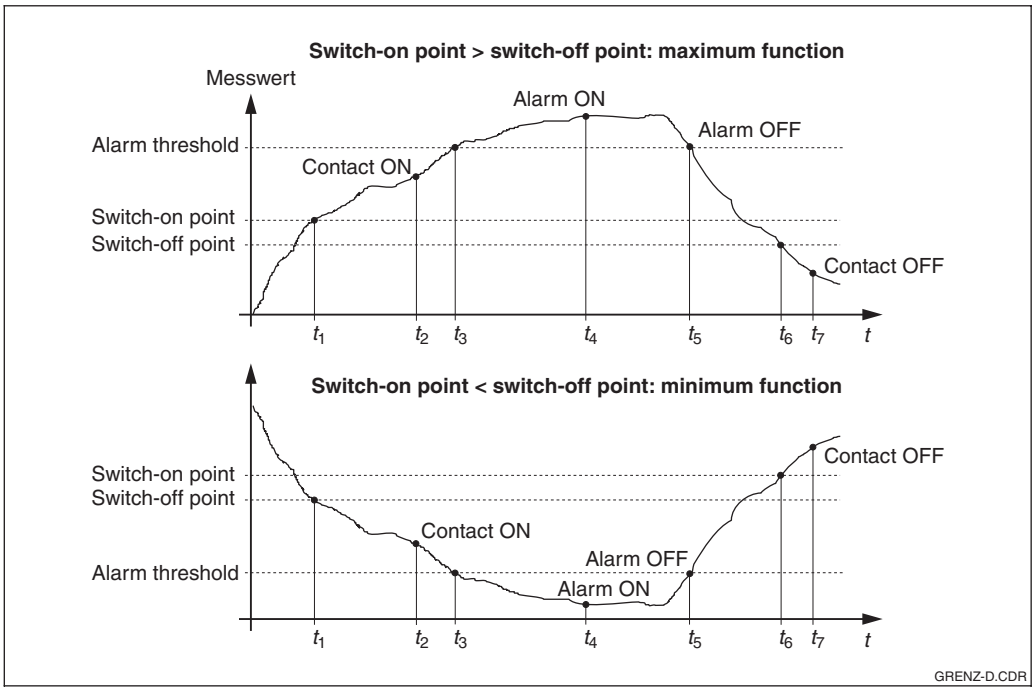

Fig. 5.8 Depiction of alarm functions

5.6.2 P(ID) controller

The transmitter supports the definition of various controller functions. On the basis of the PID controller, P, PI, PD and PID controllers can be implemented. To obtain the best control response, use the controller best suited to the application in question.

- **P controller:** Used for simple linear control purposes with small system deviations. Where major changes are to be controlled, overshooting may occur. A control offset is to be expected.
- **PI controller:** Used for processes where overshooting is to be avoided and permanent offsets are not allowed.
- **PD controller:** Used for processes that require quick response and where peaks are to be corrected.
- **PID controller:** Used for processes for which the type of control provided by a P, PI or PD controller is inadequate.

Adjustments of P(ID) controller

Three parameters can be adjusted in the case of a PID controller:

- the control gain K_p (P influence)
- the integral action time T_n (I influence)
- the derivative action time T_v (D influence)

Start-up

If there are no empirical values available for setting the control parameters, use values that provide the greatest possible stability of the control loop. To optimise the control loop further:

- Increase the control gain K_p until the control variable just starts to overswing.
- Decrease K_p again slightly and shorten the integral action time T_n to achieve the shortest possible correction time without overswing.
- In order to shorten the response time of the controller, you also have to set the derivative action time T_v.

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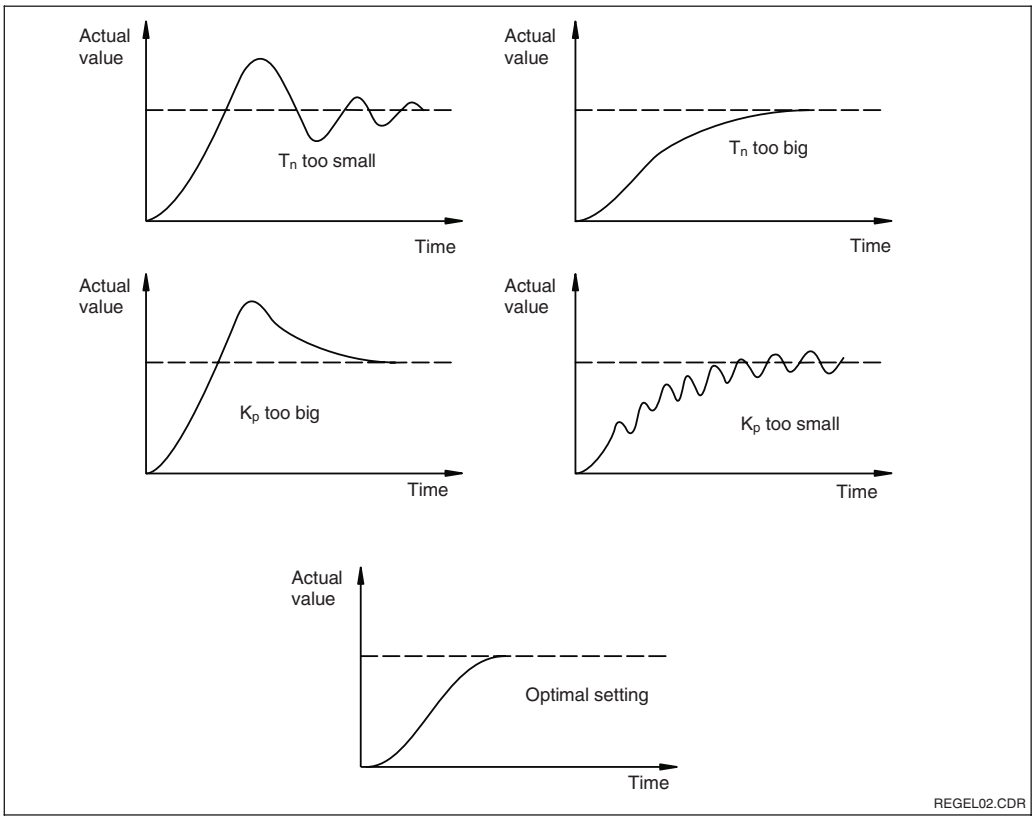

Fig. 5.10 Setting optimisation T_n and K_p

Actuating signal outputs (R237 ... R2310)

Each control contact outputs a clocked signal whose integral corresponds to the controller's manipulated variable. A distinction is made according to the type of signal clock:

- Pulse length modulation
  The greater the calculated control output, the longer the contact in question remains picked up. The period can be adjusted between 0.5 and 99 s. Pulse-length modulated outputs are used to control solenoid valves.
- Pulse frequency modulation
  The greater the calculated control output, the higher the switching frequency of the contact. The maximum switching frequency 1/T can be adjusted between 60 and 180 rpm. The ON period t_{ON} is constant. Pulse frequency outputs aid the control of directly driven magnetic dosing pumps.

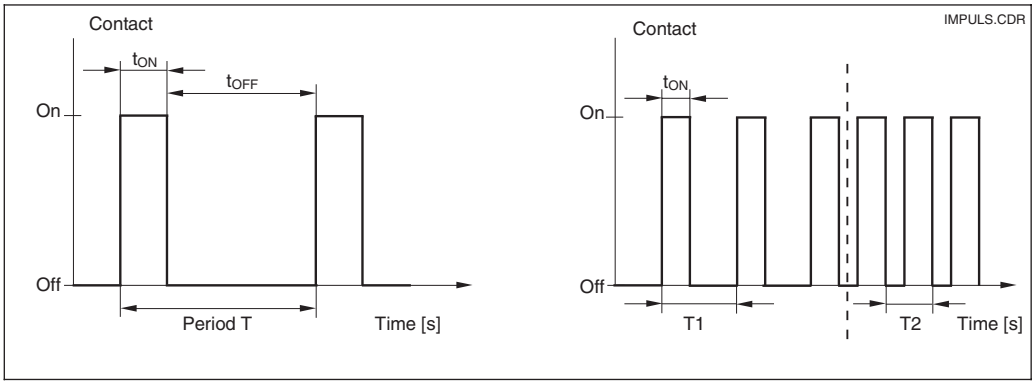

Fig. 5.9 Signal of a pulse length modulated (left) and a pulse-frequency modulated control contact (right)

Control characteristic for direct and inverted control action

Field R236 offers two control characteristics for selection which have the effects shown in the following diagram.

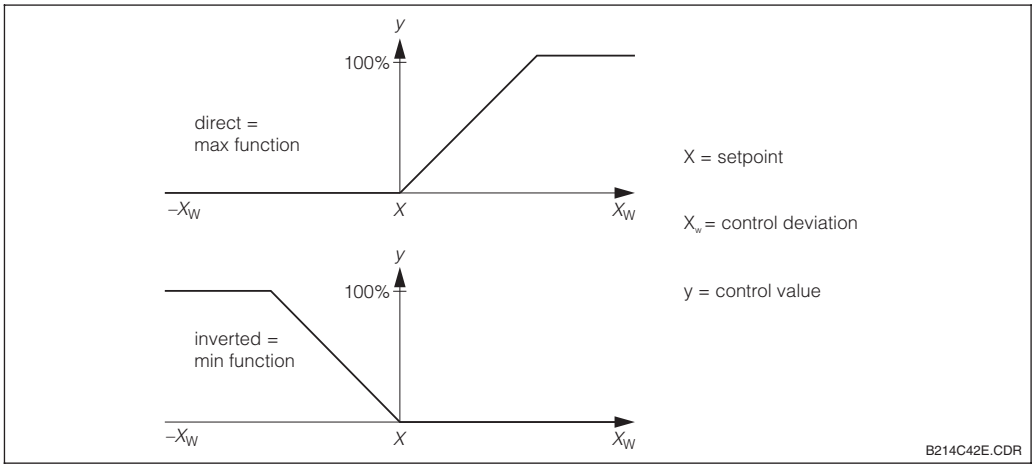

Fig. 5.11 Control characteristic of a proportional-action controller with direct and inverse control action

5.6.3 Timer for cleaning function

This function can be used to implement a simple cleaning routine. The user can specify a time interval after which cleaning is to start; i.e. only constant intervals can be defined. There are other cleaning functions in conjunction with the ChemoClean function (version with four contacts, see Chap. 5.5.4).

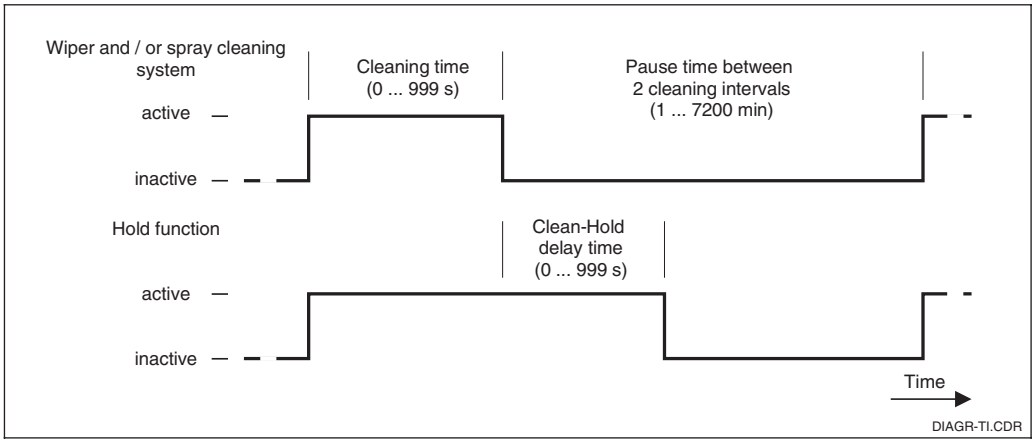

Fig. 5.12 Relationship between cleaning time, pause time and hold delay time

Note:

The timer and ChemoClean do not work independently of each other. Whilst one of the functions is active, the other cannot be started.

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5.6.4 ChemoClean function

Just like the timer function, ChemoClean can also be used to start a cleaning cycle. By comparison, the function scope is extended by an option for defining cleaning and rinsing intervals.
Thus, irregular cleaning with different repeat cycles is possible, and cleaning times with post-rinse times can be individually defined.

Note:

- Use relays 3 (water) and 4 (cleaner) for the ChemoClean function.
- Interruption of the cleaning process is always followed by a post-rinse time.
- When “Economy” is selected, cleaning is performed with water only.

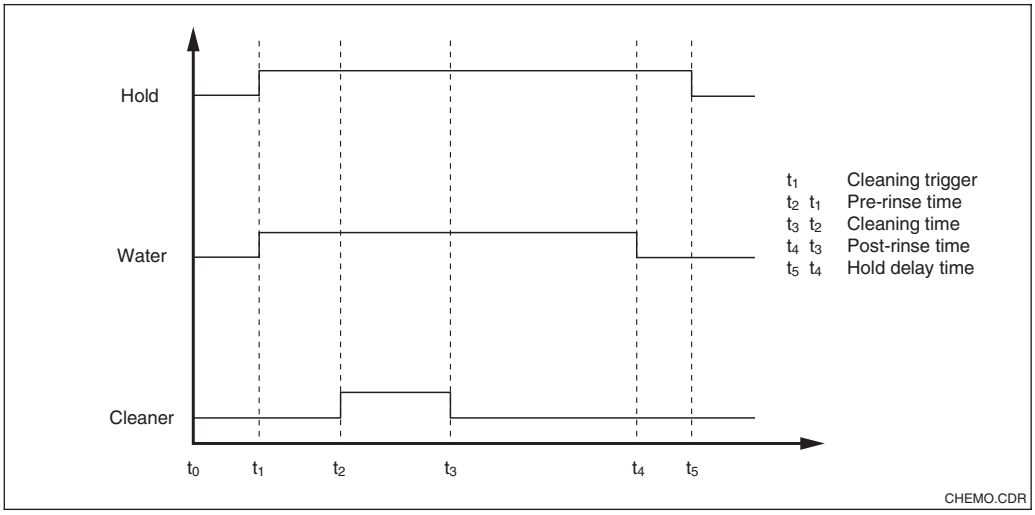

Fig. 5.13 Sequence of a cleaning cycle

Coding	Field	Selection or range Factory setting (bold)	Display	Info
R	**Function group RELAY**		SETUP HOLD R RELAY	Relay contacts can be selected and adjusted.
R1	**Selection of contact to be configured**	***Rel1*** *Rel2* *Rel3* *Rel4*	SETUP HOLD Rel1 R1 Sel.Relay	Rel3 (water) and Rel4 (cleaner) are only available on an instrument equipped accordingly. (If ChemoClean is selected as the cleaning type, Rel 4 is not available.)
R2 (1)	**Configure limit contactor for O2**	**LC PV** = **Limit contactor O_2** (1) GW °C = Limit contactor T (2) PID controller (3) Timer (4) *Clean = ChemoClean (5)*	SETUP HOLD LC PV R2 Sel. Type	PV= process value Confirmation with ENTER switches off a different, already switched-on relay function and its settings are reset to the default. Selecting Rel 4 in Field R1 means that Clean=ChemoClean cannot be selected

