Operating manual

DURAG

D-ISC 100 x xx2

Universal control unit

Before starting any work please read the operating manual!

Article no.:
4 019 392

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DURAG

Operating manual Universal control unit D-ISC 100

Version:	10015849-21-04	Previous version:	-/-
Production date:	06/11/2017		
Volume:	212		

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This manual...

- Generally relates to the entire equipment, even when individual program modules or (parts of) devices were not purchased.
- Relates to the current device design version at the time this documentation was updated (see above for production date);
- Contains illustrations which may differ from the actual appearance due to further technical developments or for reasons of clarity. Therefore, the existing illustrations do not make any claims for delivery of identical products.
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Contents

1 Information on this manual

This Operating manual is aimed at qualified **specialist personnel.**

Additional descriptions that may be relevant for setup and operation of the Universal control unit (depending on the connected devices) are described in the relevant operation manuals for these components, e.g.:

- DURAG bus systems
- D-ESI 100 DURAG Engineering and Service Interface
- D-TB xxx Terminal box
- D-BL xxx blower unit
- DURAG measuring devices

This manual is part of the product and must be stored in the immediate vicinity of the place of operation such that it is accessible to the personnel at all times. The instructions on preventing dangers and damage indicated in this manual must be followed. The safety information in this manual always specify the respective danger level. The warning symbol indicates the type of danger.

Danger level

DANGER	Risk leading to death or serious injury.
WARNING	Risk that could potentially lead to death or serious injury.
CAUTION	Risk that could potentially lead to less serious or minor injury.
ATTENTION	Risk that could potentially lead to material or environmental damage.

Warning symbols

	Warning signs (general)
	Danger due to electric current
	Electrostatic risk from electronic components (ESD)

Warnings

are displayed particularly clearly in this manual (*example*):

WARNING 	**Risk of injury due to wrong spare parts!** Incorrect or defective spare parts can result in damage or malfunctions and may also impair safety. ▸ Only use original spare parts of the manufacturer. ▸ Procure spare parts through authorised dealers or directly from the manufacturer.

Information symbols

	Material and environmental damage
	Information or tip
	Special tool and/or special technical equipment is required.

2 Safety

2.1 General safety information

Installation, commissioning, operation, maintenance and dismantling must only be carried out by qualified specialised personnel and electrical work only by qualified electricians (see 2.2 Personnel, qualifications [▶ 11]).
The personnel qualification required for a particular activity is specified in the corresponding chapters.

The manual must have been read and understood.

If necessary, load and unload the packages with an appropriate lifting device.

The laws, guidelines and standards that apply to the use and the intended purpose must all be complied with, together with the national safety and accident-prevention regulations.

The device must only be used in accordance with its proper and designated use.

Maintenance work or repairs not described in this manual must not be performed without prior arrangement with the manufacturer.

Malfunction detection

Perceptible changes from normal operation indicate functional impairments and should be taken seriously. Look out for:

- Formation of smoke or unusual odours
- Unusually high surface-temperatures of system components
- Unexpected changes in power consumption
- Warning and error messages on the device
  (see also the meaning of the display LEDs [▶ 19] as well as Section 12 Messages/error elimination [▶ 137]).

2.2 Personnel, qualifications

Work on the D-ISC 100 must only be carried out by the following personnel:

- **Specialised personnel** are those who because of their specialist training, knowledge and experience, coupled with knowledge of the applicable regulations, are in a position to perform the work assigned to them and make independent judgements of the potential hazards.
- An **electrician** is an individual who, because of his or her specialist training, knowledge and experience, coupled with knowledge of the applicable standards and regulations, is in a position to perform work on electrical equipment and make independent judgements of the potential hazards. Electricians are specifically trained for the working environment in which they are employed.

2.3 Fundamental hazards

Follow the safety instructions listed here and the warning information in the subsequent chapters of this manual in order to reduce health hazards and prevent dangerous situations.

2.3.1 Hazards due to electric current

Before commissioning the device, it must be ensured that...

- electrical work has been carried out properly and in accordance with local regulations.
- Protection from electric shock is ensured
- All cables are sufficiently dimensioned and secured

When working on the opened device, there is a:

DANGER

Danger of death due to electric current!

An immediate danger of death exists in case of contact with live parts. Damage to the insulation or individual components can present a danger of death.

- ▶ Only have work on electric systems performed by specialised electricians.
- ▶ Disconnect the device, check that no voltage is present and secure against reactivation before opening the D-ISC 100.
- ▶ In the event of damage to the insulation, turn off the power supply immediately and initiate repairs.
- ▶ Keep moisture away from live parts. This may lead to a short-circuit.

In order to prevent hazards, only ever connect the Universal control unit D-ISC 100 to permissible supply voltages (see type plate).

NOTICE

Damage to electronic components due to electrostatic discharge (ESD)

Electronic components are becoming smaller and smaller and more and more complex. Their susceptibility to damage from electrostatic discharge is increased accordingly. Therefore:

- ▶ To protect the components, measures must be undertaken to prevent electrostatic discharge during all work performed at the open device (ESD protection).
- ▶ To prevent static charges building up on the human body, service employees can for example be equipped with a personal earthing system.

2.4 Designated use

The Universal control unit D-ISC 100 parameterises, monitors and controls DURAG sensors.

The D-ISC 100 - Universal control unit is *not* suitable …
- for use in atmospheres saturated with water vapour
- for use in potentially explosive atmospheres
- for climbing or standing on!

WARNING

Danger when using other than for the designated application!

Any use other than or beyond the designated use of the D-ISC 100 - Universal control unit can lead to hazardous situations.
There is a risk of personal injury and material damage.

