Conex® DIS-C

Installation and operating instructions

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Original installation and operating instructions

CONTENTS

Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. Symbols used in this document

Warning

If these safety instructions are not observed, it may result in personal injury.

Caution — If these safety instructions are not observed, it may result in malfunction or damage to the equipment.

Note — Notes or instructions that make the job easier and ensure safe operation.

2. General information

These installation and operating instructions contain all information important for users of the Conex® DIS-C:

- technical data
- instructions on commissioning, use and maintenance
- safety information.

Should you require further information or should you encounter problems that are not handled in sufficient depth in this manual, please contact Grundfos. We shall be pleased to support you with our comprehensive know-how in the fields of measuring and control technology as well as water treatment.

We always welcome suggestions on how to optimise our installation and operating instructions to satisfy our customers.

3. Description of the device

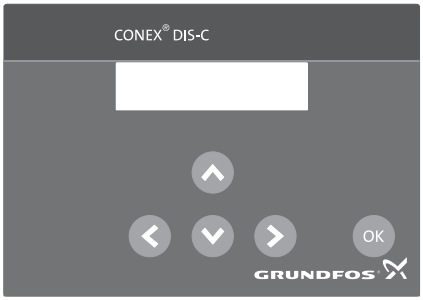

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Fig. 1 Conex® DIS-C for wall mounting

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Fig. 2 Conex® DIS-C for installation in control panel

3.1 Assembly

The complete measuring system comprises:

- the measuring amplifier Conex® DIS-C
- the conductivity measuring cell with temperature sensor.

3.2 Principles of conductivity measurement

In metallic conductors, electricity is transported by freely moving electrons, whereas in electrolytes, the electrical current is carried by ions.
All water-dissolved components that are in ionogenic form contribute towards conductivity.
The conductivity is a sum parameter.

Different types of ions vary in their electrical charge and migration rate. The migration rate is highly dependent on temperature, which means the influence of temperature must always be taken into account when measuring conductivity.

Specific electrolytic conductivity is measured in Siemens per cm (S/cm). Siemens per cm is the reciprocal value of electrical resistance.
This measurement is based on a theoretical liquid cube with sides of a length of 1 cm. In practice, cells rarely have such an even geometric shape. The cell constant C is used to specify the correlation between the actual measured conductivity and the displayed specific conductivity.

The measuring cell is inserted in a flow armature, and the water to be measured flows around it.
The Conex® DIS-C measuring and regulation device amplifies the signal from the measuring cell and calculates the signal (e.g. against cable and temperature compensation parameters). The result is displayed digitally and can also be registered using the analog output. The result is shown as an actual value.

4. Applications

The Conex® DIS-C is a measuring amplifier for measuring conductivity using a conductive or inductive measuring cell and for regulation of disturbance variables using a connected control element. Two controllers can be set separately as limit values, intermittent pulse controllers or pulse frequency controllers.

The Conex® DIS-C is available for installation in a wall-mounted enclosure or for installation in a control panel (only conductive measuring cell for conductivity measurement).

4.1 Field of application for measurements

Principal uses:

- waste water treatment
- water purification
- recycling
- in metal processing industries
- in the chemical industry
- in the foodstuff industry.

5. Safety

The owner/operations manager of the system is responsible for the following:

- compliance with country-specific safety regulations
- training of operating personnel.

5.1 Obligations of the owner/operations manager

The owner/operations manager must ensure that persons working with the device described fulfil these requirements:

- They are acquainted with the regulations concerning working safety and accident prevention.
- They have been trained in use of the device.
- They have read and understood the warning information and handling symbols.

The owner/operations manager is also responsible for ensuring that this manual is kept in the immediate vicinity of the device and is always available for the operating personnel.

5.2 Avoidance of danger

Warning

Installation and connection of the device and the associated supplementary components must only be carried out by authorised personnel!

The local safety regulations must be observed!

Switch off the power supply before connecting the power cable and the relay contacts!

Warning

Do not dismantle the device!

Cleaning, maintenance and repair must only be carried out by authorised personnel!

Warning

Other applications than those described in section *4. Applications* are not approved and not permitted. Grundfos cannot be held liable for any damage resulting from incorrect use.

Caution

The mounting location must be selected so that the housing is not subjected to mechanical loading.

Check that all settings are correct before starting up the device!

6. Identification

6.1 Nameplate

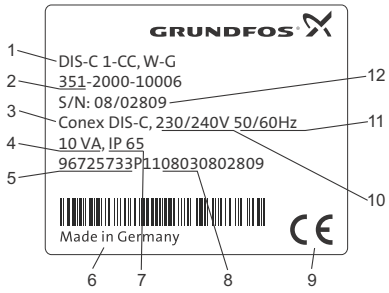

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Fig. 3 Nameplate, Conex® DIS-C

Pos.	Description
1	Type designation
2	Model
3	Product name
4	Power consumption [VA]
5	Product number
6	Country of origin
7	Enclosure class
8	Year and week of production
9	Marks of approval, CE mark, etc.
10	Voltage [V]
11	Frequency [Hz]
12	Serial number

6.2 Type key

Example:	DIS	-C	-P	CC	-R1	-F	-PVC	W	-G

Units for measurement and control

DIS-C	Dosing Instrumentation Standard for conductivity measurement

Assembly

P	Prepacked

Measuring cell

CC	Conductivity, conductive
CI	Conductivity, inductive

Measuring range

R1	0 to 200 µS/cm
R2	0 to 2000 µS/cm
R3	0 to 20,000 µS/cm

Armature type

F	Flow
I	Immersion
X	No armature

Armature material

PVC	Polyvinyl chloride
PP	Polypropylene

Controller mounting option

W	Wall-mounted
P	Panel-mounted (only for conductive measuring cell)

Power supply

G	1 x 230/240 V, 50/60 Hz
H	1 x 115/120 V, 50/60 Hz

7. Technical data

7.1 Versions

Power supply	• 230 V (± 10 %), 50/60 Hz (standard version) • 115/120 V (± 10 %), 50/60 Hz
Type of measuring cell	• Conductive • Inductive
Mounting variants	• For wall mounting • For installation in control panel (only Conex® DIS-C, CI devices - with conductive measuring cell).

7.2 General data

Dimensions (W x H x D)	• 165 x 160 x 80 mm (for wall mounting) • 96 x 96 x 127 mm (for installation in control panel)
Weight	• 1.0 kg (for wall mounting) • 0.8 kg (for installation in control panel)
Enclosure class	• IP65 (wall-mounted) • IP54 (front, installation in control panel)
Internal fuse	• Yes (wall-mounted) • No (installation in control panel)
Display	LCD display, two lines, 2 x 16 characters
Connections	Terminal strips for cable up to maximum 1.5 mm^2
Power consumption	10 VA
Electrical output	0 (4) to 20 mA galvanically isolated, maximum load 500 Ω
Switching points	Can be set within the measuring range
Contact rating for regulation and alarm relay	6 A / 250 V, maximum ohm resistive load 550 VA (with RC contact protection)
Permissible ambient temperature	0 °C to +50 °C
Permissible storage temperature	-20 °C to +65 °C
Maximum relative humidity	90 % (non-condensing)
Adjustable temperature coefficient of measurement solution	0 to 8 % / °C
Proportional band Xp	1 to 3000 %
Reset time Tn	0 to 3000 seconds