Coding	Field	Selection or range Factory setting (bold)	Display	Info
R211	Switch function of R2 (1) off or on	**Off** On	SETUP HOLD Off R231 Function	Settings made for the limit contactor are not deleted by switching the function off.
R212	Enter contact switch-on point	**Version DX/DS:** **20.00 mg/l** 0.00 ... 20.00 mg/l **200.0 %Sat** 0.0 ... 200.0 %Sat **400 hPa** 0...400 hPa **WX/WS with OOS 3 / 3S / 3HD / 31:** **20.00 mg/l** 0.00...60 mg/l **200.0 % Sat** 0.0...600.0 % Sat **400 hPa** 0...1200 hPa **WX/WS with OOS 71:** **20.000 mg/l** 0.000...20.000 mg/l **200.0 % Sat** 0.0...200.0 % Sat **400 hPa** 0...400 hPa	SETUP HOLD 20.00 mg/l R212 On value	Never set the switch-on point and the switch-off point to the same value. (The unit selected in A1 appears.)
R213	Enter contact switch-off point	**Version DX/DS:** **20.00 mg/l** 0.00 ... 20.00 mg/l **200.0 %Sat** 0.0 ... 200.0 %Sat **400 hPa** 0...400 hPa **WX/WS with OOS 3 / 3S / 3HD / 31:** **20.00 mg/l** 0.00...60 mg/l **200.0 % Sat** 0.0...600.0 % Sat **400 hPa** 0...1200 hPa **WX/WS with OOS 71:** **20.000 mg/l** 0.000...20.000 mg/l **200.0 % Sat** 0.0...200.0 % Sat **400 hPa** 0...400 hPa	SETUP HOLD 20.00 mg/l R213 Off value	Entering the switch-off point selects either a max contact (switch-off point < switch-on point) or a min contact (switch-off point > switch-on point) and implements a constantly required hysteresis (see Fig. 5.4).
R214	Enter pick-up delay	**0 s** 0 ... 2000 s	SETUP HOLD 0 s R214 On Delay	
R215	Enter dropout delay	**0 s** 0 ... 2000 s	SETUP HOLD 0 s R215 Off Delay	

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

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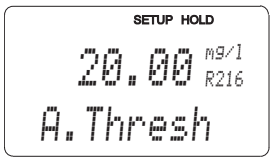
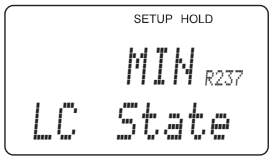
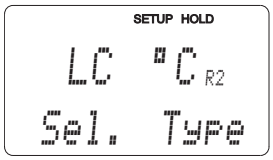
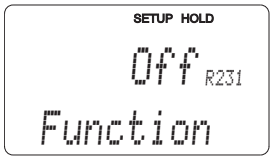
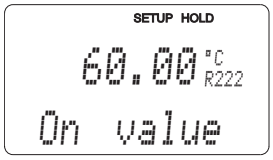
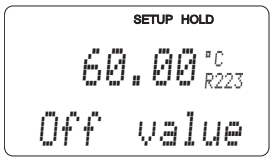
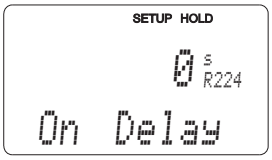
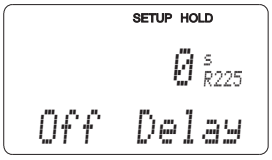
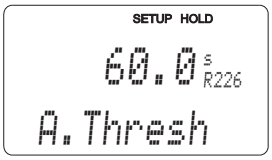
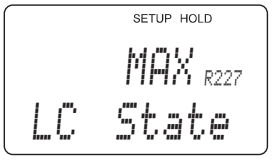
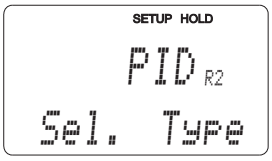
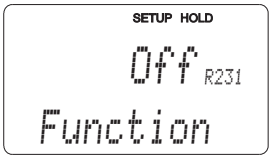
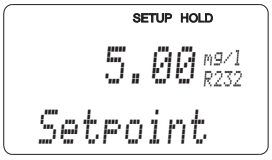
Coding	Field	Selection or range Factory setting (bold)	Display	Info
R216	Enter alarm threshold (as absolute value)	**Version DX/DS:** **20.00 mg/l** 0.00 ... 20.00 mg/l **200.0 %Sat** 0.0 ... 200.0 %Sat **400 hPa** 0...400 hPa **WX/WS with OOS 3 / 3S / 3HD / 31:** **20.00 mg/l** 0.00...60 mg/l **200.0 % Sat** 0.0...600.0 % Sat **400 hPa** 0...1200 hPa **WX/WS with OOS 71:** **20.000 mg/l** 0.000...20.000 mg/l **200.0 % Sat** 0.0...200.0 % Sat **400 hPa** 0...400 hPa		If the alarm threshold is exceeded or undershot, an alarm with error message and error current is triggered at the transmitter (note alarm delay). When defining the min contact, the alarm threshold must be set to a lower value than the switch-off point.
R217	Show status for limit contact	**MAX** MIN		Only display.
R2 (2)	**Configure limit contactor for temperature measurement**	LC PV = Limit contactor O_2 (1) **LC °C** = **Limit contactor T** (2) PID controller (3) Timer (4) *Clean = ChemoClean (5)*		Confirmation with ENTER switches off a different, already switched-on relay function and resets its settings to the default.
R221	Switch function of R2 (2) off or on	**Off** On		Settings made for the limit contactor are not deleted by switching the function off.
R222	Enter switch-on temperature	**60.0 °C** –10.0 ... 60.0 °C		Never set switch-on point and switch-off point to the same value!
R840	Enter switch-off temperature	**60.0 C** 10.0 ... 60.0 C		Entering the switch-off point selects either a max contact (switch-off point < switch-on point) or a min contact (switch-off point > switch-on point) and a constantly required hysteresis is implemented (see Fig. 5.4).

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

Coding	Field	Selection or range Factory setting (bold)	Display	Info
R224	Enter pick-up delay	**0 s** 0 ... 2000 s		
R225	Enter dropout delay	**0 s** 0 ... 2000 s		
R226	Enter alarm threshold	**60.0 C** -10.0 ... +60.0C		If the alarm threshold is exceeded or undershot, an alarm containing the fault message and the fault current is output from the measuring transmitter.
R227	Show status for limit contact	**MAX** MIN		Only display.
R2 (3)	**Configure P(ID) controller**	LC PV = Limit contactor O_2 (1) LC °C = Limit contactor T (2) **PID controller** (3) Timer (4) *Clean = ChemoClean (5)*		Confirmation with ENTER switches off a different, already switched-on relay function and its settings are reset to the default.
R231	Switch function of R2 (3) off or on	**Off** On Basic PID+B		On = PID control Basic = only basic load dosage PID+B = PID control with basic load dosage
R232	Enter reference value	**Version DX/DS:** **5.00 mg/l** 0.00 ... 20.00 mg/l **50.0 %Sat** 0.0 ... 200.0 %Sat **200 hPa** 0...400 hPa **WX/WS with OOS 3 / 3S / 3HD / 31:** **5.00 mg/l** 0.00...60 mg/l **50.0 % Sat** 0.0...600.0 % Sat **200 hPa** 0...1200 hPa **WX/WS with OOS 71:** **5.000 mg/l** 0.000...20.000 mg/l **50.0 % Sat** 0.0...200.0 % Sat **200 hPa** 0...400 hPa		The reference value is the value the controller should hold. Using this control process, this value is restored upwards or downwards when a deviation occurs.

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

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Coding	Field	Selection or range Factory setting (bold)	Display	Info
R233	Enter control gain K_p	**1.00** 0.01 ... 20.00	SETUP HOLD 1.00 R233 Kp	See Chap. 5.6.2.
R234	Enter integral action time T_n (0.0 = no I component)	**0.0 min** 0.0 ... 999.9 min	SETUP HOLD 0.0 min R234 Time Tn	See Chap. 5.5.2. Each hold sets the I component to zero. Hold can be deactivated in S2, but not for ChemoClean and timer!
R235	Enter derivative action time T_v (0.0 = no D component)	**0.0 min** 0.0 ... 999.9 min	SETUP HOLD 0.0 min R235 Time Tv	See Chap. 5.6.2.
R236	Selection of controller characteristic	**inv** = **inverted** dir = direct	SETUP HOLD inv R236 Direction	Setting may or may not be required depending on control deviation (up or down deviation, see Chap. 5.6.2).
R237	Select pulse length or pulse frequency	**len** = **Pulse length** freq = Pulse frequency curr = Current output2	SETUP HOLD len R237 Oper.Mode	Pulse length e.g. for solenoid valve, pulse frequency e.g. for megnetic dosing pump (see Chap. 5.5.2). Selection of current output 2 is only possible, if field O2 = Contr is selected.
R238	Enter pulse interval	**10.0 s** 0.5 ... 999.9	SETUP HOLD 10.0 s R238 PulsePer.	This field only appears if pulse length is selected in R237. When pulse frequency is selected, R238 is skipped and input continues in R239.
R239	Enter maximum pulse frequency of actuator	**120 min^{-1}** 60 ... 180 rpm	SETUP HOLD 120 1/min R239 Max.PFreq	This field only appears if pulse frequency is selected in R237. When pulse length is selected, R239 is skipped, and input continues in R2310.
R2310	Minimum ON time t_{ON}	**0.3 s** 0.1 ... 5.0 s	SETUP HOLD 0.3 s R2310 Min.PTime	This field only appears if pulse length is selected in R237.
R2311	Enter basic load	**0%** 0 ... 40%	SETUP HOLD 0 % R2411 BasicLoad	Selecting the basic load, you choose the desired dosage quantity. 100% basic load corresponds to: steadily on at R237 = on F_{max} at R237 = freq 20 mA at R237 = curr

The factory settings are printed in **bold**; function printed in *italics* are not available in the basic version.

Coding	Field	Selection or range Factory setting (bold)	Display	Info
R2 (4)	**Configure cleaning function (Timer)**	LC PV = Limit contactor O_2 (1) LC °C = Limit contactor T (2) PID controller (3) **Timer** (4) *Clean = ChemoClean (5)*	SETUP HOLD Timer R2 Sel. Type	Confirmation with ENTER switches off a different, already switched-on relay function and its settings are reset to the default. Cleaning only with *one* cleaning agent (unsually water); see Fig. 5.12.
R241	Switch function of R2 (4) off or on	**Off** On	SETUP HOLD Off R241 Function	Settings made for the timer are not deleted by switching the function off.
R242	Enter rinse / cleaning time	**30 s** 0 ... 999 s	SETUP HOLD 30 s R242 RinseTime	The hold and relay settings are activated for the period of time specified here.
R243	Enter pause time	**360 min** 1 ... 7200 min	SETUP HOLD 360 min R243 PauseTime	The pause time is the time between two cleaning cycles (see Chap. 5.6.3).
R244	Enter minimum pause time	**120 min** 1 ... 3600 min	SETUP HOLD 120 min R244 Min.Pause	The minimum pause time prevents constant cleaning if an external cleaning trigger occurs.
R2 (5)	**Configure cleaning with ChemoClean** (for version with four contacts and assignment of contacts 3 and 4)	LC PW = Limit contactor O_2 (1) LC °C = Limit contactor T (2) PID controller (3) Timer (4) ***Clean*** = ***ChemoClean*** *(5)*	SETUP HOLD Clean R2 Sel. Type	Confirmation with ENTER switches off a different, already switched-on relay function and resets its settings to the default. See Chap. 5.6.4. Contact 3 = Water Contact 4 = Cleaner
R251	Switch function of R2 (5) off or on	**Off** On	SETUP HOLD Off R251 Function	Settings made for ChemoClean are not deleted by switching the function off.
R252	Selection of start pulse	**int** = **internal (timer-contr.)** ext = external (digital input 2) i+ext = intern. + extern. i+stp = internal, suppressed by external	SETUP HOLD int. R252 CleanTrig	The “int” cycle is triggered by the end of the pause time (R257). There is no real-time clock. External suppression is required for irregular time intervals (e.g. weekend).

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

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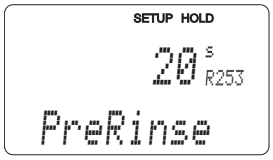
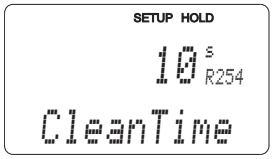
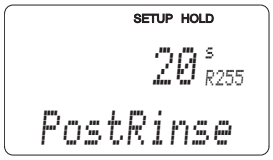
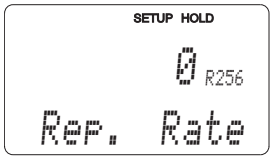
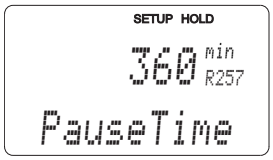
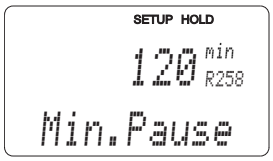
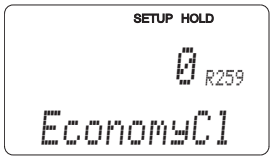
Coding	Field	Selection or range Factory setting (bold)	Display	Info
R842	Enter pre-rinse time	**20 s** 0 ... 999 s		Water is used for rinsing.
R254	Enter cleaning time	**10 s** 0 ... 999 s		Cleaning agent and water are used for cleaning.
R255	Enter post-rinse time	**20 s** 0 ... 999 s		Water is used for rinsing.
R256	Number of repeat cycles	**0** 0 ... 5		R842 ... R255 is repeated.
R257	Enter pause time	**360 min** 1 ... 7200 min		The pause time is the time between two cleaning cycles (see Chap. 5.6.3).
R258	Enter minimum pause time	**120 min** 1 ... R257 min		The minimum pause time prevents constant cleaning if cleaning trigger occurs.
R259	Enter number of cleaning cycles without cleaning agent (Economy function)	**0** 0 ... 9		After cleaning with agent, a maximum of only 9 cleaning operations can be performed with water until the next operation takes place with cleaning agent.

5.7 Service 1

Coding	Field	Selection or range Factory setting	Display	Info
S	**Function group SERVICE 1**		SETUP HOLD S SERVICE 1	
S1	Selection of language	**ENG** = **English** GER = German FRA = French ITA = Italian NEL = Dutch ESP = Spanish	SETUP HOLD ENG S1 Language	This field must be configured once during start-up. Afterwards, you can leave S1 and continue (see Chapter 5.1).
S2	Configure hold	**S+C** = **During configuration and calibration** CAL = During calibration Setup = During configuration none = No hold	SETUP HOLD S+C S2 Auto HOLD	S = Setup, C = Calibration.
S3	Manual hold	**Off** On	SETUP HOLD Off S3 Man. HOLD	The setting remains active even after a power failure.
S4	Enter hold dwell period	**10 s** 0 ... 999 s	SETUP HOLD 10 s S4 Cont.Time	
S5	Enter release code for software upgrade on Plus package	**0** 0 ... 9999	SETUP HOLD 0 S5 PlusCode	When the wrong code is entered, the system jumps back to the measurement menu. The number is edited with the PLUS or MINUS key and confirmed with the ENTER key. “1" is displayed in case of active code.
S6	Enter release code for software upgrade on ChemoClean	**0** 0 ... 9999	SETUP HOLD 0 S6 CleanCode	When the wrong code is entered, the system jumps back to the measurement menu. The number is edited with the PLUS or MINUS key and confirmed with the ENTER key. “1" is displayed in case of active code.
S7	Order code is displayed		SETUP HOLD order S7 DX0005	When you upgrade the device, the order code is updated automatically. The delivery state will be displayed.

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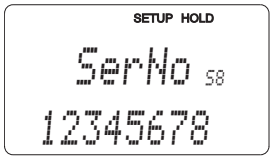
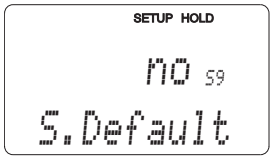
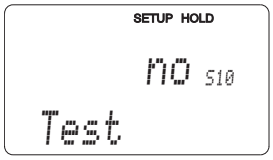
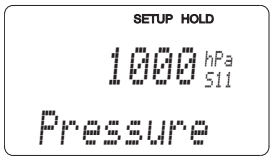
Coding	Field	Selection or range Factory setting	Display	Info
S8	Serial number is displayed			
S9	Device reset (Reset to basic settings) ⚠	**No** Sens = Sensor data Facty= Factory settings		Facty= All data (excluding fields A1 and S1) will be deleted and reset to the basic settings! Sens = Last calibration will be deleted and reset to the defaults.
S10	Perform instrument test	**no** displ = display test		
S11	Absolute air pressure will be displayed	**Current value**		Do not compare with the barometer. This shows the relative air pressure (related to sea level).