7.3 Measuring ranges

7.3.1 Measuring ranges and cell constants for Conex® DIS-C with conductive measuring cell

Measuring range	Cell constant	Conductive measuring cell
0 to 20 MΩ/cm	C = 0.05	96609150
0 to 2 µS/cm		
0 to 20 µS/cm		
0 to 200 µS/cm		
0 to 2 mS/cm	C = 0.2	96609151
0 to 20 mS/cm	C = 1	96609152

7.3.2 Measuring ranges for Conex® DIS-C with inductive measuring cell

Measuring range	Inductive measuring cell
0 to 2.000 mS/cm	95720194
0 to 20.00 mS/cm	
0 to 200.0 mS/cm	
0 to 2000 mS/cm	

7.4 Dimensional sketches / drilling diagram

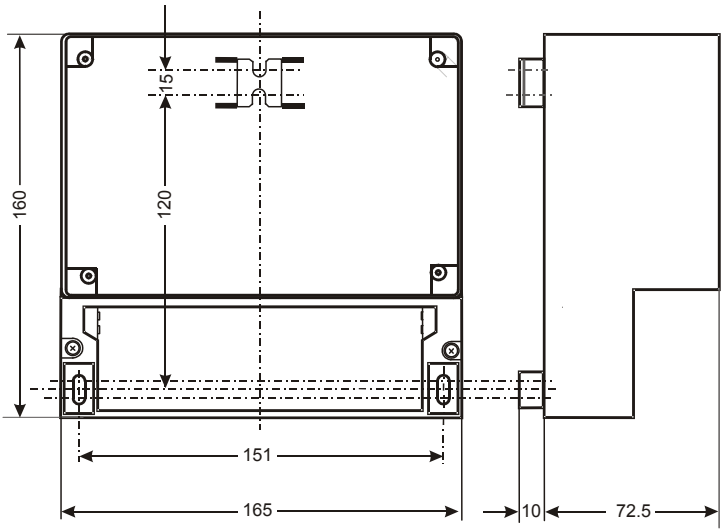

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Fig. 4 Dimensional sketch / drilling diagram for Conex® DIS-C for wall mounting

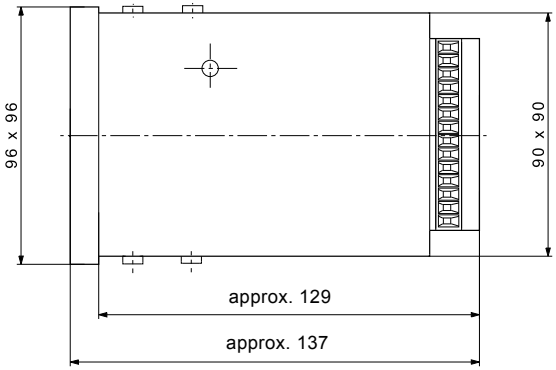

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Fig. 5 Dimensional sketch / mounting sketch for Conex® DIS-C for control-panel wall mounting

8. Installation

8.1 Transport and storage

- Transport the device carefully, do not drop!
- Store at dry and cool location between -20 °C and +65 °C.

8.2 Unpacking

Caution Do not allow any foreign bodies to enter!

- Check the device for damage. Install as soon as possible after unpacking.
- Do not install or connect damaged devices!

Note Retain the packing material or dispose of it according to local regulations.

8.3 Installation requirements

Caution If you do not observe the installation requirements, the device may be damaged! The measurements may not be correct!

- The location must be vibration-free, dry, dust-free and free of corrosive, pungent fumes or aggressive solvents.
- Observe the data in section *7. Technical data*.

8.4 Assembling the Conex® DIS-C housing for wall mounting

Warning

Switch off the power supply before installing!

Enclosure class IP65 is only guaranteed if the clamp covers and the associated threaded cable connections and temporary covers are closed.

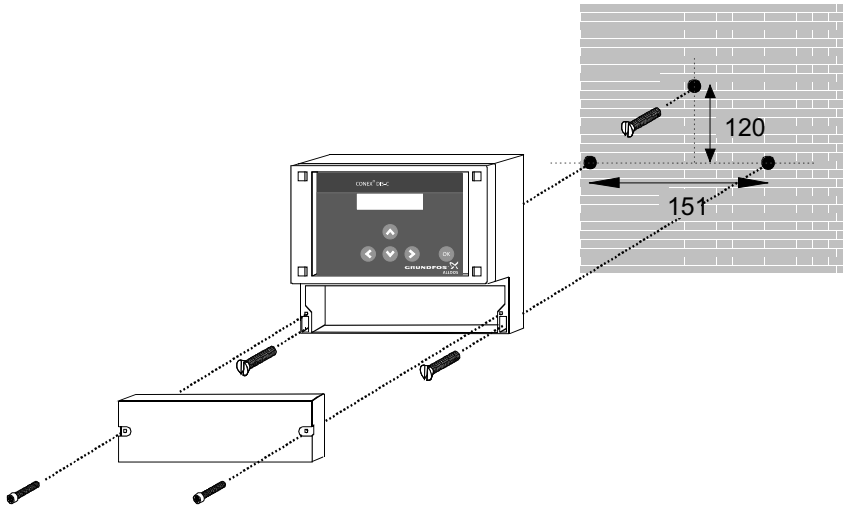

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Fig. 6 Installation of Conex® DIS-C for wall mounting

1. Drill three dowel holes with a diameter of 8 mm. See section *7.4 Dimensional sketches / drilling diagram*.
2. Insert the supplied dowel pins.
3. Unscrew the clamp cover from the device.
4. Screw in the top middle screw.
5. Hang the device onto this screw.
6. Secure the device using the other two screws.
7. Screw the clamp cover back on.

Caution Do not damage the gasket.
The gasket must be fitted exactly.

8.5 Assembling the Conex® DIS-C-P, CI housing for installation in control panel

1. Make an opening of 92 + 0.8 mm x 92 + 0.8 mm in the control panel.
2. Slip on the supplied gasket.
3. Insert the device into the opening from the front.

Caution Do not damage the gasket.
The gasket must be fitted exactly.

4. Hook the clamps into the tightening cones on the sides at the top and bottom.
5. Secure the device from the rear using a screwdriver.

9. Commissioning / electrical connections

Warning
Switch off the power supply before installing!
Enclosure class IP65 is only guaranteed with the front panel of the terminals enclosure closed and with appropriate cable glands or dummy caps.

Warning
Switch off the power supply before connecting the power supply cable and the relay contacts! For safety reasons, the protective conductor must be connected correctly!
Observe the local safety regulations!
Protect the cable connections and plugs against corrosion and humidity.

Before connecting the power supply cable, check that the supply voltage specified on the nameplate corresponds to the local conditions!
An incorrect supply voltage may destroy the device!

Caution To ensure electromagnetic compatibility (EMC), the input and current output cables must be screened.
Connect the screening to the screen ground on one side.
Refer to the wiring diagram! Route the input, current output and power supply cables in separate cable channels.

Enclosure class IP65 is only guaranteed if the terminal cover is correctly sealed! Do not damage the gasket on the terminal cover!

Caution
The gasket on the terminal cover must be positioned precisely!
Do not damage the gasket!

Note Unused terminals must remain open.

1. Remove the terminal cover on the front of the device.
2. Use the appropriate cable feedthroughs and tighten the screws carefully.
3. Connect the cables used to the terminals according to the Conex® DIS-C terminal assignment.
4. Close the terminal cover again with correctly positioned gasket.

9.1 Conex® DIS-C conductive, housing for wall mounting

Caution

The measurement input must be screened! The screen must not be connected to the Conex® DIS-C, but only to the measuring cell (outer casing of the cell)!

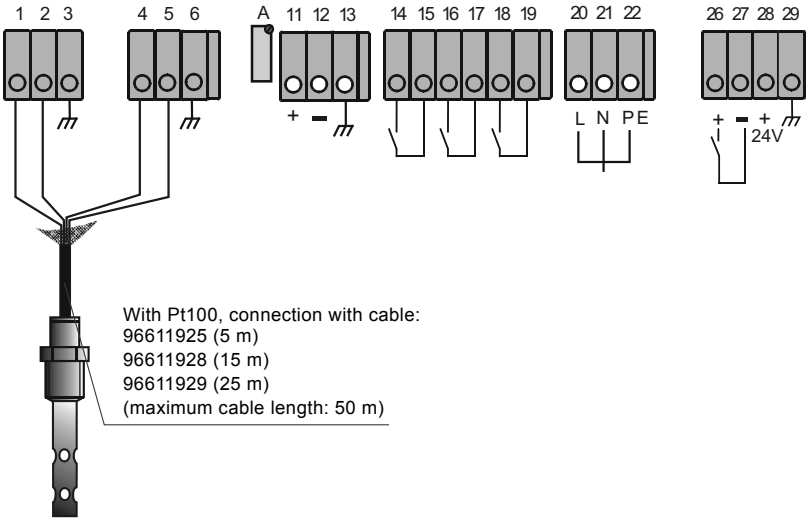

Fig. 7 Terminal connection diagram for Conex® DIS-C with conductive measuring cell, housing for wall mounting

Pos.	Description
1	White, inner electrode of measuring cell
2	Brown, outer electrode of measuring cell
4	Yellow, Pt100
5	Green, Pt100
A	Trimmer contrast setting
11-12	0/4-20 mA output
14 / 15	Control relay 1 output
16 / 17	Control relay 2 output
18 / 19	Alarm relay 3 output
20 / 21 / 22	For supply voltage, see nameplate
26 / 27	Water sensor
28	Screen

9.2 Conex® DIS-C inductive, housing for wall mounting

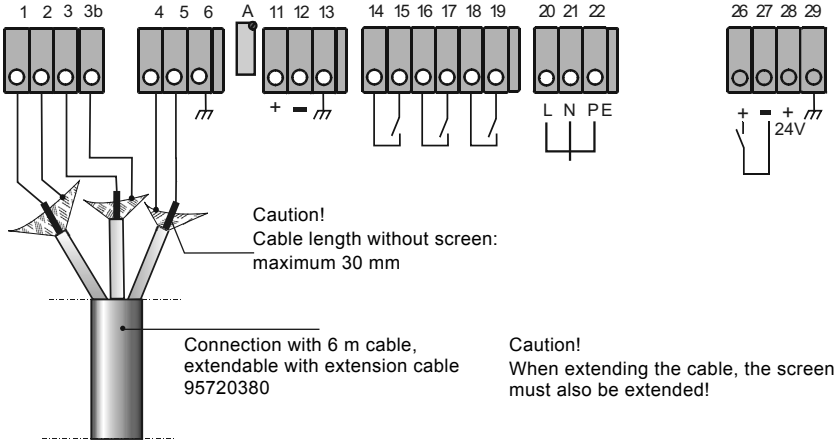

Fig. 8 Terminal connection diagram for Conex® DIS-C with inductive measuring cell, housing for wall mounting

Pos.	Description
1	Green, measurement
2	White, screen
3	Red, voltage supply
3b	Black, voltage supply screen
4	Yellow, temperature sensor NTC, screen
5	Brown, temperature sensor NTC
A	Trimmer contrast setting
11 / 12	0/4 to 20 mA output
14 / 15	Control relay 1 output
16 / 17	Control relay 2 output
18 / 19	Alarm relay 3 output
20 / 21 / 22	For supply voltage, see nameplate
26 / 27	Water sensor (external controller stop)
28	+24 V
29	Screen

9.3 Conex® DIS-C conductive, housing for installation in control panel

Caution

The screen must not be connected to the Conex® DIS-C, but only to the measuring cell. See the installation and operating instructions for the measuring cell!

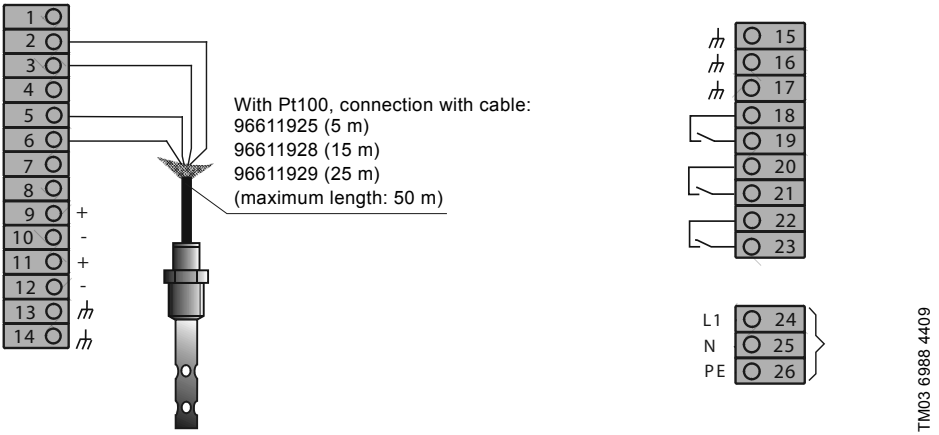

Fig. 9 Terminal connection diagram for Conex® DIS-C with conductive measuring cell, housing for installation in control panel

Pos.	Description
2	White, inner electrode of measuring cell
3	Brown, outer electrode of measuring cell
5	Yellow, Pt100
6	Green, Pt100
9 / 10	0/4 to 20 mA output
11 / 12	Water sensor
18 / 19	Control relay 1 output
20 / 21	Control relay 2 output
22 / 23	Alarm relay 3 output
24 / 25 / 26	For supply voltage, see nameplate

9.4 Important instructions for connecting the device

As is common in microprocessor-controlled devices, certain precautions must be taken during installation and wiring. In addition to the general guidelines, the following is of particular importance:

- Input wires and control wires must be laid separately from one another and from power supply cables.
- Analog output wires must be screened. The screen can be connected to the device.
- Relays and protective spools must remain free of interference.
- If inductive loads are connected, they must either be screened, or the relay contact must be protected on the clamping strip of the Conex® DIS-C by an RC protective circuit, in accordance with the following table and the switching diagrams.

9.4.1 Power supply

Warning
Before connecting the device, switch off the power supply!

- The device is connected to the power supply at the clamps (L), (N) and (PE).
- Check the correct supply voltage on the nameplate.

Caution Connection of an incorrect supply voltage may destroy the device!

9.4.2 Connecting the conductivity measuring cell

Caution For connecting the conductivity cell to the Conex® DIS-C, only use the prescribed cable. This cable must not be used in the same cable channel as power supply cables!
Protect cable connections and plugs against corrosion and moisture!

9.4.3 Relay outputs

If inductive loads (including relay and protective spools) are connected, they must be screened. If this is not possible, the relay contact must be protected using a protection circuit in accordance with the table below.