5.8 Service 2

Coding	Field	Selection or range Factory setting	Display	Info
E	**Function group SERVICE 2**		SETUP HOLD E SERVICE 2	
E1	**Select module**	**Contr Central module** (1) Trans = Transmitter (2) Haupt = Power unit(3) Rel = Relay (4) Sens = Sensor (5)	SETUP HOLD Contr E1 Select	Sens only with version WX or WS and sensor OOS 31 or OOS 71.
E111 E121 E131 E141 E151	Software version is displayed		SETUP HOLD xx.xx E111 SW-Vers.	This field cannot be edited. If E1 = Contr: Instrument software If E1 = Trans, Main, Rel: Module firmware
E112 E122 E132 E144 E152	Hardware version is displayed		SETUP HOLD xx.xx E112 HW-Vers.	This field cannot be edited.
E113 E123 E133 E143 E153	Serial number is displayed		SETUP HOLD SerNo E113 12345678	This field cannot be edited.
E114 E124 E134 E144 E154	Module name is displayed		SETUP HOLD LSG E114 Modul-ID	This field cannot be edited.

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5.9 Interfaces

Coding		Field	Selection or range Factory setting	Display	Info
I		**Function group INTERFACE**		SETUP HOLD I INTERFACE	See additional Operating Instructions 208e00 (HART®) 209e00 (PROFIBUS®)
	I1	Enter address	Address HART: **0** ... 15 or PROFIBUS: 1 ... **126**	SETUP HOLD 126 I1 Address	Only for communication.
	I2	Tag description		SETUP HOLD Tag I2 @@@@@@@@	Only for communication.

The factory settings are printed in **bold** ; function printed in *italics* are not available in the basic version.

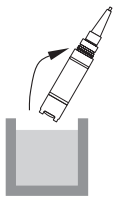
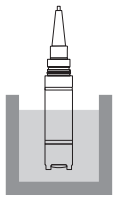
5.10 Calibration

This function group is used to calibrate the transmitter. The sensor is calibrated in air or in the medium.

Note:

- If the calibration procedure is aborted by pressing the PLUS and MINUS keys at the same time (return to C113 or C124) or if the calibration is faulty, then the previous calibration data are reinstated. A calibration error is indicated by the “ERR” message and flashing of the electrode symbol on the display. Repeat calibration!
- After calibration, the system returns to Measuring mode. During the hold delay time (Field S4), the Hold symbol appears in the display.

For access to the CALIBRATION menu, please enter Code 22.

Coding	Field	Selection or range Factory setting (bold)	Display	Info
C	**Function group CALIBRATION**		CAL HOLD C CALIBRAT	
C1 (1)	**Calibration to air**	**Air** H_2O Ref	CAL HOLD Air C1 Cal.Mode	Calibration in air is only possible if air temperature is ≥ –5 °C.
Remove sensor from medium				
C111	Start calibration	**Last sensor slope** Counter in second row counts down: 600 s → 0 s	CAL HOLD 100 % C111 600	The sensor slope is checked for 10 s after 530 s (permitted range 75 % ... 140 %, outside range: error 32, calibration is aborted). The stability of the signal is checked during the last 60 s of the calibration (< 1 %), if greater: error 44 and calibration is aborted.
C112	Calibration status is displayed	o.k. E xxx	CAL READY HOLD o.k. C112 Status	
Immerse sensor in medium, if C112=OK.				

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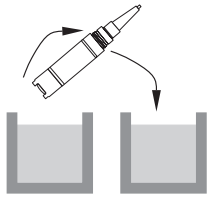
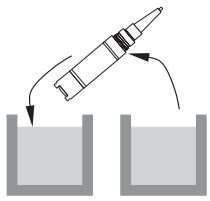
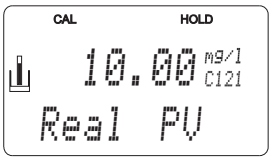
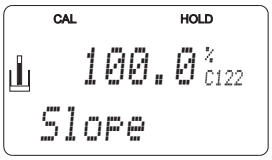
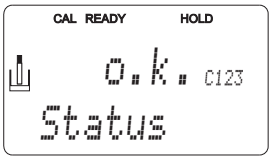
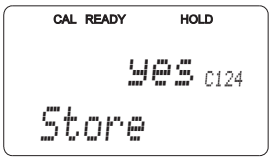
Coding	Field	Selection or range Factory setting (bold)	Display	Info
C113	Save calibration result?	**yes** no new	CAL READY HOLD yes C113 Store	If C112 = E xxx, then only no or **new.** If new, return to C. If yes/no, return to "Measurement".
C1 (2)	**Calibration in air-saturated water**	Air **H_2O** Ref	CAL HOLD H2O C1 Calibrat	
Remove sensor from medium and immerse in air-saturated water				
C121	Start calibration	**Last sensor slope** Counter in second row counts down 600 s —-> 0 s.	CAL HOLD 10.00 mg/l C121 Real PV	The sensor slope is checked for 10 s after 530 s (permitted range 75 % ... 140 %, outside range: error 32, calibration is aborted). The stability of the signal is checked during the last 60 s of the calibration (< 1 %), if greater: error 44 and calibration is aborted.
C122	Calibration status is displayed	o.k. E xxx	CAL READY HOLD o.k. C112 Status	
Remove sensor from air-saturated water and reimmerse in medium, if C122=o.k.				
C123	Save calibration result ?	**yes** no new	CAL READY HOLD yes C113 Store	If C122 = E xxx, then only no or **new**. If new, jump to C. If yes/no, jump to "Measurement".
C1 (3)	**Single-point calibration in medium**	Air H_2O **Ref**	CAL HOLD Ref C1 Cal.Mode	The calibration value must be determined using an external method, e. g.: - Oxygen handheld measuring device - Winkler titration

The factory settings are printed in **bold**; functions printed in *italics* are not available in the basic version.

Coding	Field	Selection or range Factory setting (bold)	Display	Info
C131	Enter calibration value	**Current value**		Minimum value is 0.2 mg/l. During measurement and calibration value entry, the value indicated should remain stable.
C132	Slope is displayed	**100.0 %** 75.0 ... 140.0 %		
C133	Calibration status is displayed	o.k. E xxx		
C134	Save calibration result?	**yes** no new		If C133 = E xxx, then only no or **new.** If new, return to C. If yes/no, return to “Measurement”.

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6 Interfaces

For instruments with a communication interface, please refer to the separate Operating Instructions BA 208e00 (HART®) or BA 209e00 (PROFIBUS®).

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7 Maintenance and troubleshooting

Maintenance:

- Maintenance means that all measures which will guarantee the safety of operation and reliability of the entire measuring system are taken in due time.

Maintenance of Model 840 / 842 includes:
- Calibration (see chapter 5.10)
- Cleaning of assembly and sensor
- Checking of cables and connections

Troubleshooting:

Determination and elimination of the cause of the problem in the case of an operating fault. Troubleshooting refers to measures that can be performed without intervention in the instrument (for instrument defects, see chapter 8, Corrective maintenance).

Troubleshooting of the Model 840/842 and the measuring system is performed with the aid of the troubleshooting table in chapter 7.1.

Warning:

Please be aware of effects work performed on the instrument might have on the process control system or the process itself.

Warning:

When removing the sensor during maintenance or calibration, please consider potential hazards due to pressure, high temperatures and contamination.

7.1 Troubleshooting instructions

Problem	Possible cause	Remedy	Equipment needed, spare parts
Instrument cannot be operated, value 9999	– Operation locked	Press CAL and MINUS key simultaneously	See Chapter 4.3
	– Incorrect sensor	Check sensor type	OOS 4 / 41 for Model 840/842-DX/DS OOS 3 / 31 / 71 for Model 840/842-WX/WS
	– Sensor defective	- Test with new sensor, - Instrument test with sensor diagram, - Sensor current test	Sensor type acc. to instrument version For sensor simulation, s. Chap. 8.8.1 For current measurement, s. Chap. 8.3
Value indicated 0.0	– Sensor extension line interrupted	Check junction boxes and line	For simulation, see Chapter 8.8.1
	– Incorrect sensor connection	Check connection	Connection, see Chapter 3.4
	– Instrument input defective	Replace module MKO1 (DX/DS) Replace module MKO5 (WX/WS)S	ee spare parts list, Chapter 8.4.4 / 8.5.4
No or creeping display change	– Sensor soiled	Clean sensor membrane	See instructions for OOS xx. Heavily soiled media: use spray cleaning.
	– Sensor installed in dead zone	Check installation conditions, move sensor to area with optimal flow conditions	

Problem	Possible cause	Remedy	Equipment needed, spare parts
Value indicated too small / Sensor can probably not be calibrated	– Membrane soiled	Clean sensor membrane	See instructions for OOS xx. Heavily soiled media: use spray cleaning.
	– Incorrect temperature measurement	Check temperature value	Ref. measurement / thermometer
	– Incorrect altitude setting	Check altitude value	
	– Incorrect air pressure measurement	Check pressure value in field S11. Sea level: approx. 1013 hPa 500 m above sea level: approx. 950 hPa	Only with version WX/WS Caution: display value = absolute atmospheric pressure.
	– Electrolyte used up or soild	Replace electrolyte	See Instructions for OOSxx
	– Flow rate too low	Check installation conditions, move sensor to area with optimal flow conditions	
Value indicated too small / Sensor cannot be calibrated	– Sensor type recognition (OOS 31) unsuccessful	Calibrate sensor to air	See description in Chap. 8.9
	– Polarisation incomplete	After sensor commissioning (also after interruption to operation) wait for the polarisation time	Polarisation is complete when the measured value is stable, max. approx. 60 minutes
	– Incorrect altitude setting	Check altitude value	
	– Incorrect air pressure measurement	Check pressure value in field S11. Sea level: approx. 1013 hPa 500 m above sea level: approx. 950 hPa	Only with version WX/WS Caution: display value = absolute atmospheric pressure.
Value indicated too high/ Sensor can possibly not be calibrated	– Electrolyte soiled	Replace electrolyte	See instructions for OOS xx
	– Air cushion under membrane	Install new membrane cap	For procedure and spare parts ordering see instructions for OOS xx
	– Anode coating worn off (silver-coloured)	Sensor regeneration at factory	Normal anode colour is brownish
	– “S” membrane on standard sensor	Install correct membrane cap	“S” membrane cap recognisable through impressed “S” (OOS 3S) or through white colour of the membrane cap (OOS 31). With OOS 31 self-recognition of S version
	– Sensor type recognition (OOS 31) unsuccessful	Calibrate sensor to air	See description in Chap. 8.9
Fixed, incorrect measured value	– Impermissible instrument operating state (no response to key actuation)	Switch instrument off and back on	EMC problem: check line routing if problem persists, check for possible sources of interference
Incorrect temperature value	– Incorrect sensor connection	Verify connections using connection diagram	Connection diagram: see Chap. 3.4 and 3.5
	– Defective measuring cable	Check cable	Ohmmeter or on-site simulation
	– Temp. probe in sensor defective	Measure resistance value in sensor (red and brown sensor lines) only possible with OOS 4 / OOS 41	Ohmmeter / values see Chap. 8.8.1. With faults, replace sensor
Measured value variations	– Faults on measuring cable	Connect cable screening according to circuit diagram	See Chap. 3.4 and 3.5
	– Faults on signal outputline	Check line laying, possibly lay line separately	Separate signal output, measuring input and power supply lines
	– irregular flow / turbulences / large air bubbles	Select a better installation site or calm turbulences. Possibly use large measured value loss factor	Measured value loss see field A4
Controller or time cannot be activated	– No relay module available	Install module LSR1-2 or LSR1-4	see Chap. 8.4 and 8.5

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Problem	Possible cause	Remedy	Equipment needed, spare parts
Controller / limit contact not working	– Controller switched-off	Activate controller	See Chap. 5.5 or Fields R2xx
	– Controller in “Manual / Off” mode”	Choose “Auto” or “Manual/On” mode	Keyboard, REL key
	– Pickup delay setting too long	Disable or shorten pickup delay	See fields R2xx
	– “Hold” function active	“Autom. hold” during calibration, “hold” input activated; “hold” via keyboard active	See fields S2 to S4
Controller / limit contact works continuously	– Controller in “Manual / On” mode	Set controller to “Manual/Off” or “Auto”	Keyboard, REL and AUTO keys
	– Dropout delay setting too long	Shorten dropout delay	See fields R2xx
	– Control loop interruption	Check measured value, current output or relay contacts, actuators, chemical supply	
No O_2 current output signal	– Line open or short-circuited	Disconnect line and measure directly on instrument	mA meter 0–20 mA DC
Fixed current output signal	– Current simulation active	Switch off simulation	See Field O2
	– Processor system out of sync	Switch instrument off and back on	EMC problem: check installation if problem persists
Incorrect current output signal	– Incorrect current assignment	Check current assignment: 0–20 mA or 4–20 mA?	Field O211
	– Total load in current loop excessive (> 500 Ω)	Disconnect output and measure directly on instrument	mA meter for 0–20 mA DC
Current output table not accepted	– Value interval too small	Use sensible intervals	
No temperature output signal	– Instrument has only one current output	Check variant using nameplate, if necessary replace module LSCH-x1	Module LSCH-x2, See Chap. 8.4.4 and 8.5.4
Chemoclean function not available	– No relay module (LSR1-x) installed or only LSR1-2 available	Install module LSR1-4. Chemoclean only enabled with release code, which is supplied by the manufacturerwith Chemoclean upgrade.	Module LSR1-4, See Chap. 8.4.4 und 8.5.4
	– Additional function not enabled	Version check : see nameplate	
No Plus package functions available	– Plus package not enabled (Enabled with a code number which is dependent on the serial-number and which is provided by the manufacturer when Plus package is ordered)	– With Plus package upgrade: code received from the manufacturer => enter	Detailed description See Chap. 8.5.5
		– Following replacement of defective LSCH/LSCP module: First enter instrument serial number (see nameplate) manual-ly, then enter code number	

7.2 Troubleshooting using the error messages

Display and select the error messages using the MINUS key.

Error no.	Display	Measures	Contact		Error current		Automatic cleaning trigger	
			Fact.	User	Fact.	User	Fact.	User
E001	EEPROM memory error	Switch instrument off and back on, return instrument to your local sales agency for repair or replace instrument. Load software compatible with hardware. Load instrument software specific to parameter measured.	yes		no		—	—*
E002	Instrument not calibrated, calibration data invalid, no user data available or user data invalid (EEPROM error) Instrument software not suitable for hardware (cental module)		yes		no		—	—*
E003	Download error	Invalid configuration. Repeat download, check optoscope.	yes		no		–	–*
E004	Device software version incompatibel with hardware version of module	Load software compatible with hardware. Load instrument software specific to parameter measured.	yes		no		–	–*
E007	Transmitter fault Instrument software not suitable for hardware (Transmitter)		yes		no		—	—*
E008	Sensor error		yes		no		—	—
E010	Temperature sensor defective	Send in sensor for repair	yes		no		—	—
E017	Sensor electrode section defective	Send in sensor for repair	yes		no		—	—
E018	Sensor membrane damaged (not sealed) or membrane cap not completely screwed on	Replace membrane cap. Completely screw on membrane cap.	yes		no		—	—
E020	Signal range of sensor undershot	Check medium and sensor	yes		no		—	—
E020	Signal range of sensor exceeded	Check medium and sensor	yes		no		—	—
E032	During calibration signal outside permitted slope range 75...140 %	Check sensor and recalibrate.	yes		no		—	—*
E044	During calibration, sensor unstable	Check sensor and calibrate.	yes		no		no	
E057	Measuring range of main parameter exceeded	Check measurement, control and connections.	yes		no		no	
E059	Below temperature value measuring range		yes		no		no	
E061	Temperature value measuring range exceeded		yes		no		no	
E063	Current output 1: range undershot	Check configuration.	yes		no		no	
E064	Current output 1: range exceeded	Check measured value and current assignment.	yes		no		no	

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Error no.	Display	Measures	Contact		Error current		Automatic cleaning trigger	
			Fact.	User	Fact.	User	Fact.	User
E065	Current output 2: range exceeded	Check measured value and current assignment.	yes		no		no	
E066	Current output 2: range exceeded		yes		no		no	
E067	Alarm threshold limit contactor 1 exceeded	Limit or reference value exceeded or undershot.	yes		no		no	
E068	Alarm threshold limit contactor 2 exceeded		yes		no		no	
E069	Alarm threshold limit contactor 3 exceeded		yes		no		no	
E070	Alarm threshold limit contactor 4 exceeded		yes		no		no	
E080	Distance between 0/4 mA and 20 mA values at output 1 too short	Adjust spreading for current output 1.	no		no		—	—*
E081	Distance between 0/4 mA and 20 mA values at output 2 too short	Adjust spreading for current output 2.	no		no		—	—*
E082	Air pressure range undershot (<500 hPa)	Measurement only possible when uncompensated or with location height data.	yes		no		no	
E083	Air pressure range exceeded (>1100 hPa)		yes		no		no	
E100	Current simulation active		no		no		—	—*
E101	Service function yes	Switch off service function or switch instrument off and back on.	no		no		—	—*
E102	Manual mode active		no		no		—	—*
E106	Download yes	Wait for download to end.	no		no		—	—*
E116	Download error	Repeat download.	no		no		—	—*
E152	Measuring signal of main parameter delayed or frozen (AC function / Alternation check)	Inspect sensor and connection line, repair or replace.	yes		no		no	

*When this error is present, the cleaning function cannot be started.
(Field F8 does not exist for this error.)

Error no.	Display	Measures	Contact		Error current		Automatic cleaning trigger	
			Fact.	User	Fact.	User	Fact.	User
E154	Lower alarm threshold undershot for longer than alarm delay (AC function / alarm threshold monitoring)	If necessary make manual comparison measurement. Service sensor and recalibrate.	yes		no		no	
E155	Upper alarm threshold exceeded for longer than alarm delay (AC function / alarm threshold monitoring)		yes		no		no	
E156	Actual value undershoots monitoring value for longer than the set permissible maximum period (CC function / Controller Check)		yes		no		no	
E157	Actual value exceeds monitoring value for longer than the set permissible maximum period (CC function / Controller Check)		yes		no		no	
E162	Dosage stop	Check settings in CURRENT INPUT or CHECK function group.	yes		no		no	
E171	Flow in main stream loo low or zero	Restore flow.	yes		no		no	
E172	Switch-off limit for current iput exceeded	Check process variables at sending measuring instrument.	yes		no		no	
E173	Current input < 4 mA	Check process variables at sending measuring instrument. Change range assignment if required.	yes		no		no	
E174	Current input > 20 mA	Check process variables at sending measuring instrument. Change range assignment if required.	yes		no		no	

*When this error is present, the cleaning function cannot be started.
(Field F8 does not exist for this error.)

8 Diagnostics and corrective maintenance

Diagnosis

Diagnosis refers to the identification of instrument malfunctions and defects.

Corrective maintenance:

- replacement of parts diagnosed to be defective;
- testing of instrument and measuring system function;
- restoration of complete functionality.

Diagnosis based on the error table below and depending on difficulty and measuring equipment at hand is to be performed by:

- trained operator personnel
- operator's electricians
- company responsible for system installation/operation
- your Service Organization.

Please refer to the tables in chap. 8.2 and 8.3 for identification of spare parts required.

Warning:

- Disconnect the instrument from the power source before opening it up. Work with live lines may only be performed by trained electricians.
- Switched contacts may be supplied from external circuits. These circuits must also be de-energised before work on the terminals is performed.

- Caution: ESD! Electronic components are sensitive to electrostatic discharges. Personal protective measures, such as discharge via PE or permanent grounding using a wrist strap, are to be taken.
- For your own safety, use only original spare parts. Original parts will guarantee functionality, accuracy and reliability after repairs.

8.1 Diagnosis

The table below will help you diagnose problems and specifies the spare parts required. You can find information concerning the exact spare part designations and the installation of these parts in Chap. 8.4.3 and 8.5.3.

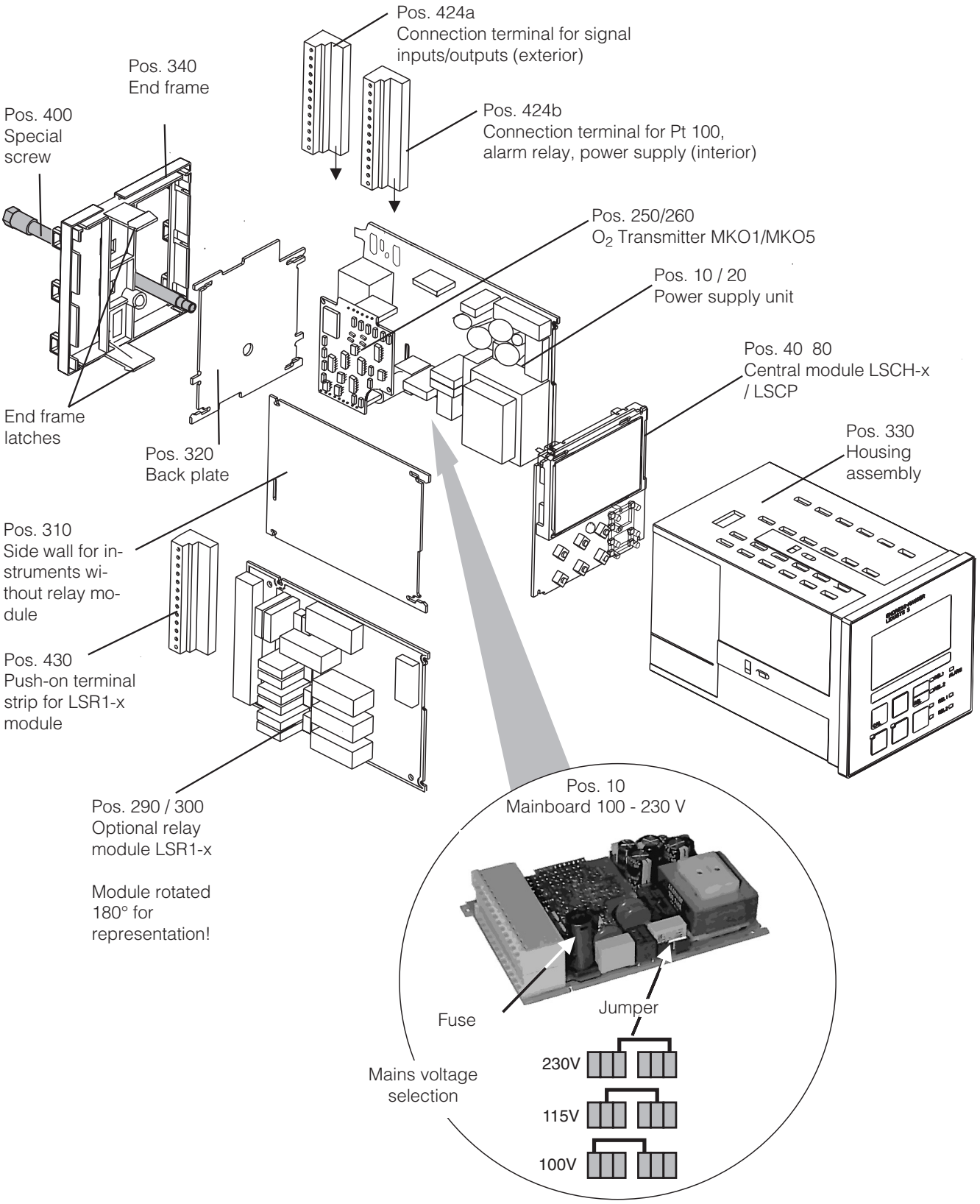
Problem	Possible cause	Tests and / or remedial measures	Equipment, spare parts, personnel
Display dark, no LEDs active	– No mains voltage	Test whether mains voltage is available	Electrician / e.g. Multimeter
	– Wrong supply voltage / voltage too low	Compare mains voltage and rating on nameplate	Operator (utility company specification or multimeter)
	– Connection fault	Terminal not tightened; insulation clamped in terminal; wrong terminal used	Electrician
	– Instrument fuse defective	Replace fuse, Also compare mains voltage and nameplate rating	Electrician / suitable fuse; See Figs. Chap. 8.2.1 and 8.3.1
	– Power unit defective	Replace power unit, you must check variants	On-site diagnosis by your Service (LSGx module required for test)
	– Central module defective	Replace central module, you must check variants	On-site diagnosis by your Service (LSCxx module required for test)
	– Model 842: ribbon cable Pos. 310 loose or defective	Check ribbon cable, replace if necessary	See spare parts for Model 842

Problem	Possible cause	Tests and / or remedial measures	Equipment, spare parts, personnel
Display dark, but LED(s) active	Central module defective (Module: LSCH/LSCP)	Replace central module Model 840	On-site diagnosis by your Service (LSCxx module required)
Display on, but – no change in display and / or – instrument cannot be operated	– Instrument or module in instrument incorrectly installed	Model 840: Reinstall module Model 842: Reinstall display module	Carry out using installation - diagrams, Chap. 8.2.1 and 8.3.1
	– Impermissible operating system state	Switch instrument off and back on	Possible EMC problem: if problem persists, call your Service to have installation checked
– Missing pixels in display	– Conductive rubber soiled	Replace LSCxx module Clean conductive rubber and printed conductor	only in emergency, with alcohol and glass fibre brush
	– Contact pressure too low	Lay paper strips in frame	Only in emergency, better: replace LSCxx
Instrument gets hot	– Incorrect voltage / too high	Compare mains voltage and rating on nameplate	Correct voltage setting, see Chap. 8.4.1 / 8.5.1
	– Power unit defective	Replace power unit	Diagnostics only possible through your Service
Measured value O_2 and / or measured value temperature incorrect	– Transmitter module defective (Module: MKO1 / MKO 5). First carry out tests and measures acc. to Chapter 7.3 to make sure that the error does not lie with the sensor or cabling.	Measuring inputs test MKO 1: – Connect substitute resistances for oxygen and temperature, see Chapter 8.8.1 Measuring inputs test MKO 5: (WX/WS)	If test negative: Replace module (check variants), Carry out using the explosion drawings Chap. 8.2.1 and 8.3.1. only possible with intact sensor as digital data transfer sensor <-> instrument If test positive: check peripherals once more.
	– Incorrect sensor current	Sensor current readable in the display in measurement mode by pressing “+” key 3 x	Display in nA. Nominal value in air for 20 °C and 1013 hPa: 290 nA
Pressure value incorrect / unreadable	– Defective pressure sensor	Module MKO1 defective Module MKO5 defective	Pressure readable in field S 11. Caution: The absolute air pressure is displayed.
	– No pressure sensor available	From introduction -WX/WS: - WX/WS always with pressure sensor - DX/DS with MKO1 is always without pressure sensor	
Current output, incorrect current	– Not calibrated correctly – Load excessive – Shunt / short-circuit to frame in current loop – Incorrect mode of operation	Test with built-in current simulation, connecting mA meter directly to current output. Check whether 0–20 mA or 4–20 mA has been selected	If simulation value is incorrect: recalibration at factory or new LSCxx module required. If simulation value is correct: check current loop for load and shunts.
No current output signal	– Current output stage defective (module: LSCH/LSCP)	Test with built-in current simulation, connecting mA meter directly to current output. For safety reasons completely disconnect the auxiliary power output beforehand.	If test negative: Replace central module (using correct variant)
Additional relays do not work	– Model 842: ribbon cable Pos. 320 loose or defective	Make sure ribbon cable is properly connected, replace cable if nec.	See spare parts for Model 842
Only 2 additional relays can be used	– Relay module LSR1-2 with 2 relays installed	Convert to LSR1-4 with 4 relays	Operator or your Service
Additional functions (Plus packet) missing	– No or incorrect release code used	When upgrading: check that the correct serial number was used when ordering the Plus packet	Handling by your Sales Agency
	– Incorrect serial number of the LSCH/LSCP module	Check that the serial on the nameplate agress with the SNR LSCH/LSCP (Field E113)	For the S packet, the serial number of the LSCH/LSCP module is decisive.

Problem	Possible cause	Tests and / or remedial measures	Equipment, spare parts, personnel
	– Changed product strategy	From introduction WX/WS: - WX/WS always with pressure sensor - DX/DS always without pressure sensor	for DX/DS: Use location height setting
Additional functions (Plus package and / or Chemoclean) missing after replacement of LSCH/LSCP module	– Replacement modules LSCH or LSCP have the default instrument serial number 0000. No releases for Plus packet or Chemoclean.	For LSCH / LSCP with SNR 0000 you can enter an instrument serial number **once** in fields E114 to E116. Then enter release codes for S package and/or Chemoclean.	For detailed description, see Chap. 8.5.5
No sensor data in E 151 ... 159	– Analog sensor connected	For OOS 3 and compatible sensors, no data exchange possible	

8.2 Corrective maintenance of Model 840

8.2.1 Exploded view



8.2.2 Dismantling of Model 840

- Consider potential effects on process when removing the instrument from service!
- Before opening, make sure the instrument is voltage-free.
- First pull off the terminal block (Pos. 424b) on the rear of the instrument to de-energize the instrument.
- Then pull off the terminal blocks (Pos. 424a and 430 if applicable) on the rear. Now you can dismantle the instrument.
- Push the end frame latches (Pos. 340) inward and pull off the frame towards the rear.
- Loosen the special screw (Pos. 400) by turning it counterclockwise.
- Remove the complete electronics block from the housing. The modules are plugged together mechanically and can be easily separated:
  – Simply pull the central/display module forwards
  – Gently pull the clips of the backplate (Pos. 320) outwards. This means that the modules at the side can be removed easily.
- Removal O_2 transmitter (Pos. 250 / 260): Pull off the module towards the top.

8.2.3 Assembly of Model 840

- Reverse the dismantling sequence for assembly.
- Hand-tighten the special screw without using a tool.
- Incorrect assembly is not possible! A module block which has been plugged together incorrectly cannot be inserted in the housing.