For AC current

Current up to	Capacitor C	Resistor R
60 mA	10 nF, 260 V	390 Ω, 2 W
70 mA	47 nF, 260 V	22 Ω, 2 W
150 mA	100 nF, 260 V	47 Ω, 2 W
1.0 A	220 nF, 260 V	47 Ω, 2 W

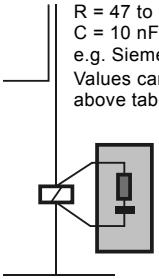

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Fig. 10 Protection circuit with AC current

For DC voltage

The relay or protective spool must be screened with a suppressor diode.

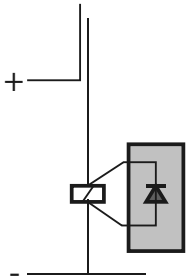

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Fig. 11 Protection circuit with DC voltage

Warning
If floating relay outputs are used, they must be supplied with a backup fuse!

9.4.4 Current outputs

Caution When connecting the electrical outputs, be aware of the polarity and the maximum load (500 Ω)!

Caution Use a screened cable for connecting the electrical outputs. The screen must be connected to PE with one end.

10. Principles of regulatory function

Freely selectable control functions mean that the Conex® DIS-C controller can be adapted to a wide variety of closed-loop control systems.

10.1 Regulatory behaviour

10.1.1 P regulation behaviour

The P controller has a static characteristic curve. The characteristic proportional band for the P controller is Xp. Within this range, which is limited to a maximum or minimum depending on the control direction, there is a proportional correlation between the input and output quantities of the controller.

The lower limit is the response threshold of the controller. This is the smallest regulatory deviation that leads to a measurable control variable.

The upper limit separates the proportional band from saturation. Above this limit, no further increase in output signal is possible, regardless of increases in the input signal. This range is called the control range of the controller, and the control variable can have any value within this range.

Due to the static characteristic curve, the P controller cannot reach the setpoint in a stationary state. This results in a consistent regulatory deviation, which can be reduced by decreasing Xp, but which cannot be completely eliminated using a P controller.

The controller reacts quicker with small Xp values. The Xp value cannot, however, be reduced arbitrarily, as this causes the controller to become unstable.

10.1.2 I regulation behaviour

The non-delayed relationship between the regulatory deviation and the control variable in a P controller results in an undesirable persistent regulatory deviation. However, if the regulatory deviation is controlled directly by the regulating speed instead of the control variable, this fixed assignment of the two variables no longer applies. The result is an integrated controller.

With a regulatory deviation of zero, i.e. when the setpoint is equal to the actual value, the regulating speed is also zero. Both positive and negative regulatory deviations can be influenced by positive or negative regulating speeds. The control variable covers the whole control range. The control range of the I controller is the range in which the regulatory deviation controls the regulating speed in a linear fashion.

The characteristic value of the I controller is the reset time Tn. The reset time is the time that must elapse, due to the integrated mode of action, for the step response to reach the value that a P controller would reach immediately.

The control circuit reacts slowly. If a regulatory deviation results, an I controller can only react by constantly changing its control variable. For this reason, regulation with I controllers is always slower than with controllers that act proportionally. If the speed of the controller is increased by decreasing the integration constant, the control circuit has a slight tendency towards instability.

At Tn = 0, the controller has no I proportion.

In the absence of external influences, a control circuit with an I controller therefore has no residual regulatory deviation in a stationary state when the control variable is constant.

10.2 Limit values

Note Setting for a limit value: Xp = O.

In principle, the limit value only has two switching states; ON and OFF. Depending on the set control direction, the controller is deactivated when the setpoint value is exceeded, or when the value drops below the setpoint.

10.2.1 Limit values with hysteresis

To prevent constant switching when the setpoint value is reached, it is possible to specify a hysteresis for the controller.

Example:

- setpoint 600 µS/cm
- hysteresis 10 µS/cm.

The hysteresis band is arranged symmetrically around the switching point.

- Switch-off point = measured value + hysteresis / 2
- Switch-on point = measured value - hysteresis / 2.

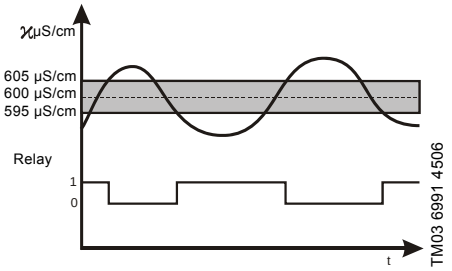


Fig. 12 Limit values with hysteresis

10.3 On-off controller with P behaviour

Note Setting for an on-off controller: Xp > O.

It is possible to use an on-off controller with P behaviour as an intermittent pulse regulator or as a pulse frequency regulator.

10.3.1 Intermittent pulse regulator

Note Setting for an intermittent pulse regulator: Xp > O, pulse frequency = 0.

Example:

- setpoint = 6 mS/cm
- measuring range 0 to 10
- Xp = 30
- control direction = downwards.

Xp determines the size of the proportional band as a percentage of the measuring range. In the following example, this means that above 6 mS the relay switches on, first with a short activation time and then with an increasing activation time to 9 mS (the total switching on + off time remains constant). For greater measured values, the relay remains constantly switched on.

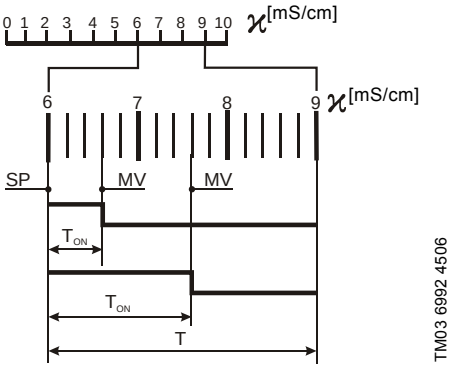


Fig. 13 Intermittent pulse regulator

SP	setpoint
MV	measured value

The intermittent pulse regulation offers the option to recreate a constant controlling element using very simple control elements, e.g. a magnetic valve. Here, the relationship between switching on and off is changed depending on the calculated control variable. The total time (ON+OFF) is constant in intermittent pulse regulation. The total time can be set to between 1 and 99 seconds depending on the control system. A setting of 10 seconds leads to a good result in most cases.

If the calculated control variable is very low, in some cases it is possible that the control element attached here does not show a reaction within this short time. In this case, it is possible to set a minimum drive pulse. This can be within the range 0.1 to 9.9 seconds.

Note The intermittent pulse period must always be at least twice as long as the minimum switch-on time!

10.3.2 Pulse-frequency regulator

Note Setting for a pulse-frequency regulator: Xp > O, pulse frequency > 0.

Example:

- setpoint = 6 mS/cm
- measuring range 0 to 10
- Xp = 20 or 40
- pulse frequency = 120
- control direction = downwards.

Xp determines the size of the proportional band as a percentage of the measuring range. In the following example, this means that impulses are output from 6 mS and constantly increase to 8 mS (Xp = 20) or 10 mS (Xp = 40). For higher measured values, the prespecified maximum number of impulses (here 120/min) is output.