8.2.4 Spare parts for Model 840

Pos.	Designation	Name	Function or components	Order number
10	Power supply unit	LSGA	100/115/230 V AC	51500317
20	Power supply unit	LSGD	24 V AC + DC	51500318
40	Central module	LSCH-S1	1 current output	51501225
50	Central module	LSCH-S2	2 current outputs	51501222
60	Central module	LSCH-H1	1 current output + HART	51501840
70	Central module	LSCH-H2	2 current outputs + HART	51501226
250	O_2 transmitter	MKO1 (-DX/DS)	O_2 + Temperature O_2 + Temp. air pressure	51501207 51501208
260	O_2 transmitter	MKO5 (-WX/WS)	O_2 + Temp. air pressure	51506938
290	Relay module	LSR1-2	2 Relays	51500320
290	Relay module	LSR2-2i	2 Relays + current input 4..20 mA	51504304
300	Relay module	LSR1-4	4 Relays	51500321
300	Relay module	LSR2-4i	4 Relays + current input 4..20 mA	51504305
310	Side panel		Kit with 10 parts	51502124
330, 400	Housing module		Housing with front membrane, Sensor plungers, Seal, Special screw, Clamp tappets, Connection and nameplates	51501075
310, 320, 340, 400	Mechanical parts Housing		Backplate, Side wall, End frame, Special screw	51501076
424a, 424b	Complete terminal strip set		Terminal strip set, Inputs/outputs, Power supply / Alarm relay	51501204
430	Terminal strip		Terminal strip for relay module	51501078
	Kit O_2 transmitter		MKO 5 with air pressure measurement	51506938

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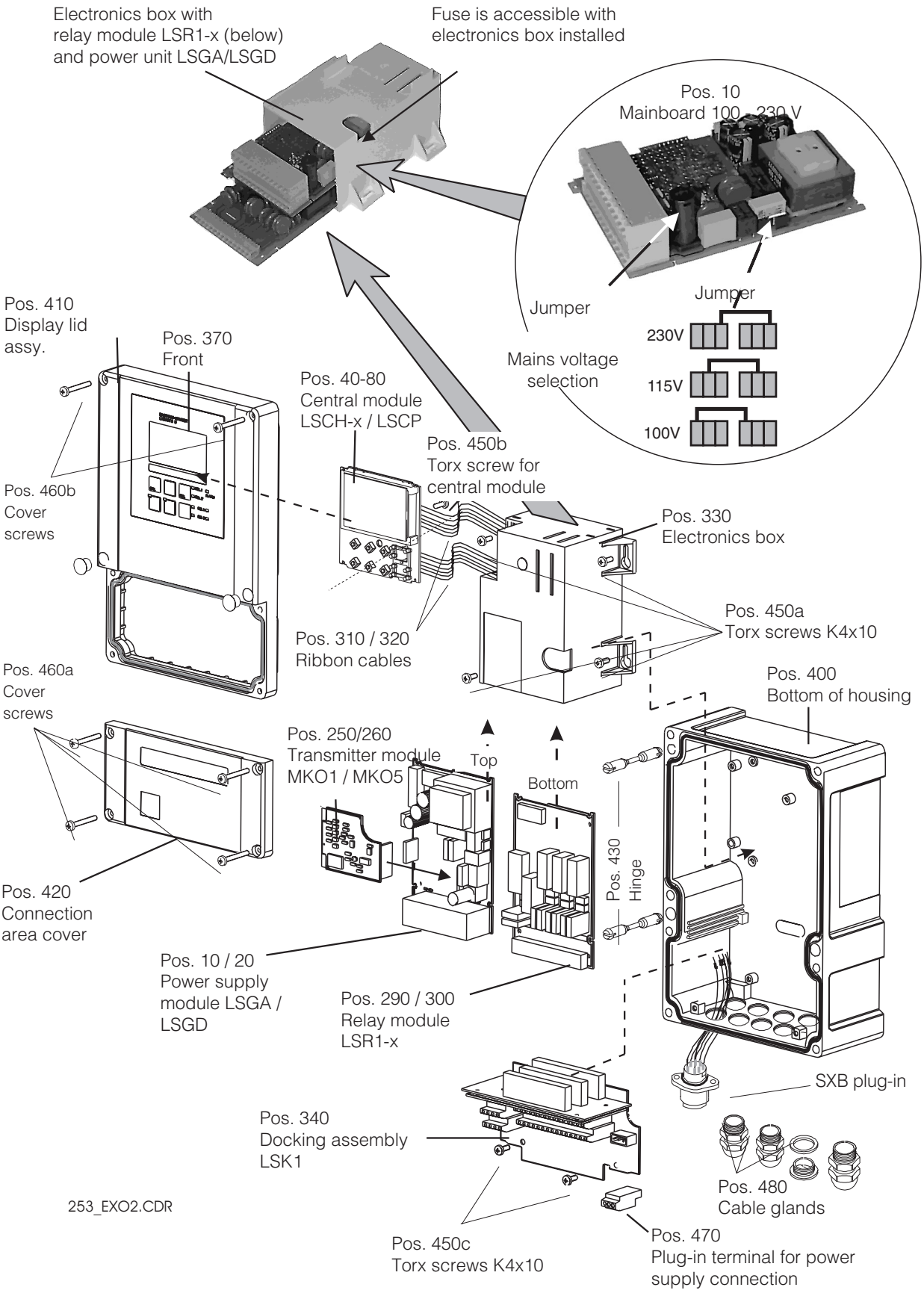
8.3 Corrective maintenance of Model 842

8.3.1 Exploded view



8.3.2 Dismantling of Model 842

- Before opening, make sure the instrument is voltage-free.
- Open and remove the connection compartment cover (Pos. 420).
- Pull off the power connection terminal strip (Pos. 470) to de-energize the instrument.
- Open the display lid (Pos. 410) and remove the ribbon cables (Pos. 310 / 320) on the side of the electronics box (Pos. 330).
- Removal of electronics box (Pos. 330): Unscrew the screws (Pos. 450a) in the bottom of the housing 2 revolutions, then slide entire box backward and remove towards the top.
  Make sure that the module catches do not come unlatched while you push the electronics box back!
- Now bend the module latches outward and remove the module(s).
- Removal of central module (Pos. 40): Loosen the screw (Pos. 450b) in the display lid.
- Removal of docking assembly (Pos. 340): Remove the screws (Pos. 450c) in the bottom of the housing and remove the entire assembly towards the top.
- Removal of transmitter (Pos. 250/260): Simply pull off the module towards the top.

8.3.3 Assembly of Model 842

- Insert the module(s) in the electronics box guide rails carefully and latch into the lateral lugs in the box.
- Incorrect assembly is not possible! Modules inserted in the electronics box incorrectly are not operable since the ribbon cables cannot be inserted.
- Make sure that the cover gaskets are intact since they are required to guarantee protection class IP 65.

8.3.4 Spare parts kits for Model 842

Pos.	Designation	Name	Function or components	Order number
10	Power supply unit	LSGA	100/115/230 V AC	51500317
20	Power supply unit	LSGD	24 V AC + DC	51500318
40	Central module	LSCH-S1	1 current output	51501225
50	Central module	LSCH-S2	2 current outputs	51501222
60	Central module	LSCH-H1	1 current output + HART	51501840
70	Central module	LSCH-H2	2 current outputs + HART	51501226
250	O_2 transmitter	MKO1 (-DX/DS)	O_2 + Temperature O_2 + Temp. air pressure	51501207 51501208
260	O_2 transmitter	MKO5 (-WX/WS)	O_2 + Temp. air pressure	51506938
290	Relay module	LSR1-2	2 Relays	51500320
290	Relay module	LSR2-2i	2 Relays + current input 4..20 mA	51504304
300	Relay module	LSR1-4	4 Relays	51500321
300	Relay module	LSR2-4i	4 Relays + current input 4..20 mA	51504305
370, 410, 420, 430, 460	Housing cover		Display lid, connection compartment cover, front membrane, hinges, cover screws, small parts	51501068
400, 480	Bottom of housing		Bottom, cable glands	51501072
330, 340, 450	Internal housing parts		Docking assembly, empty electronics box, small parts	51501073
310, 320	Ribbon cables		2 ribbon cables	51501074
430	Hinges		2 pairs of hinges	51501069
470	Terminal strip		Terminal strip for power connection	51501079
490	Sensor box SXB		Sensor connection	51506966

8.3.5 Special case: replacement of central module

Note:

Since the serial and release numbers are linked for the Plus package and Chemoclean, an existing Plus package or Chemoclean may not be active. All the editable data are reset to the factory settings following central module replacement.

Proceed as described below after central module replacement:

- If possible, record the user settings of the instrument, e.g.:
  - Calibration data
  - O_2 and temperature current assignments
  - Relay function selections
  - Limit / controller settings
  - Cleaning settings
  - Monitoring functions
  - Interface parameters
- Dismantle the instrument as described in Chap. 8.2.2 or 8.3.2.
- Refer to the part no. of the central module to determine whether the new module has the same part no. as the old one.
- Reassemble the instrument with the new module, as described in Chap. 8.4.3 and 8.5.3.
- Start up the instrument and test its basic functions (e.g. meas. value and temperature display, operation via keyboard).
- Enter the instrument serial number:
  - Read the serial number (»ser-no.«) of the instrument from the nameplate.
  - Enter this number in the fields E115 (year, one-digit), E116 (month, one-digit), E117 (sequence number, four-digit).
  - Field E118 displays the complete number for verification; acknowledge with ENTER or abort and re-enter.

  Please note: The serial number can only be entered – and **only once** – in the case of a new module from the factory with serial number 0000! Make sure that your entry is correct before confirming with ENTER! Entry of an incorrect code will prevent the enhanced functions from being enabled. An incorrect serial number can only be corrected at the factory.
- Verify that the S package is enabled (e.g. by accessing function group CHECK / Code P) or the Chemoclean function.
- Check the Plus packet release (e.g. by opening the function group CHECK / Code P) or the Chemoclean function.
- Restore the user settings of the instrument.

8.4 Spare parts orders

Spare parts are to be ordered from your local Sales Agency. For this, use the order numbers listed in Chapters 8.4.4 or 8.5.4. To be on the safe side, you should **always** specify the following data with spare parts orders:

- Instrument order code (order code)
- Serial number (ser-no.)
- Software version where available

Refer to the nameplate for the order code and serial number.
The software version is displayed in field E111 when the instrument processor system is functional.

8.5 Service equipment »Optoscope« with »Scopeware«

The Optoscope together with the »Scopeware« software offers the following possibilities, **without** having to remove or open the transmitter and **without** galvanic connection to the instrument:

- Documentation of the instrument settings in conjunction with Commuwin II
- Software update by the service technician
- Upload/download a hex dump to duplicate configurations.

The optoscope serves as an interface between the transmitter and PC / laptop. The information exchange takes place via the optical interface on the transmitter and via an RS 232 interface on the PC / laptop.

Handling and operation are described in the optoscope operating instructions. The user-friendly Windows software required for the PC or laptop is supplied with the optoscope.

The optoscope is supplied in a sturdy case with all the accessories required.

Order number of optoscope: 51500650

8.6 Corrective maintenance on the complete measuring point Model 840 / 842-DX/-DS

8.6.1 Oxygen transmitter DX/DS

Cleaning the front panel

To clean the front panel, only use standard cleaning agents.The front panel is resistant to the following cleaning agents (acc. to test methode DIN 42 115):

- Isopropanol
- Thinned acids (3 %)
- Thinned alkalis (5 %)
- Ester
- Hydrocarbons
- Ketone
- Household cleaners

Caution!

Do not use any concentrated mineral acids or alkalis, benzyl-alcohol, methylene chloride or high-pressure water vapour at over 100 °C.

Simulation of oxygen measurement:

The instrument versions Model 840 / 842-DX/-DS work with the sensors OOS 4 / OOS 4HD, i.e. with amperometric sensors without a preamp. The temperature sensor is directly brought out.
To perform a functional test of the instrument, the OOS 4 sensor can be simulated by resistors. Since the display value greatly depends on the sensor slope setting and on temperature, the following values should be considered as reference values:

Simulation resistance	Display value
∞ (open)	0 mg O_2/l
1.9 MΩ	7 ... 13 mg O_2/l
With 1.9 MΩ and a temperature equivalent resistance of 37.3 kΩ after calibration	9.0 ... 9.2 mg O_2/l
4.06 MΩ	3.3 ... 6.1 mg O_2/l

Simulation of temperature sensor:
The OOS 4 sensor uses an NTC sensor (30.0 kΩ/25 °C) for temperature measurement. Use the following equivalent resistances to test the temperature measurement:

Simulation resistance	Display value
95.0 kΩ	0.0 °C
58.7 kΩ	10.0 °C
37.3 kΩ	20.0 °C
30.0 kΩ	25.0 °C
24.3 kΩ	30.0 °C

Test procedure:

- Connect the O_2 equivalent resistance (e.g. decade resistor) to terminals 90 and 91.
- Connect the temperature equivalent resistance (e.g. decade resistor) to terminals 11 and 12.
- Air pressure measurement:
  On instruments equipped with the S package, the air pressure measured can be checked in field S11.
  There is no air pressure measurement for the DX/DS versions. Use the location altitude setting to compensate for the air pressure influence.

8.6.2 Oxygen sensor OOS 4

Please refer to the operating instructions for the OOS 4 with regard to sensor maintenance and troubleshooting!
The operating instructions contain detailed information including:

- Sensor design and function
- Mounting and installation
- Electrical connection
- Start-up and calibration
- Calculation examples and tables for verification of measured values
- Maintenance, regeneration, cleaning
- Troubleshooting table
- Accessories and spare parts
- Technical data and ordering information

8.6.3 Assembly

Refer to the assembly operating instructions for maintenance and troubleshooting! The following assemblies can be used for OOS 4:

- Suspension assembly holder OYH101-A with immersion pendulum assembly OYA 611
- Suspension assembly holder OYH101-D with stainless steel immersion tube OYH 101-D / -E
- Basin wall mount OYY 106-A with stainless steel immersion tube OYY 105-A / -B
- Flow assembly OOA 250
- Float assembly OOA 110-50

8.6.4 Connecting lines and junction boxes

Since the OOS 4 works with low measuring currents, shunts in connecting cables and junction boxes may introduce considerable inaccuracy.
The following is to be assured:

- Intact gaskets on lids and cable glands
- Dry and clean inner compartment (if necessary dry, clean and insert a dehydrating bag)
- Lines, ferrules, terminals and connectors are to be free of corrosion
- Terminal screws are to be tightened firmly
- Cables are to enter junction boxes and instruments from below
- Make a downward cable loop in the case of lateral cable entries to allow water to drip off

If the function test explained in chapter 8.8.1 is performed on a junction box instead of the instrument, the junction box, terminals and connecting line to the instrument are automatically included in the test.

8.7 Corrective maintenance on the complete measuring point Model 840 / 842-WX/WS

8.7.1 Oxygen transmitter WX/WS

Cleaning the front panel

To clean the front panel, only use standard cleaning agents. The front panel is resistant to the following cleaning agents (acc. to test methode DIN 42 115):

- Isopropanol
- Thinned acids (3 %)
- Thinned alkalis (5 %)
- Ester
- Hydrocarbons
- Ketone
- Household cleaners

Caution!

Do not use any concentrated mineral acids or alkalis, benzyl-alcohol, methylene chloride or high-pressure water vapour at over 100 °C.

Function, simulation and test with OOS 31, OOS 31-S, OOS 71

The instrument versions Model 840 / 842-WX/-WS work preferably with the sensors OOS 31, OOS 31-S and OOS 71. These sensors have digital data transfer using the interface RS485. The sensors OOS 31 or OOS 31-S are automatically recognised internally after calibration. All the sensor data are forwarded to the Model 840 / 842 by data exchange. After a mains supply interruption, the data are resent to the transmitter. The sensors require an ± 8.5 VDC voltage supply from the Model 840 / 842.
Due to the digital data, **no simulation** of sensor signals is possible.
Test possibilities in digital mode:

- Measure supply voltage (± 8.5 VDC , see connection diagram)
- Connect intact sensor OOS 31, OOS 31-S or OOS 71
- Measure sensor current consumption
- Check O_2 measured variable and temperature value on the transmitter
- The O_2 input can be tested by measuring the output DC voltage.
  The reference is terminal »0«, the O_2 input is terminal 18:
  0 mV = 0.0 mgO_2/l
  –150 mV = O_2 saturation
  (at 25 °C = 8.1 mgO_2/l. Value indicated dependent on last calibration)
- The sensor data can be read off in the fields »Service 2« E 151 to 159.
- In measurement mode, the sensor current can be displayed in nA by pressing the »-« key.
  Guide values:
  OOS 31: . . ca. 40 nA/mg O_2/l at 25 °C
  OOS 31-S: . ca. 120 nA/mgO_2/l at 25 °C
  OOS 71: . . ca. 800 nA/mgO_2/l at 25 °C

Function, simulation and test with OOS 3, OOS 3-S, OOS 3HD

If a sensor with analogue on-site electronics is connected (OOS 3, OOS 3-S, OOS 3HD, OOS 1, TriOxmatic®), this is recognised by the Model 840/842 and the operating mode is automatically switched to »analogue input«. These sensors also require a ± 8.5 VDC voltage supply from the Model 840/842. Because of the analogue on-site signal processing, a **limited** simulation of sensor signals is possible.

Test possibilities in analogue mode:

- Measure supply voltages (see above)
- Connect intact OOS 3 or compatible sensor
- Measure sensor current consumption (max. 0.5 mA at OOS 3)
- Check O_2 measured variable or temperature value on the transmitter **or**
- connect temperature equivalent resistor of 30 kOhm at terminals 96 and 97 (Display 25 °C)
  The table in Chapter 8.8.1 can be used for additional tests.
- The O_2 input can be tested by measuring the output DC voltage.
  The reference is terminal »0«, the O_2 input is terminal 18:
  . 0 mV . = 0.0 mgO_2/l
  . –150 mV = O_2 saturation
  (at 25 °C = 8.1 mgO_2/l. Value indicated dependent on last calibration)
- In measurement mode, the sensor voltage can be displayed in mV by pressing the »-« key.
- Due to missing data transfer, Fields E 151 to 159 are empty in analogue mode.

The air pressure measurement in the Model 840/842-WX/-WS can be checked in Field S11. **Caution!** The absolute pressure is displayed (a normal barometer indicates the relative pressure referred to sea level and cannot be used as a comparison).

8.7.2 Oxygen sensors OOS 31 / OOS 71

Please refer to the operating instructions for the OOS 31/ OOS 71 with regard to sensor maintenance and troubleshooting!
The operating instructions contain detailed information including:

- Sensor design and function
- Mounting and installation
- Electrical connection
- Start-up and calibration
- Calculation examples and tables for verification of measured values
- Maintenance, regeneration, cleaning
- Troubleshooting table
- Accessories and spare parts
- Technical data and ordering information

8.7.3 Assembly

Refer to the assembly operating instructions for maintenance and troubleshooting. The following assemblies can be used for OOS 31/ OOS 71:

- Suspension assembly holder OYH101-A with immersion pendulum assembly OYA 611
- Suspension assy. holder OYH101-D with stainless steel immersion tube OYH 101-D / -E
- Basin wall mount OYY 106-A with stainless steel immersion tube OYY 105-A / -B
- Flow assembly OOA 250
- Float assembly OOA 110-50

8.7.4 Connecting lines and junction boxes

OOS 31 / 71 sensors work with a digital interface and therefore are sensitive to electrical faults and shunting by humidity. Nevertheless, keep to the recommendations in Chapter 8.8.4. For safe data transfer, always use an extension cable with twisted wire pairs, e.g. OMK.
OOS 3 sensors and compatibles work with analogue signal processing and therefore are also sensitive to electrical faults and shunting by humidity. For extension purposes, you require a 7-wire screened cable.
Recommendation: Use original OMK cable.

9 Accessories

Connection accessories

- Extension cable OMK
  for OOS 3, OOS 31 and OOS 71
  Non-terminated measuring cable for oxygen sensors (metre goods)
  Order No.: 50004124
- Junction box VS
  Junction box for extension of measuring cable connection between sensor and instrument.
  Order No.: 50001054

- Extension cable OYK 71
  for OOS 4, OOS 41
  Non-terminated measuring cable for oxygen sensors (metre goods)
  Order No.: 50085333
- Junction box VBM
  Junction box for extension of measuring cable connection between sensor and instrument.
  Order No.: 50003987

Sensors

- Oxygen sensor OOS 41
- Oxygen sensor OOS 31
- Oxygen sensor OOS 71

Order sensors using the product code, see Technical Information:

TI 284e00 (OOS 41)
TI 285e00 (OOS 31)
TI 286e00 (OOS 71)

Instrument upgrade
(Order only possible with serial number of relevant device)

- Plus package
  Order no.: 51501679
- ChemoClean
  Order no.: 51500963
- Two-relay card (standard version)
  Order no.: 51500320
- Two-relay card (CSA version)
  Order no.: 51511446
- Four-relay card (standard version)
  Order no.: 51500321
- Four-relay card (CSA version)
  Order no.: 51511447
- Two-relay card with current input (standard version / CSA version)
  Order no.: 51504304
- Four-relay card with current input (standard version / CSA version)
  Order no.: 51504305

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10 Technical data

General specifications

Instrument name	Model 840 Model 842

Input

Measured variables	O_2, temperature

O_2 measurement with sensor OOS 41 / OOS 4 / OOS 4HD

Display and measuring range		0 ... 20 mg/l or 0 ... 200 % SAT or 0 ... 400 hPa
Temperature compensation range		0 ... 50 °C
Altitude adjustment range		0 ... 4000 m
Salinity adjustment range		0 ... 4.0 %
Nominal slope (sensor in air, 25 °C, 1013 hPa)		290 nA
Required conductor cross-section	Model 840 Model 842	0.75 mm^2 / AWG 18 1.50 mm^2 / AWG 14
Terminal cross-section		2.5 mm^2
Maximum cable length to sensor		50 m

O_2 measurement with sensor OOS 31 / OOS 3 / OOS 3S / OOS 3HD

Display and measuring range		0 ... 60 mg/l or 0 ... 600 %SAT or 0 ... 1200 hPa
Temperature compensation range		0 ... 50 °C
Pressure compensation range		500 ... 1100 hPa
Location height setting range		0 ... 4000 m
Salinity setting range		0 ... 4 %
Nominal slope (sensor in air, 25 °C, 1013 hPa)		290 nA
Required conductor cross-section	Model 840 Model 842	0.75 mm^2 / AWG 18 1.50 mm^2 / AWG 14
Terminal cross-section		2.5 mm^2
Maximum cable length to sensor		100 m

O_2 measurement with sensor OOS 71

Display and measuring range		0 ... 20 mg/l or 0 ... 200 % SAT or 0 ... 400 hPa
Temperature compensation range		0 ... 50 °C
Pressure compensation range		500 ... 1100 hPa
Location height setting range		0 ... 4000 m
Salinity setting range		0 ... 4 %
Nominal slope (sensor in air, 25 °C, 1013 hPa)		8000 nA
Required conductor cross-section	Model 840 Model 842	0.75 mm^2 / AWG 18 1.50 mm^2 / AWG 14
Terminal cross-section		2.5 mm^2
Maximum cable length		100 m

O_2 signal input

Signal current	0 ... 3000 nA (DX/DS) or 0 ... –7500 mV (WX/WS)
Slope adaptation	75 ... 140 % of nominal slope (OOS 71: 50 ... 150 %)

Temperature measurement

Temperature sensor	NTC, 30 kΩ at 25 C
Display range	–10 ... +60 °C

Digital inputs 1 and 2

Voltage	10 ... 50 V
Current consumption	max. 10 mA

Current input

Current range	4 ... 20 mA, galvanically separated
Load	260 Ω at 20 mA (voltage drop 5.2 V)

Output

O_2 signal output

Current range	0 / 4 ... 20 mA, galvanically separated; error current 2.4 / 22 mA
Load	max. 500 Ω
Maximum resolution	700 digits/mA
Output rangewith OOS 4, 4HD, 41, 71	Δ 0.2 ... Δ 20 mg/l or Δ 2 ... Δ 200 % SAT or Δ 4 ... Δ 400 hPa
Output range with OOS 3, 3S, 3HD, 31	Δ 0.6 ... Δ 60 mg/l or Δ 6...Δ 600 % SAT or Δ 12... Δ 1200 hPa
Separation voltage	max. 350 V_{rms} / 500 V DC
Overvoltage protection (lightning protection)	to EN 61000-4-5:1995

Temperature signal output (optional)

Current range	0 / 4 ... 20 mA, galvanically separated
Load	max. 500 Ω
Maximum resolution	700 digits/mA
Transfer range	Δ 7 ... Δ 70 C
Separation voltage	max. 350 V_{rms} / 500 V DC
Overvoltage protection (lightning protection)	to EN 61000-4-5:1995

Output (continued)

Auxiliary voltage output

Output voltage	15 V ± 0.6 V
Output current	max. 10 mA

Contact outputs (potential-free changeover contacts)

Switching current with ohmic load (OOS φ = 1)	max. 2 A
Switching current with inductive load (OOS φ = 0.4)	max. 2 A
Switching voltage	max. 250 V AC, 30 V DC
Switching power with ohmic load (OOS φ = 1)	max. 1250 VA AC, 150 W DC
Switching power with inductive load (OOS φ = 0.4)	max. 500 VA AC, 90 W DC

Limit contactor

Limit value setting range	0 ... 20 mg/l or 0 ... 200 % SAT or 10 C ... +60 C
Pickup / dropout delay	0 ... 7200 s

Controller

Function (adjustable)	pulse length / pulse frequency controller
Controller response	PID
Control gain K_p	0.01 ... 20.00
Integral action time T_n	0.0 ... 999.9 min
Derivative action time T_v	0.0 ... 999.9 min
Period for pulse-length controller	0.5 ... 999.9 s
Frequency for pulse frequency controller	60 ... 180 min^{-1}
Basic load	0 ... 40% of max. set value

Alarm

Function (switchable)	steady / fleeting contact
Alarm threshold adjustment range	0 ... 20.00 mg/l or 0 ... 200.0 % SAT
Alarm delay	0 ... 2000 s
Monitoring time lower limit violation	0 ... 2000 min
Monitoring time upper limit violation	0 ... 2000 min

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Accuracy

O_2 measurement with sensor OOS 41

Measured value resolution	0.01 mg/l or 0.1 % SAT or 1 hPa
Measured error [1] Display	max. 0.5 % of measuring range
Repeatability	max. 0.2 % of measuring range
Measured error[1] O_2 signal output	max. 0.75 % of measuring range

O_2 measurement with sensor OOS 31

Measured value resolution	0.01 mg/l or 0.1 % SAT or 1 hPa
Measured error[1] Display	max. 0.5 % of measuring range
Repeatability	max. 0.2 % of measuring range
Measured error[1] O_2 signal output	max. 0.75 % of measuring range

O_2 measurement with sensor OOS 71

Measured value resolution	0.001 mg/l or 0.1 % SAT or 1 hPa
Measured error [1] Display	max. 0.5 % of measuring range
Repeatability	max. 0.2 % of measuring range
Measured error[1] O_2 signal output	max. 0.75 % of measuring range

Temperature measurement with OOS 41, OOS 31, OOS 71

Measured value resolution	0.1 °C
Measured error[1] Display	max. 1.0 % of measuring range
Measured error[1] temperature signal output	max. 1.25 % of current output range

Ambient conditions

Ambient temperature (nominal operating conditions)	–10 ... +55 °C
Ambient temperature (limit operating conditions)	–20 ... +60 °C
Storage and transport temperature	–25 ... +65 °C
Relative humidity (nominal operating conditions)	10 ... 95 %, non-condensing
Ingress protection of panel-mounted instrument	IP 54 (front panel), IP 30 (enclosure)
Ingress protection of field instrument	IP 65
Pollution degree	2 acc. to IEC 61010-1
Installation category	II
Maximum altitude	2000 m above sea level
Electromagnetic compatibility	interference radiation and radiation immunity to EN 61326-1 : 1997/ A1: 1998

Mechanical construction

Dimensions of panel-mounted unit (H × W × D)	96 × 96 × 145 mm
Installation depth	approx. 165 mm
Dimensions of field instrument (H × W × D)	204 × 155 × 215 mm
Weight of panel-mounted unit	max. 0.7 kg
Weight of field instrument	max. 2.3 kg
Measured value display	LC display, two lines, five and nine digits, with status indicators

Materials

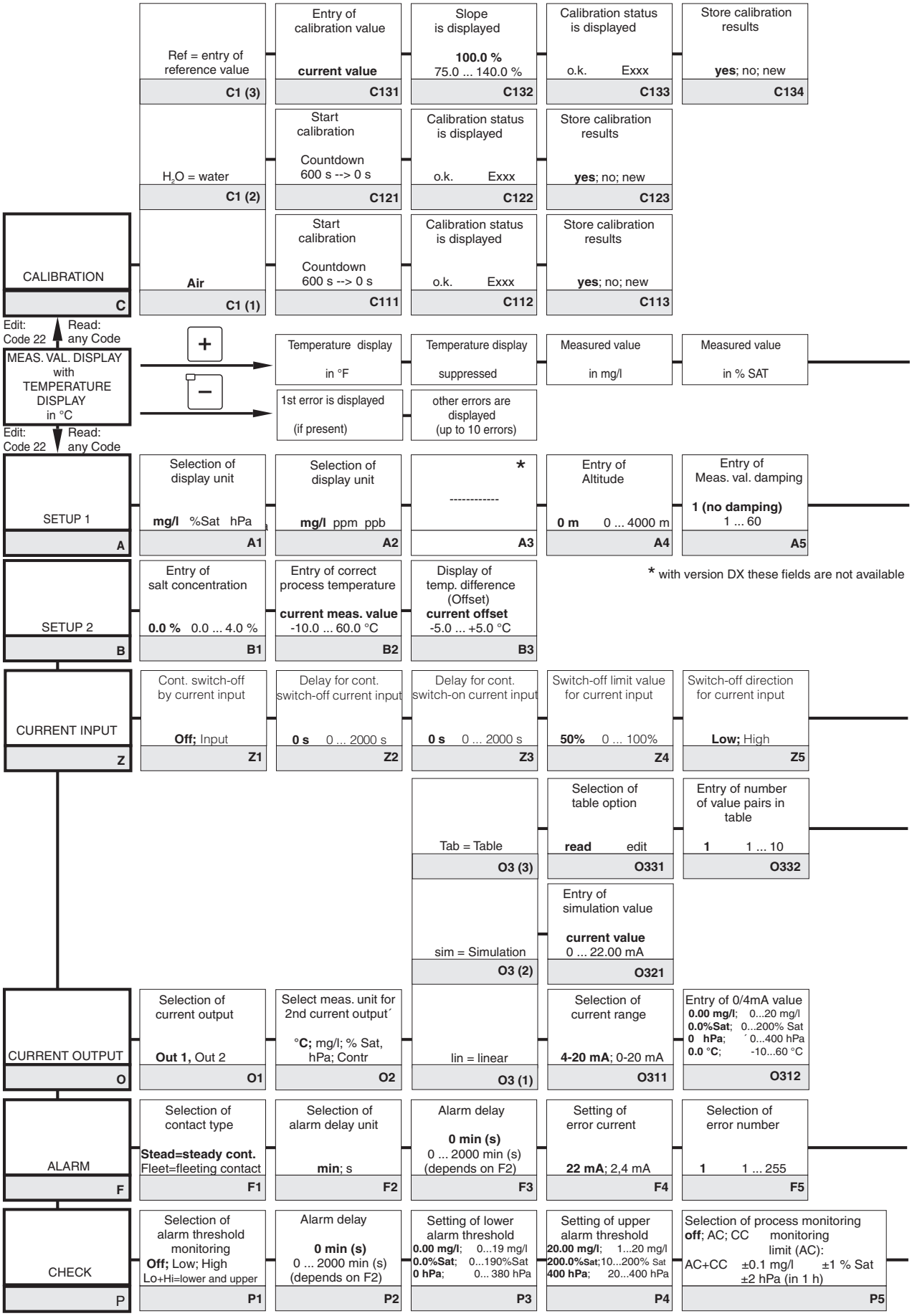
Housing of panel-mounted unit		polycarbonate
Front membrane		Polyester, UV-resistant
Field instrument	standard versions CSA GP versions	ABS PC Fr Polycarbonate

Power supply

Supply voltage	100 / 115 / 230 V AC +10 / –15 %, 48 ... 62 Hz 24 V AC/DC +20 / –15 %
Power consumption	max. 7.5 VA
Mains fuse	fine-wire fuse, medium time-lag, 250 V / 3.15 A

[1]According to IEC 746-1, for nominal operating conditions

11 Appendix


CALIBRATION
C
Edit: Code 22
Read: any Code
MEAS. VAL. DISPLAY with TEMPERATURE DISPLAY in °C
Edit: Code 22
Read: any Code
SETUP 1
A
SETUP 2
B
CURRENT INPUT
Z
CURRENT OUTPUT
O
ALARM
F
CHECK
P
Ref = entry of reference value
C1 (3)
Entry of calibration value
current value
C131
Slope is displayed
100.0 %
75.0 ... 140.0 %
C132
Calibration status is displayed
o.k. Exxx
C133
Store calibration results
yes; no; new
C134
H2O = water
C1 (2)
Start calibration
Countdown 600 s --> 0 s
C121
Calibration status is displayed
o.k. Exxx
C122
Store calibration results
yes; no; new
C123
Air
C1 (1)
Start calibration
Countdown 600 s --> 0 s
C111
Calibration status is displayed
o.k. Exxx
C112
Store calibration results
yes; no; new
C113
+
−
Temperature display in °F
Temperature display suppressed
Measured value in mg/l
Measured value in % SAT
1st error is displayed (if present)
other errors are displayed (up to 10 errors)
Selection of display unit
mg/l %Sat hPa
A1
Selection of display unit
mg/l ppm ppb
A2
*