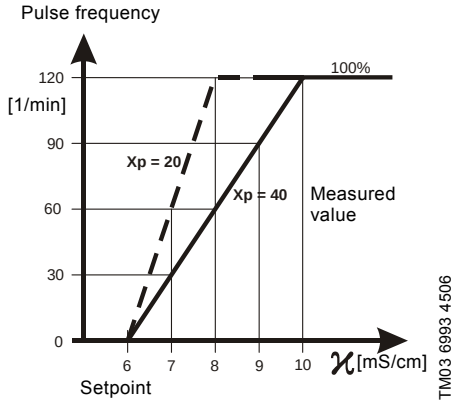


Fig. 14 Pulse-frequency regulator

The pulse frequency regulator in combination with an appropriate control variable is almost the same as a continuous controller. The disadvantages of the impulse-driven control variable only becomes apparent in the lower control variable range and with a low maximum pulse frequency. The specification of the maximum pulse frequency refers to 100 % dosing flow and can be set within a range from 0 to 180 impulses per minute.

10.3.3 Continuous action controllers

The control variables calculated by the controller based on the setpoint S1 or S2 can optionally be output as a continuous control signal via the analog output.

See section *12.4.4 Analog output*.

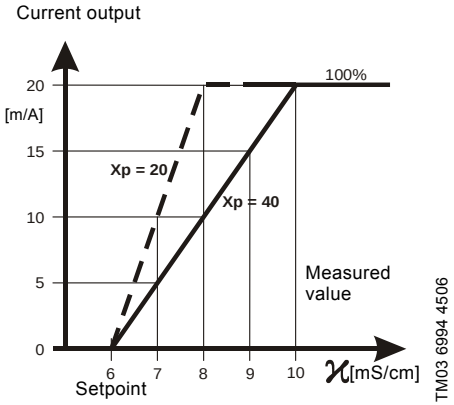


Fig. 15 Continuous-action controllers

10.4 Parameter settings

Make a note here of the parameter settings for the device.

Setup	
Controller	
Pulse freq. S1	_____ / min
Pulse freq. S2	_____ / min
Ctrl. direction S1	__ downward
	__ upward
Ctrl. direction S2	__ downward
	__ upward
Hysteresis	_____ µS
Int. pulse period	_____ s
Min. switch-on	_____ s
Delay control	
Delay ctrl.	__ off
	__ on
Delay ctrl.	_____ s
Analog output	
Select output	__ 0-20 mA
	__ 4-20 mA
Start 0/4 mA	_____ µS
End 20 mA	_____ µS
Analog output	__ measured value
Temper. coeff.	_____ % / °C
Cell const.	_____
Measur. range	_____
Averaging	__ on
	__ off
Temperature compensation	
Temp. compens.	__ Automat.comp.
	__ Manual comp.
Manual temp.	_____ °C
Controller settings	
Setpoint 1	_____ µS
Prop. band XP S1	_____ µS
Reset time TN S1	_____ s
Setpoint 2	_____ µS
Prop. band XP S2	_____ µS
Reset time TN S2	_____ s

Alarm	
Alarm value A1	_____ µS
Alarm value A2	_____ µS
Delay	_____ s

11. Initial operation and settings

11.1 Initial steps for operation

Once the assembly and connection steps have been completed, carry out the following steps when using the device for the first time.

Warning

Before connecting the power supply, ensure that the supply voltage corresponds to the power supply specified on the nameplate!

1. Switch on the power supply.
2. If required, set the measuring range.
3. Check the entered cell constants.
4. If necessary, perform a cable compensation (for a conductive measuring cell).
5. Set the parameters for the device function.

Check the outputs and secondary devices.

Note: Notes or instructions that make the job easier and ensure safe operation.

12. Operation

12.1 Device layout for Conex® DIS-C

12.1.1 Control and display elements

The Conex® DIS-C conductivity measuring amplifier is operated using a touch-sensitive membrane keypad.

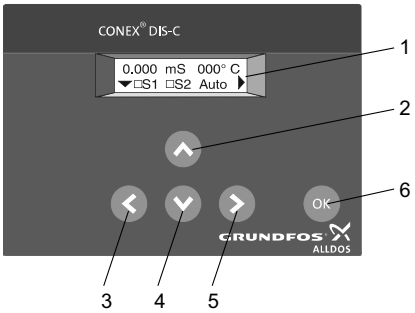


Fig. 16 Control and display elements

Display

Pos.	Description
1	LCD display

Control elements

Pos.	Function	Name
2	Menu control button	[Up]
3		[Left]
4		[Down]
5		[Right]
6	Button for returning to start menu	[OK]

Display fields

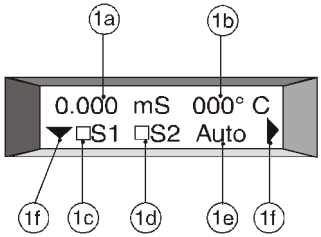


Fig. 17 Display fields

Pos.	Description
1a	Measuring value display • Displays the current measured value in MΩ, µS, mS (depending on the selected measuring range).
1b	Temperature display • Displays the temperature used for compensation. Depending on the setting, this is either the manually specified temperature or the temperature measured using the temperature sensor.
1c	Relay 1 switching status • A filled rectangle indicates switched-on status.
1d	Relay 2 switching status • A filled rectangle indicates switched-on status.
1e	Control function • Displays the preselected regulation type.
1f	Display of active menu control buttons.

12.2 Menu control

Main menu		Default values
Temp. compens.	Temp. compens.	Manual comp.
	Manual temp.	025 °C
Enter password	Enter password	Code 086
Controller	Setpoint S1	02.5 µS
	Prop. and xp S1	10 %
	Reset time TN S1	000 s
	Setpoint S2	02.0 µS
	Prop. band xp S2	10 %
	Reset time TN S2	000 s
Alarm values	Alarm value A1	00.0 µS
	Alarm value A2	02.0 µS
	Delay	0.05 s
Setup	See table below	
Service	See table below	

Setup menu		Default values
Corr. temp.	Corr. temp.	0 °C
Contr. param.	Pulse freq. S1	0-180 / min
	Pulse freq. S2	0-180 / min
	Ctrl. direction S1	Downward control
	Ctrl. direction S2	Upward control
	Hysteresis	00.1 µS
	Int. pulse period	10 s
	Min. switch-on	0.5 s
Delay ctrl.	Delay ctrl.	off
	Delay ctrl.	180 s
Analog output	Select output	0-20 mA
	Start 0/4 mA	00.0 µS
	End 20 mA	200.0 µS
	Analog output	Measured value
Language	Sel. language	Deutsch
Temper. coeff.	Temper. coeff.	0.0 % / °C
Cell const.	Cell const.	0.050
Cable compens.	Cable compens.	00.0 µS
Measur. range	Measur. range	20.00 µS
Averaging	Averaging	off

Service menu		Default values
Product info	Unit No.	No. 041
	Software date	M/Y 1.00
	Product. date	M/Y 1.00
Analog input	Input 1	-019
	Input 2	000 °C
Delete setting	Delete setting	

12.3 Navigation in the menus

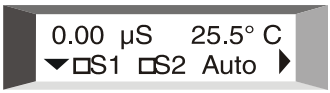
- To navigate in and between menus, use the [Up] and [Down] buttons.
- Use the [Right] button to open the menu next to it. The currently active menu control buttons are displayed in the corresponding line.
- Use the [Left] button to save values.
- Use [OK] to exit the menu and return to the start display.

Note Important menu selections and changes to data are code-protected to prevent unauthorised access.

Note The order of the settings in the following section is different to the order of menu navigation. This section describes the basic settings that are made first during setup.