A3
Entry of Altitude
0 m 0 ... 4000 m
A4
Entry of Meas. val. damping
1 (no damping)
1 ... 60
A5
* with version DX these fields are not available
Entry of salt concentration
0.0 % 0.0 ... 4.0 %
B1
Entry of correct process temperature
current meas. value
-10.0 ... 60.0 °C
B2
Display of temp. difference (Offset)
current offset
-5.0 ... +5.0 °C
B3
Cont. switch-off by current input
Off; Input
Z1
Delay for cont. switch-off current input
0 s 0 ... 2000 s
Z2
Delay for cont. switch-on current input
0 s 0 ... 2000 s
Z3
Switch-off limit value for current input
50% 0 ... 100%
Z4
Switch-off direction for current input
Low; High
Z5
Tab = Table
O3 (3)
Selection of table option
read edit
O331
Entry of number of value pairs in table
1 1 ... 10
O332
sim = Simulation
O3 (2)
Entry of simulation value
current value
0 ... 22.00 mA
O321
Selection of current output
Out 1, Out 2
O1
Select meas. unit for 2nd current output´
°C; mg/l; % Sat, hPa; Contr
O2
lin = linear
O3 (1)
Selection of current range
4-20 mA; 0-20 mA
O311
Entry of 0/4mA value
0.00 mg/l; 0...20 mg/l
0.0%Sat; 0...200% Sat
0 hPa; ´0...400 hPa
0.0 °C; -10...60 °C
O312
Selection of contact type
Stead=steady cont.
Fleet=fleeting contact
F1
Selection of alarm delay unit
min; s
F2
Alarm delay
0 min (s)
0 ... 2000 min (s)
(depends on F2)
F3
Setting of error current
22 mA; 2,4 mA
F4
Selection of error number
1 1 ... 255
F5
Selection of alarm threshold monitoring
Off; Low; High
Lo+Hi=lower and upper
P1
Alarm delay
0 min (s)
0 ... 2000 min (s)
(depends on F2)
P2
Setting of lower alarm threshold
0.00 mg/l; 0...19 mg/l
0.0%Sat; 0...190%Sat
0 hPa; 0... 380 hPa
P3
Setting of upper alarm threshold
20.00 mg/l; 1...20 mg/l
200.0%Sat; 10...200% Sat
400 hPa; 20...400 hPa
P4
Selection of process monitoring
off; AC; CC monitoring
limit (AC):
AC+CC ±0.1 mg/l ±1 % Sat
±2 hPa (in 1 h)
P5

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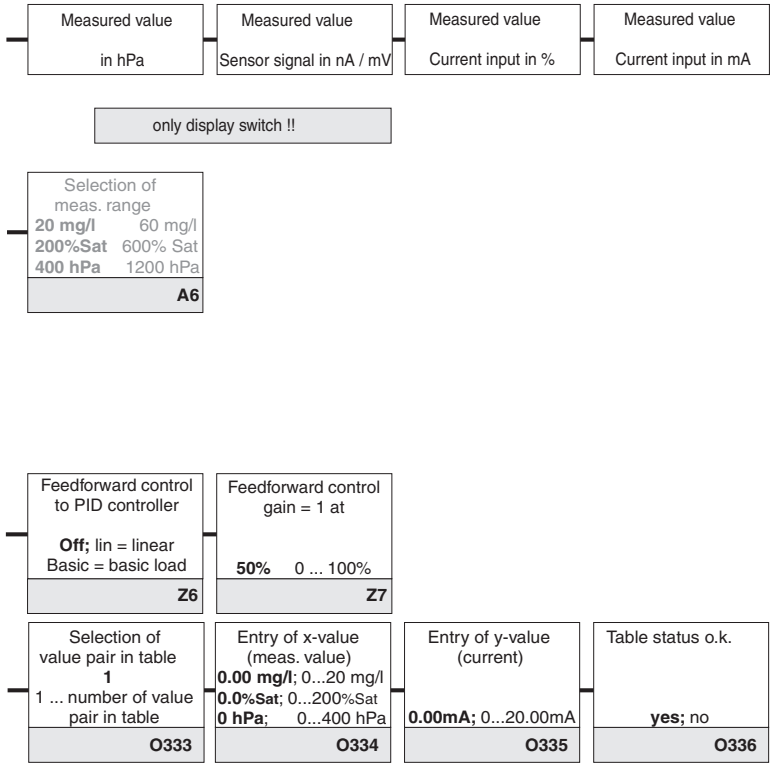
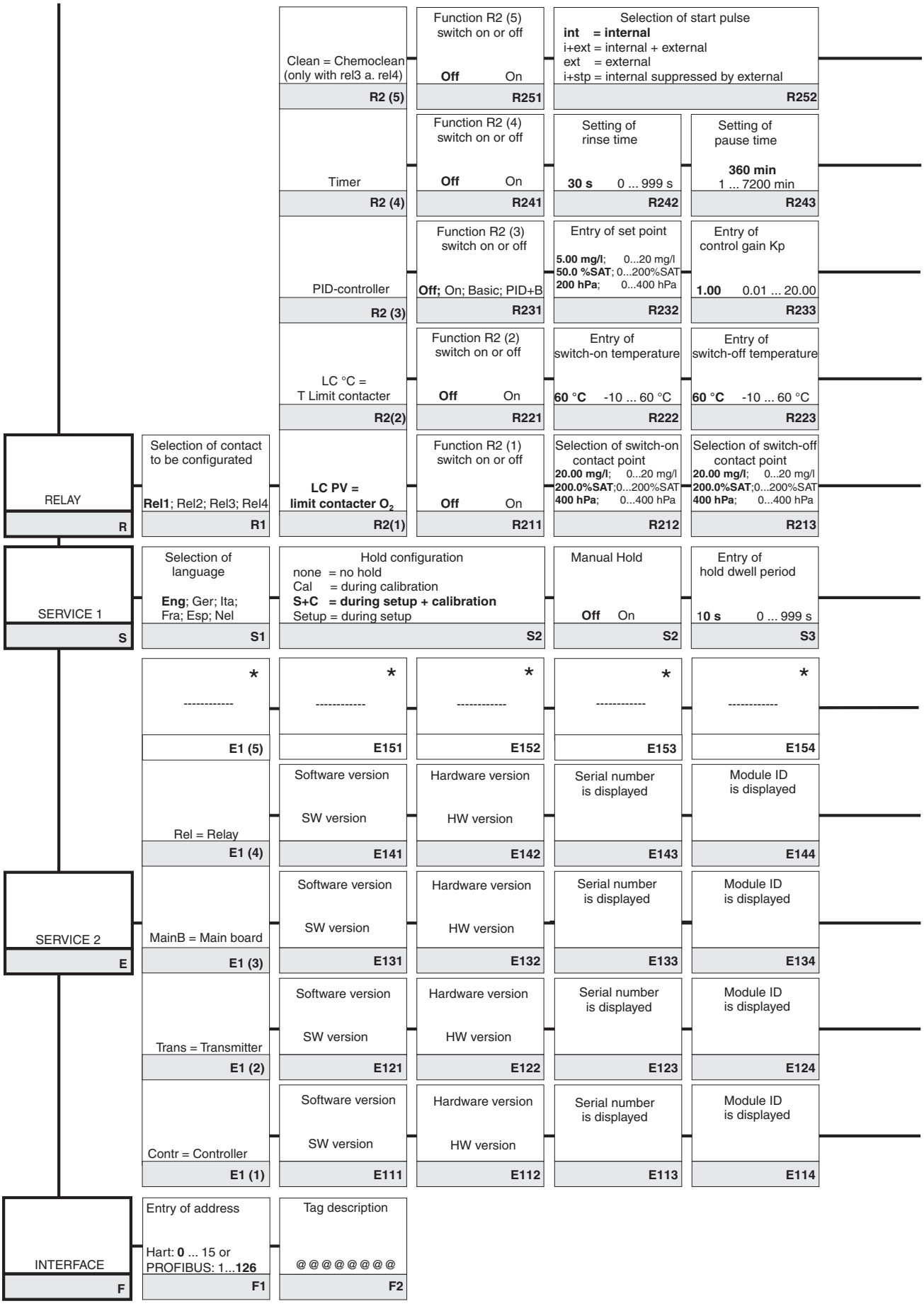
Desktop Model 840 / 842 - **DX/DS with OOS 4 / 4HD / 41**



Field for entry of user settings


RELAY
R
Selection of contact to be configurated
Rel1; Rel2; Rel3; Rel4
R1
LC PV = limit contacter O2
R2(1)
Function R2 (1) switch on or off
Off On
R211
Selection of switch-on contact point
20.00 mg/l; 0...20 mg/l
200.0%SAT;0...200%SAT
400 hPa; 0...400 hPa
R212
Selection of switch-off contact point
20.00 mg/l; 0...20 mg/l
200.0%SAT;0...200%SAT
400 hPa; 0...400 hPa
R213
LC °C = T Limit contacter
R2(2)
Function R2 (2) switch on or off
Off On
R221
Entry of switch-on temperature
60 °C -10 ... 60 °C
R222
Entry of switch-off temperature
60 °C -10 ... 60 °C
R223
PID-controller
R2 (3)
Function R2 (3) switch on or off
Off; On; Basic; PID+B
R231
Entry of set point
5.00 mg/l; 0...20 mg/l
50.0 %SAT; 0...200%SAT
200 hPa; 0...400 hPa
R232
Entry of control gain Kp
1.00 0.01 ... 20.00
R233
Timer
R2 (4)
Function R2 (4) switch on or off
Off On
R241
Setting of rinse time
30 s 0 ... 999 s
R242
Setting of pause time
360 min
1 ... 7200 min
R243
Clean = Chemoclean (only with rel3 a. rel4)
R2 (5)
Function R2 (5) switch on or off
Off On
R251
Selection of start pulse
int = internal
i+ext = internal + external
ext = external
i+stp = internal suppressed by external
R252
SERVICE 1
S
Selection of language
Eng; Ger; Ita; Fra; Esp; Nel
S1
Hold configuration
none = no hold
Cal = during calibration
S+C = during setup + calibration
Setup = during setup
S2
Manual Hold
Off On
S2
Entry of hold dwell period
10 s 0 ... 999 s
S3
SERVICE 2
E
Rel = Relay
E1 (4)
Software version
SW version
E141
Hardware version
HW version
E142
Serial number is displayed
E143
Module ID is displayed
E144
MainB = Main board
E1 (3)
Software version
SW version
E131
Hardware version
HW version
E132
Serial number is displayed
E133
Module ID is displayed
E134
Trans = Transmitter
E1 (2)
Software version
SW version
E121
Hardware version
HW version
E122
Serial number is displayed
E123
Module ID is displayed
E124
Contr = Controller
E1 (1)
Software version
SW version
E111
Hardware version
HW version
E112
Serial number is displayed
E113
Module ID is displayed
E114
* ----------
E1 (5)
* ----------
E151
* ----------
E152
* ----------
E153
* ----------
E154
INTERFACE
F
Entry of address
Hart: 0 ... 15 or
PROFIBUS: 1...126
F1
Tag description
@@@@@@@@
F2

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Desktop Model 840 / 842 - **DX/DS with OOS 4 / 4HD / 41**

Entry of pre-rinse time	Entry of cleaning time	Entry of post-rinse time	Number of repeat cycles	Setting of interval between 2 cleaning cycles (pause time)	Setting of minimum pause time	Number of clean. cycles without cleaning agent
30 s 0 ... 999 s	**10 s** 0 ... 999 s	**30 s** 0 ... 999 s	**0** 0 ... 5	**360 min** 1...7200 min	**120** min 1...3600 min	**0** 0 ... 9
R253	**R254**	**R255**	**R256**	**R257**	**R258**	**R259**

Chemoclean: uses 2 contacts, only for contact 3 (+4) permissible

Setting of minimum pause time
120 min 1...3600 min
R244

Entry of integral action time Tn (0.0=no I component)	Entry of derivative action time Tv (0.0=no D component)	Selection of control characteristics	Selection	Entry of pulse interval	Entry of pulse frequency	Entry of minimum On-time t_{on}	Entry of basic load
0.0 s 0.0...999.9 min	**0.0 s** 0.0...999.9 min	**inv = invers** dir = direct	**len = pulse length** freq=pulse frequency curr = current input	**10.0 s** 0.5...999.9 s	**120 min**$^{-1}$ 60 ... 180 min^{-1}	**0.3 s** 0.1 ... 5.0 s	**0%** 0 ... 40%
R234	**R235**	**R236**	**R237**	**R238**	**R239**	**R2310**	**R2311**

Setting of pickup delay	Setting of dropout delay	Setting of alarm threshold (absolute value)	LC status
0 s 0 ... 2000 s	**0 s** 0 ... 2000 s	**60 °C** -10 ... 60 °C	**MIN;** MAX
R224	**R225**	**R226**	**R227**

Setting of pickup delay	Setting of dropout delay	Setting of alarm threshold (abs. value)	LC status
0 s 0 ... 2000 s	**0 s** 0 ... 2000 s	**20.00 mg/l**; 0...20 mg/l **200.0%SAT**;0...200%SAT **400 hPa**; 0...400 hPa	**MIN;** MAX
R214	**R215**	**R216**	**R217**

Entry of SW-Upgrade release code (plus package)	Entry of SW-Upgrade release code Chemoclean	Display of order number	Display of serial number	Reset instrument to default values	Perform instrument test	*
0000 0000 ... 9999	**0000** 0000 ... 9999			**no;** Sens; factory	**no;** display	----------
S5	**S6**	**S7**	**S8**	**S9**	**S10**	**S11**

*	*	*	*	*
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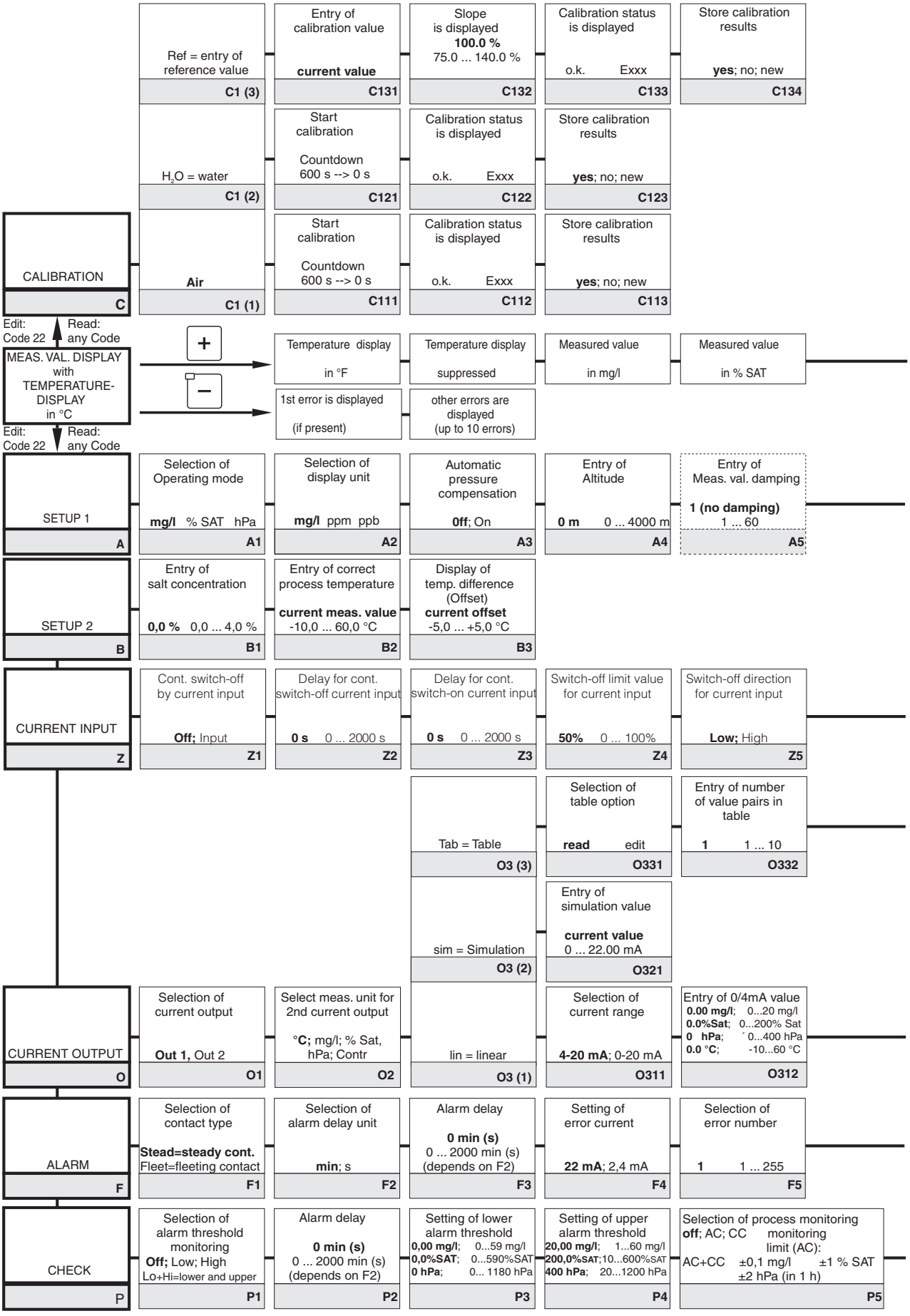
E155	**E156**	**E157**	**E158**	**E159**

* with COS 41 these fields are not available


CALIBRATION
C
Edit: Code 22
Read: any Code
Ref = entry of reference value
C1 (3)
Entry of calibration value
current value
C131
Slope is displayed
100.0 %
75.0 ... 140.0 %
C132
Calibration status is displayed
o.k. Exxx
C133
Store calibration results
yes; no; new
C134
H2O = water
C1 (2)
Start calibration
Countdown 600 s --> 0 s
C121
Calibration status is displayed
o.k. Exxx
C122
Store calibration results
yes; no; new
C123
Air
C1 (1)
Start calibration
Countdown 600 s --> 0 s
C111
Calibration status is displayed
o.k. Exxx
C112
Store calibration results
yes; no; new
C113
MEAS. VAL. DISPLAY with TEMPERATURE-DISPLAY in °C
Edit: Code 22
Read: any Code
+
−
Temperature display in °F
Temperature display suppressed
Measured value in mg/l
Measured value in % SAT
1st error is displayed (if present)
other errors are displayed (up to 10 errors)
SETUP 1
A
Selection of Operating mode
mg/l % SAT hPa
A1
Selection of display unit
mg/l ppm ppb
A2
Automatic pressure compensation
0ff; On
A3
Entry of Altitude
0 m 0 ... 4000 m
A4
Entry of Meas. val. damping
1 (no damping)
1 ... 60
A5
SETUP 2
B
Entry of salt concentration
0,0 % 0,0 ... 4,0 %
B1
Entry of correct process temperature
current meas. value
-10,0 ... 60,0 °C
B2
Display of temp. difference (Offset)
current offset
-5,0 ... +5,0 °C
B3
CURRENT INPUT
Z
Cont. switch-off by current input
Off; Input
Z1
Delay for cont. switch-off current input
0 s 0 ... 2000 s
Z2
Delay for cont. switch-on current input
0 s 0 ... 2000 s
Z3
Switch-off limit value for current input
50% 0 ... 100%
Z4
Switch-off direction for current input
Low; High
Z5
Tab = Table
O3 (3)
Selection of table option
read edit
O331
Entry of number of value pairs in table
1 1 ... 10
O332
sim = Simulation
O3 (2)
Entry of simulation value
current value
0 ... 22.00 mA
O321
CURRENT OUTPUT
O
Selection of current output
Out 1, Out 2
O1
Select meas. unit for 2nd current output
°C; mg/l; % Sat, hPa; Contr
O2
lin = linear
O3 (1)
Selection of current range
4-20 mA; 0-20 mA
O311
Entry of 0/4mA value
0.00 mg/l; 0...20 mg/l
0.0%Sat; 0...200% Sat
0 hPa; ´0...400 hPa
0.0 °C; -10...60 °C
O312
ALARM
F
Selection of contact type
Stead=steady cont.
Fleet=fleeting contact
F1
Selection of alarm delay unit
min; s
F2
Alarm delay
0 min (s)
0 ... 2000 min (s)
(depends on F2)
F3
Setting of error current
22 mA; 2,4 mA
F4
Selection of error number
1 1 ... 255
F5
CHECK
P
Selection of alarm threshold monitoring
Off; Low; High
Lo+Hi=lower and upper
P1
Alarm delay
0 min (s)
0 ... 2000 min (s)
(depends on F2)
P2
Setting of lower alarm threshold
0,00 mg/l; 0...59 mg/l
0,0%SAT; 0...590%SAT
0 hPa; 0... 1180 hPa
P3
Setting of upper alarm threshold
20,00 mg/l; 1...60 mg/l
200,0%SAT;10...600%SAT
400 hPa; 20...1200 hPa
P4
Selection of process monitoring
off; AC; CC
monitoring limit (AC):
AC+CC ±0,1 mg/l ±1 % SAT
±2 hPa (in 1 h)
P5

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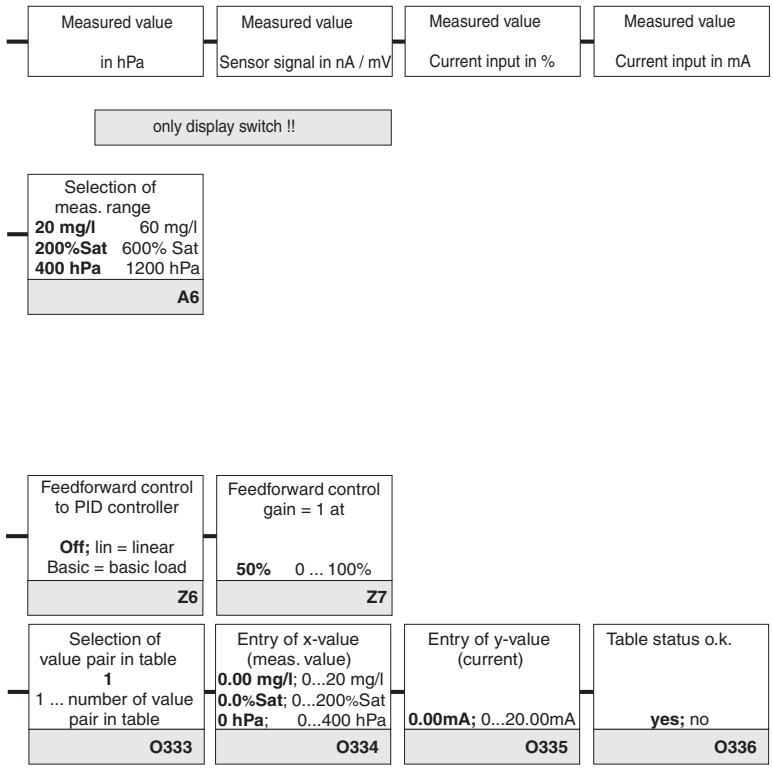
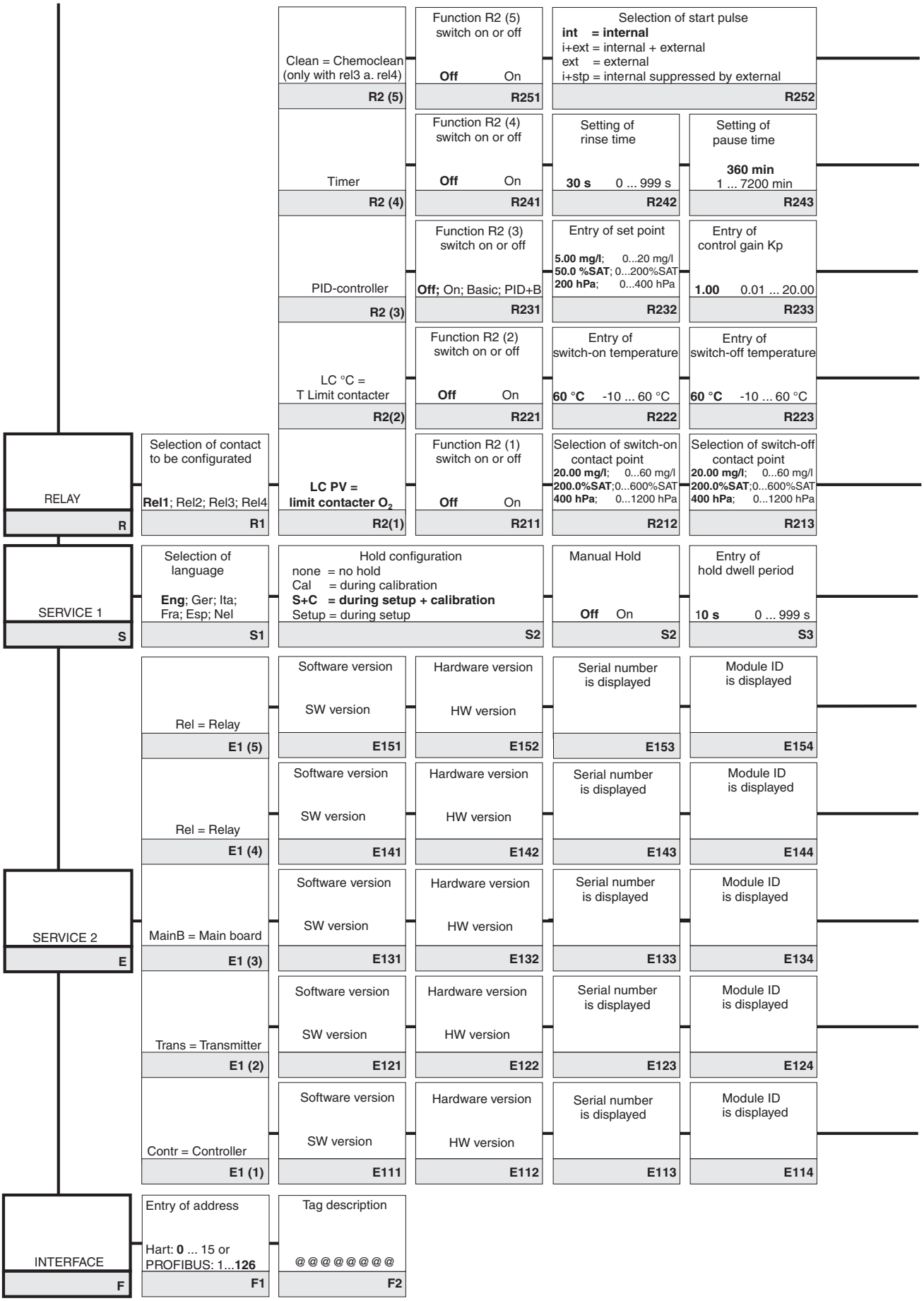
Desktop Model 840 / 842 - **WX/WS with OOS 3 / 3S / 3HD / 31**



Field for entry of user settings


RELAY
R
Selection of contact to be configurated
Rel1; Rel2; Rel3; Rel4
R1
Clean = Chemoclean (only with rel3 a. rel4)
R2 (5)
LC °C = T Limit contacter
R2(2)
Timer
R2 (4)
PID-controller
R2 (3)
LC PV = limit contacter O2
R2(1)
Function R2 (5) switch on or off
Off On
R251
Function R2 (4) switch on or off
Off On
R241
Function R2 (3) switch on or off
Off; On; Basic; PID+B
R231
Function R2 (2) switch on or off
Off On
R221
Function R2 (1) switch on or off
Off On
R211
Selection of start pulse
int = internal
i+ext = internal + external
ext = external
i+stp = internal suppressed by external
R252
Setting of rinse time
30 s 0 ... 999 s
R242
Entry of set point
5.00 mg/l; 0...20 mg/l
50.0 %SAT; 0...200%SAT
200 hPa; 0...400 hPa
R232
Entry of switch-on temperature
60 °C -10 ... 60 °C
R222
Selection of switch-on contact point
20.00 mg/l; 0...60 mg/l
200.0%SAT; 0...600%SAT
400 hPa; 0...1200 hPa
R212
Setting of pause time
360 min
1 ... 7200 min
R243
Entry of control gain Kp
1.00 0.01 ... 20.00
R233
Entry of switch-off temperature
60 °C -10 ... 60 °C
R223
Selection of switch-off contact point
20.00 mg/l; 0...60 mg/l
200.0%SAT; 0...600%SAT
400 hPa; 0...1200 hPa
R213
SERVICE 1
S
Selection of language
Eng; Ger; Ita; Fra; Esp; Nel
S1
Hold configuration
none = no hold
Cal = during calibration
S+C = during setup + calibration
Setup = during setup
S2
Manual Hold
Off On
S2
Entry of hold dwell period
10 s 0 ... 999 s
S3
SERVICE 2
E
Rel = Relay
E1 (5)
Software version
SW version
E151
Hardware version
HW version
E152
Serial number is displayed
E153
Module ID is displayed
E154
Rel = Relay
E1 (4)
E141
E142
E143
E144
MainB = Main board
E1 (3)
E131
E132
E133
E134
Trans = Transmitter
E1 (2)
E121
E122
E123
E124
Contr = Controller
E1 (1)
E111
E112
E113
E114
INTERFACE
F
Entry of address
Hart: 0 ... 15 or
PROFIBUS: 1...126
F1
Tag description
@@@@@@@@
F2

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Desktop Model 840 / 842 - **WX/WS with OOS 3 / 3S / 3HD / 31**

Entry of pre-rinse time	Entry of cleaning time	Entry of post-rinse time	Number of repeat cycles	Setting of interval between 2 cleaning cycles (pause time)	Setting of minimum pause time	Number of clean. cycles without cleaning agent
30 s 0 ... 999 s	**10 s** 0 ... 999 s	**20 s** 0 ... 999 s	**0** 0 ... 5	**360 min** 1...7200 min	**120** min 1...3600 min	**0** 0 ... 9
R253	**R254**	**R255**	**R256**	**R257**	**R258**	**R259**

Setting of minimum pause time
120 min 1...3600 min
R244

Chemoclean: uses 2 contacts, only for contact 3 (+4) permissible

Entry of integral action time Tn (0.0=no I component)	Entry of derivative action time Tv (0.0=no D component)	Selection of control characteristics	Selection	Entry of pulse interval	Entry of pulse frequency	Entry of minimum On-time t_{on}	Entry of basic load
0.0 s 0.0...999.9 min	**0.0 s** 0.0...999.9 min	**inv = invers** dir = direct	**len = pulse length** freq=pulse frequency curr = current output	**10.0 s** 0.5...999.9 s	**120 min**$^{-1}$ 60 ... 180 min^{-1}	**0.3 s** 0.1 ... 5.0 s	**0%** 0 ... 40%
R234	**R235**	**R236**	**R237**	**R238**	**R239**	**R2310**	**R2311**

Setting of pickup delay	Setting of dropout delay	Setting of alarm threshold (absolute value)	LC status
0 s 0 ... 2000 s	**0 s** 0 ... 2000 s	**60 °C** -10 ... 60 °C	**MIN;** MAX
R224	**R225**	**R226**	**R227**

Setting of pickup delay	Setting of dropout delay	Setting of alarm thre shold (abs. value)	LC status
0 s 0 ... 2000 s	**0 s** 0 ... 2000 s	**20.00 mg/l**; 0...60 mg/l **200.0%SAT**;0...600%SAT **400 hPa**; 0...1200 hPa	**MIN;** MAX
R214	**R215**	**R216**	**R217**

Entry of SW-Upgrade release code (plus package)	Entry of SW-Upgrade release code Chemoclean	Display of order number	Display of serial number	Reset instrument to default values	Perform instrument test	Display of absolute air pressure
0000 0000 ... 9999	**0000** 0000 ... 9999			**no;** Sens; factory	**no;** display	
S5	**S6**	**S7**	**S8**	**S9**	**S10**	**S11**

Serial number sensor head	Serial number sensor	Order number sensor	Display of minimum temperature	Display of maximum temperature
existing serial no. 00000000...99999999	**existing serial no.** 00000000...99999999	**existing order no.** COS31-...COS31-ZZZZ		
E155	**E156**	**E157**	**E158**	**E159**

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BA 199e10/07.02