12.4 Setup

The "Setup" menu contains settings that need to be made or checked the first time the Conex® DIS-C is used.



TM03 6997 4506

1. Press the [Down] button to navigate to the "Setup" menu.

TM03 6998 4506

2. Press the [Right] button to open the "Setup" menu.
3. Press the [Down] button to navigate to the submenus.

In the submenus, it is possible to enter settings for the following values:

- temperature correction
- control parameters
- switch-on delay
- analog output
- language
- temperature coefficient
- cell constant C
- bus address
- cable compensation/zero point
- measuring range
- averaging on/off.

12.4.1 Temperature correction

Because the temperature sensor is connected using a 2-conductor method, this can result in deviations in temperature measurement and display.
These deviations can be corrected within a range of ± 5 °C.

1. Press the [Right] button to open the "Corr. temp." menu.

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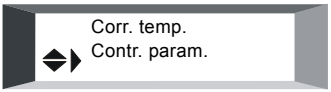
2. Press the [Right] button to start value input.
3. Press the [Up] and [Down] buttons to set the value.

12.4.2 Control parameters

The first time the device is used, the regulatory functions must be defined.

In the "Contr. param." menu, the following values can be set:

- pulse frequency S1
- pulse frequency S2
- hysteresis
- pulse + pause
- minimum impulse.



TM03 6998 4506

1. Press the [Right] button to open the "Contr. param." menu.
2. Press the [Down] button to navigate to the submenus.

Pulse frequency S1/S2

Setting for a limit value: Xp = O.

Note

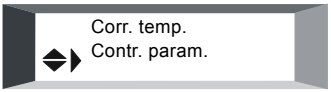
Setting for an intermittent pulse regulator: Xp > O, pulse frequency = 0.
Setting for a pulse frequency regulator: Xp > O, pulse frequency > 0.

Note

Pulse frequency setting = maximum number of impulses per minute. Set the appropriate pulse frequency for the connected control element.

Note

It is possible to make separate control parameter settings for S1 and S2.



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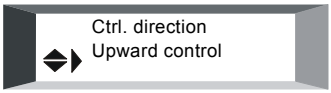
1. Press the [Right] button to open the "Pulse freq. S1" or "Pulse freq. S2" menu.
2. Press the [Up] and [Down] buttons to set the value.

Control direction S1/S2

By default, the control direction is set to exceeded (= downwards) for S1, and for S2 it is set to upwards. This means that if the value set for setpoint S1 is exceeded, relay 1 is switched, and if the value drops below setpoint S2, relay 2 is switched.

It is possible to change the control direction for S1 and S2.



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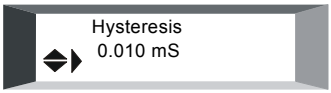
1. Press the [Right] button to open the "Ctrl. direction S1" or "Ctrl. direction S2" menu.
2. Press the [Up] and [Down] buttons to set the value.

Hysteresis

The hysteresis setting only takes effect for a limit value. If a setting is made, the hysteresis band surrounds the selected setpoint symmetrically. If the setpoint S1 is set to 0.500 mS and the hysteresis setting is set to 0.010 mS, the relay switches on or off (depending on the control direction) at 0.505 mS and 0.495 mS.



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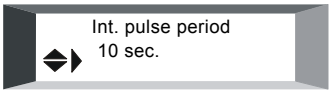
1. Press the [Right] button to open the "Hysteresis" menu.
2. Press the [Up] and [Down] buttons to set the value.

Intermittent pulse period

The factory setting for the intermittent pulse period is 10 seconds. This setting has proved ideal for nearly all applications.



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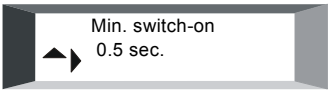
1. Press the [Right] button to open the "Int. pulse period" menu.
2. Press the [Up] and [Down] buttons to set the value.

Minimum impulse/minimum switch-on time

The minimum switch-on time determines the shortest drive pulse in the intermittent pulse period regulation.

The intermittent pulse period setting must always be at least twice as long as the minimum switch-on time.

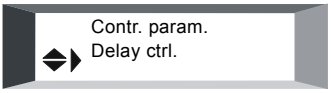


TM03 6999 4506

1. Press the [Right] button to open the "Min. switch-on" menu.
2. Press the [Up] and [Down] buttons to set the value.

12.4.3 Switch-on delay

If the switch-on delay of the Conex® DIS-C is activated, the controller is not activated until the specified time has elapsed after the power supply to the device has been switched on. This menu can be used to switch the switch-on delay on and off, and if the switch-on delay is activated, the delay duration can be entered.



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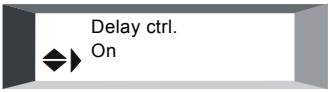
Activating/deactivating the switch-on delay

1. Press the [Right] button to open the "Delay control" menu.



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2. Press the [Right] button to switch between on and off.

Setting the switch-on delay time

1. Press the [Right] button to open the value input display.
2. Press the [Up] and [Down] buttons to set the value.

12.4.4 Analog output

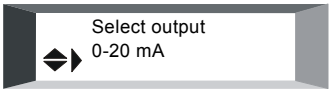
Using the analog output, it is possible to choose whether the measured value is signalled externally as a registry output, or it is possible to choose the switching points S1 or S2 as continuous control outputs. Any range of 0 to 20 mA or 4 to 20 mA within the measuring range can be assigned to the analog output. The indicated measuring range is defined by the start and end values. This also determines the direction of the analog output.

- Press the [Right] button to open the "Analog output" menu.

The following settings are made in the "Analog output" menu:

- switching between 0 to 20 mA and 4 to 20 mA
- analog output start value
- analog output end value
- assigning analog output.

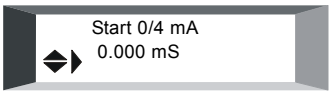
Switching between 0 to 20 mA and 4 to 20 mA



TM03 6998 4506

1. Press the [Right] button to choose between 0-20 mA and 4-20 mA.
2. Press the [Down] button to open the "Start 0/4 mA" submenu.

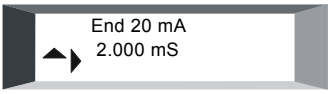
Analog output start value



TM03 6998 4506

1. Press the [Right] button to open the value input display.
2. Press the [Up] and [Down] buttons to set the value.
3. Press the [Right] button to save the entry.
4. Press the [Down] button to open the "End 20 mA" submenu.

Analog output end value

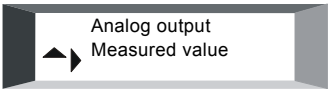


TM03 6999 4506

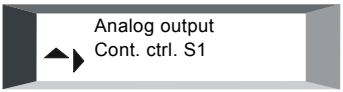
1. Press the [Right] button to open the value input display.
2. Press the [Up] and [Down] buttons to set the value.
3. Press the [Left] button to save the entry.
4. Press the [Down] button to open the "Analog output" submenu.

Assigning analog output

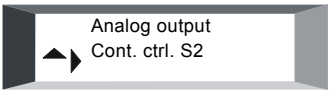
1. Press the [Right] button to choose between the measured value, continuous controller 1 and continuous controller 2.



TM03 6999 4506



TM03 6999 4506

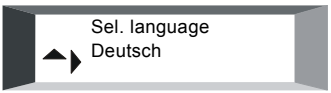


TM03 6999 4506

12.4.5 Language

The "Language" menu is used to determine the language for the Conex® DIS-C.

1. Press the [Right] button to open the "Language" menu.



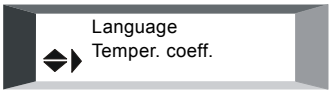
TM03 6999 4506

2. Press the [Right] button to choose between the languages (German, English, French).

12.4.6 Temperature coefficient

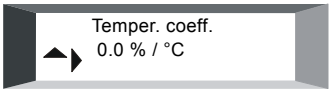
This menu is used for displaying and setting the temperature coefficient.

Because different measuring fluids have different temperature coefficients, the appropriate coefficient must be set. The setting range is 0.0 to 8.0 % / °C. The factory setting is 2.5 % / °C, which is suitable for many applications.



TM03 6998 4506

1. Press the [Right] button to open the "Temper. coeff." menu.



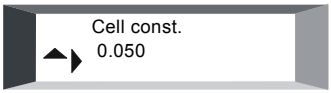
TM03 6999 4506

2. Press the [Right] button to open the value input display.
3. Press the [Up] and [Down] buttons to set the value.

12.4.7 Cell constant C

The mechanical dimensions used for the measurement of active surfaces of the measuring cell are defined in the cell constant. The measuring cell is characterised by the cell constant.

1. Press the [Right] button to open the "Cell const." menu.



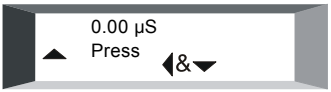
TM03 6999 4506

2. Press the [Right] button to open the value input display.
3. Press the [Up] and [Down] buttons to set the value.

Cable compensation (only for conductive measurement)

The capacity of the cable can lead to an incorrect value, particularly for small measuring ranges. This incorrect value can be corrected as follows:

1. Press the [Right] button to select the "Cable compens." menu.
2. Hold the connected, dry measuring cell in the air.
   – If the top line of the display reads a measured value, i.e. the value 0.00 is not displayed, cable compensation must be performed.



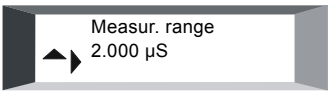
TM03 7000 4506

3. Simultaneously press the [Left] and [Down] buttons.
   – If the compensation is successful, the value 0.00 is displayed.

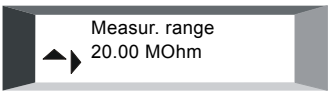
12.4.8 Measuring range

In this menu, the required measuring range for the device can be set (MΩ, µS, mS).

1. Press the [Right] button to open the "Measur. range" menu.
2. Press the [Right] button (several times) to select a measuring range.



TM03 6999 4506



TM03 6999 4506

Note

When setting the measuring range, ensure that it is suitable for the cell constant of the measuring cell. See section *7. Technical data*.

12.4.9 Averaging on/off

In this menu, the averaging function can be switched on or off. If the averaging function is switched on, the mean of the last 10 measured values is calculated and displayed as the measured value.

1. Press the [Right] button to open the "Averaging" menu.

TM03 6999 4506

2. Press the [Right] button to select averaging on or off.

Note

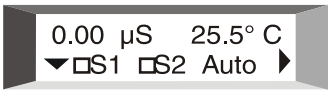
The description of the rest of the menus now continues in the order of menu navigation.

12.5 Relay menu (S1 S2)

In the relay menu (S1 S2), it is possible to choose between manual and automatic operation. In manual operation, the relays S1 and S2 can be switched on and off separately.

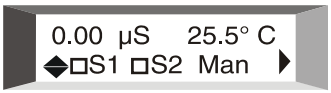
12.5.1 Automatic and manual operation

In automatic operation, the relay contacts are switched by the built-in controller. "Auto" is shown in the display.



TM03 6997 4506

In manual operation, the relay is switched manually. "Man" is shown in the display.



TM03 7001 4506

Note

If the relays are switched on manually, they remain switched on until they are switched off again, or until control is switched back to automatic.

Switching between automatic and manual operation:

- Press the [Right] button to switch the controller to manual or automatic operation.

Note

Switching to automatic operation is only possible if the arrow to the right of the "Man" text is visible.

12.5.2 S1/S2 in manual operation

Switching the relays S1/S2 on and off:

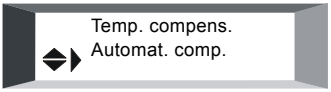
1. Press the [Up] button to select the chosen relay (S1/S2).
   – The corresponding symbol flashes.
2. Press the [Right] button to switch the chosen relay (S1 or S2) on or off.
   – The switch status of the relay is displayed as follows:
   Relay ON = symbol filled
   Relay OFF = symbol not filled.

12.6 Temperature compensation

Temperature compensation cancels out the effect of temperature dependency of the medium. It is based on a reference temperature of 25 °C.

This temperature compensation can be performed automatically via a connected temperature sensor or manually by entering the relevant temperature.

- Select the "Temp. compens." menu.



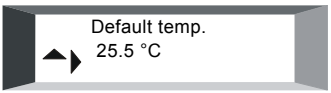
TM03 6998 4506

Switching between manual and automatic compensation:

- Press the [Right] button to select between manual and automatic compensation.

Selecting the default temperature for manual compensation

1. Press the [Down] button to open the "Manual temp." menu.
2. Press the [Right] button to open the temperature selection display.



TM03 6999 4506

3. Press the [Up] and [Down] buttons to select the temperature.

12.7 Displaying / changing code

Note

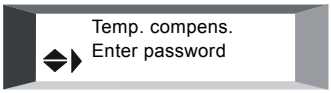
Important menu selections and changes to data are code-protected to prevent unauthorised access.

The device can be protected against unauthorised or unintentional changing of the programmed data. Two release codes are stored:

- **Code 086:** General access to all functions.
- **Code 011:** Access to temperature compensation and controller settings.

In all other code settings, the device is protected against unintentional changes to data. If a code is set and a locked menu is selected, the operator is prompted to enter the code.

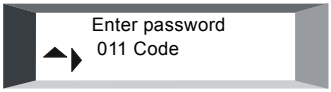
Displaying the code



TM03 6998 4506

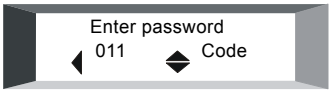
- Press the [Right] button to open the "Enter password" menu.
  – The current code is displayed.

Changing the code



TM03 6999 4506

1. Press the [Right] button to open the "Enter password" menu.



TM03 7002 4506

2. Press the [Up] and [Down] buttons to enter the required code in the range 000 to 2000.
   – Pressing the [Up] button once increases the value by +1. If the button is held down for longer, the value increases automatically.
   – Pressing the [Down] button once decreases the value by -1. If the button is held down for longer, the value decreases automatically.
3. Press the [Left] button to save the entry.

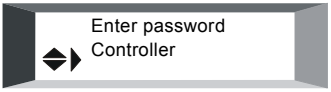
12.8 Controller settings

In the "Controller" menu, the following values are set:

- setpoint S1
- proportional band Xp S1
- reset time Tn (I part) S1
- setpoint S2
- proportional band Xp S2
- reset time Tn (I part) S2.

Note

This entry is only possible if the corresponding controller function is already set in the "Setup" menu.

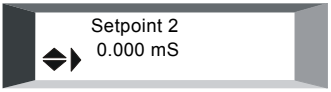


TM03 6998 4506

1. Press the [Right] button to open the "Controller" menu.
2. Press the [Up] and [Down] buttons to select the required value.
3. Press the [Right] button to open the value input display.

12.8.1 Setpoint setting S1/S2

The setpoints S1 and S2 are set separately and can have different values within the measuring range.



TM03 6998 4506

1. Press the [Right] button to open the value input display.
2. Press the [Up] and [Down] buttons to set the value.

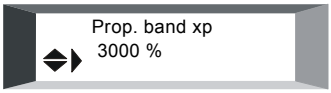
12.8.2 Proportional band Xp S1/S2

Note

Setting for a limit value: Xp = O.

Setting for an intermittent pulse controller or pulse frequency controller: Xp > O.

The proportional band Xp (P behaviour) is set separately for both setpoints in the range 1 to 3000 %.



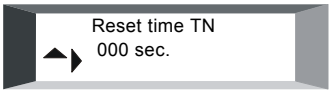
TM03 6998 4506

1. Press the [Right] button to open the value input display.
2. Press the [Up] and [Down] buttons to set the value.

12.8.3 Reset time Tn (I part) S1/S2

The reset time Tn (I part) is set separately for both setpoints in the range 0 to 3000 seconds.

If the reset time Tn is 0 seconds, the I part is deactivated.



TM03 6999 4506

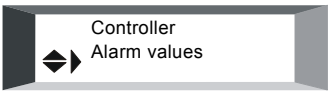
1. Press the [Right] button to open the value input display.
2. Press the [Up] and [Down] buttons to set the value.

12.9 Alarm value setting A1/A2

For the limit value alarm, the alarm values A1 and A2 are set separately. The switch direction for alarm value A1 is set to "exceed", and for alarm value A2 it is set to "drop below". If the alarm value 1 is exceeded or if the value drops below alarm value 2, relay 3 is switched after the specified delay time has elapsed.

The alarm message is delayed by the specified time. If the delay time is set to 000 seconds, the alarm message of the limit value alarm is raised immediately.

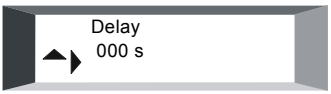
Setting the alarm values



TM03 6998 4506

1. Press the [Right] button to open the "Alarm values" menu.
2. Press the [Up] and [Down] buttons to select the required value (A1, A2).
3. Press the [Right] button to open the value input display.
4. Press the [Up] and [Down] buttons to set the value.

Setting the alarm delay time



TM03 6999 4506

1. Press the [Up] and [Down] buttons to select "Delay".
2. Press the [Right] button to open the value input display.
3. Press the [Up] and [Down] buttons to set the value.

12.10 Service

The "Service" menu contains service information and utilities.

The "Service" menu contains the following options:

- device data
- analog inputs
- resetting factory settings.

TM03 6998 4506

- Press the [Right] button to open the "Service" menu.

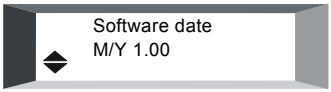
12.10.1 Device data

1. Press the [Right] button to open the "Product info" menu.
2. Press the [Up] and [Down] buttons to switch between the following displays.

Device number

Displays the serial number.

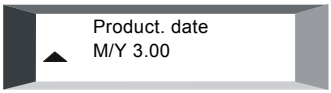
Software status



TM03 7003 4506

Displays the latest revision date of the software (e.g. 1.00: The software revision status is January 2000).

Production date



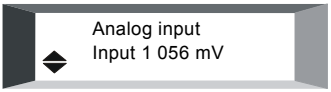
TM03 7004 4506

Displays the date of manufacture of the device (e.g. 3.00: The device was produced in March 2000).

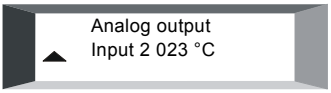
12.10.2 Analog inputs/test

In this menu, the analog inputs are tested. The input signals are displayed in mV (analog input 1) and °C (analog input 2).

1. Press the [Right] button to open the "Analog input" menu.
2. Press the [Up] and [Down] buttons to switch between the following displays:



TM03 7003 4506



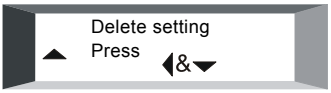
TM03 7004 4506

12.10.3 Deleting data/resetting factory settings

In some circumstances it may be necessary to restore the device to its delivered status. All values set by the customer are overwritten with the factory settings.

The initial settings on the device must then be made again.

Note Before deleting the memory, make a note of the important parameter settings.



TM03 7000 4506

1. Press the [Right] button to open the "Delete setting" menu.
2. Simultaneously press and hold down the [Left] and [Down] buttons.
   – "Please wait!!!" is displayed.

Deleting the data takes approximately 10 seconds. When this display disappears, the Conex® DIS-C is restored to the factory settings.

13. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

Subject to alterations.

Declaration of conformity

GB: EC/EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the product Conex DIS-C, to which the declaration below relates, is in conformity with the Council Directives listed below on the approximation of the laws of the EC/EU member states.

DE: EG-/EU-Konformitätserklärung

Wir, Grundfos, erklären in alleiniger Verantwortung, dass das Produkt Conex DIS-C, auf das sich diese Erklärung bezieht, mit den folgenden Richtlinien des Rates zur Angleichung der Rechtsvorschriften der EG-/EU-Mitgliedsstaaten übereinstimmt.

ES: Declaración de conformidad de la CE/UE

Grundfos declara, bajo su exclusiva responsabilidad, que el producto Conex DIS-C al que hace referencia la siguiente declaración cumple lo establecido por las siguientes Directivas del Consejo sobre la aproximación de las legislaciones de los Estados miembros de la CE/UE.

FR: Déclaration de conformité CE/UE

Nous, Grundfos, déclarons sous notre seule responsabilité, que le produit Conex DIS-C, auquel se réfère cette déclaration, est conforme aux Directives du Conseil concernant le rapprochement des législations des États membres CE/UE relatives aux normes énoncées ci-dessous.

IT: Dichiarazione di conformità CE/UE

Grundfos dichiara sotto la sua esclusiva responsabilità che il prodotto Conex DIS-C, al quale si riferisce questa dichiarazione, è conforme alle seguenti direttive del Consiglio riguardanti il riavvicinamento delle legislazioni degli Stati membri CE/UE.

NL: EG/EU-conformiteitsverklaring

Wij, Grundfos, verklaren geheel onder eigen verantwoordelijkheid dat product Conex DIS-C, waarop de onderstaande verklaring betrekking heeft, in overeenstemming is met de onderstaande Richtlijnen van de Raad inzake de onderlinge aanpassing van de wetgeving van de EG-/EU-lidstaten.

PT: Declaração de conformidade CE/UE

A Grundfos declara sob sua única responsabilidade que o produto Conex DIS-C, ao qual diz respeito a declaração abaixo, está em conformidade com as Directivas do Conselho sobre a aproximação das legislações dos Estados Membros da CE/UE.

- EMC Directive (2014/30/EU).
  Standards used:
  EN 61326-1:2013,
  EN 61000-3-2:2015, EN 61000-3-3:2014.
- Low Voltage Directive (2014/35/EU).
  Standard used:
  EN 61010-1:2011-07.

This EC/EU declaration of conformity is only valid when published as part of the Grundfos instructions.

Pfinztal, 20th April 2016

Ulrich Stemick
Technical Director
Grundfos Water Treatment GmbH
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Person authorised to compile the technical file and empowered to sign the EC/EU declaration of conformity.

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