- Only ever operate the device in compliance with the parameters stated on the type label and in 13 Technical data [▶ 146]

Fault-free and safe operation of this product depends on appropriate transport, correct storage, installation and assembly, as well as careful operation and maintenance by qualified personnel.

3 Device and Function description

Fundamental features:

The D-ISC 100 universal operation unit can be used with all latest-generation DURAG sensors, and has the following functions:

- Operation and parameterisation of connected sensors
- Signal output via analogue and relay outputs
- Signal input via analogue and digital inputs
- Communication with higher-level control systems via a digital interface
- Voltage supply for one sensor
- Purge air supply for one sensor (D-ISC 100 P only)

Up to eight DURAG sensors can be connected to a D-ISC 100 operation unit. The operation unit has a modular structure and can be expanded to include expansion modules.

3.1 System overview

A measuring system with the D-ISC 100 may consist of the following components (example):

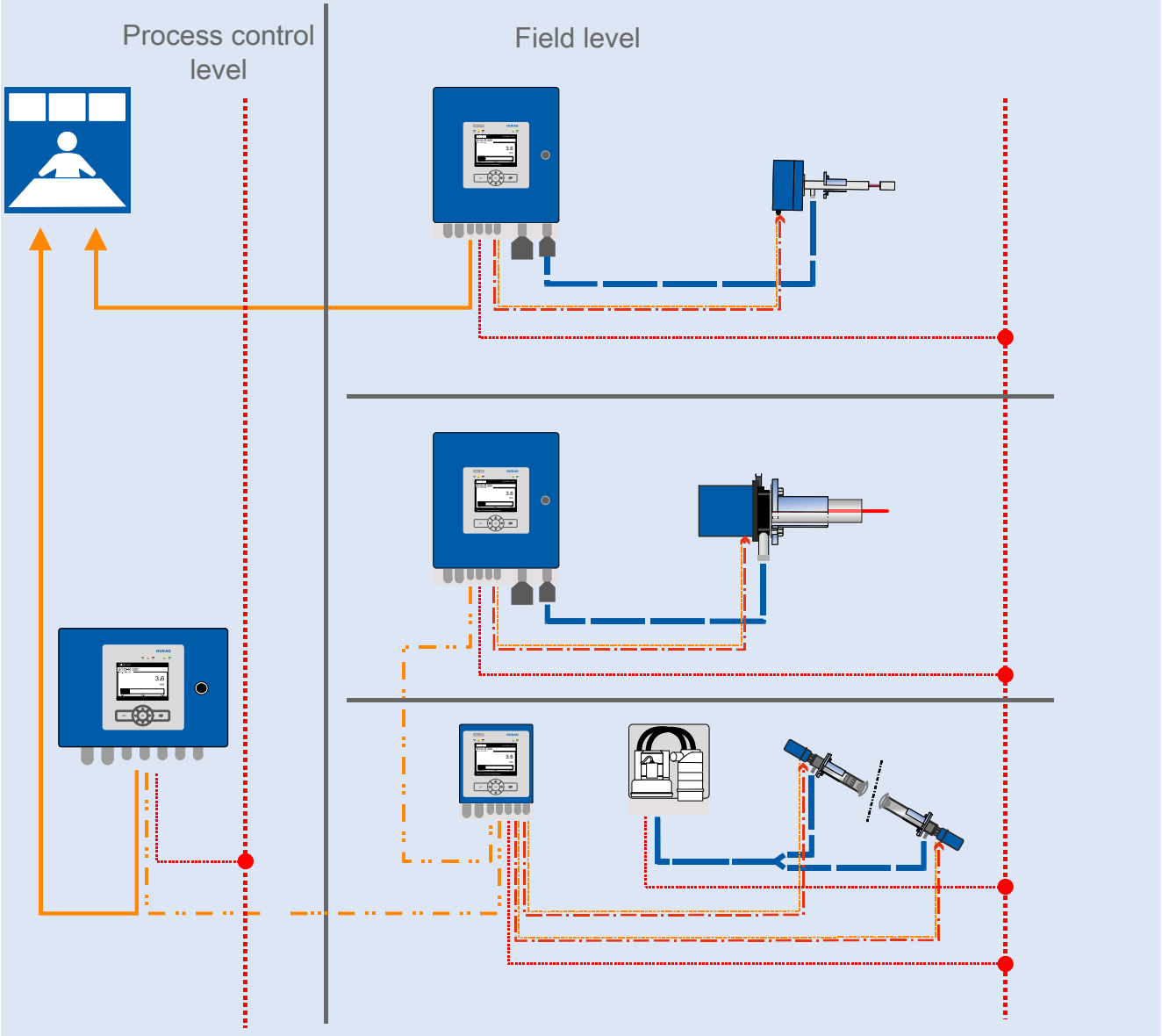


Table 3.1: System examples

	Line types
	Connecting cable for supply voltage
	DURAG Modbus (process) ≤ 1000 m or analogue/digital interface
	Device connection cable (with plug) ≤ 20 m
	DURAG Modbus (field) ≤ 1000 m
	Purge air tube
	Monitoring room • Central device monitoring and measuring value displays

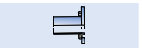
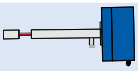
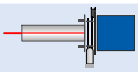
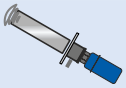
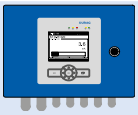
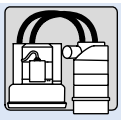
	Name • Function
	Welded-in pipe with flange and seal • Process connection
	D-R 808 measuring device • Monitoring of dust concentration
	D-R 320 measuring device • Monitoring of dust concentration
	D-FL 220 measuring device • Monitoring of speed and volume flow of gases
	D-ISC 100 P universal operation unit
	D-ISC 100 C universal operation unit
	D-ISC 100 M universal operation unit
	separate purge air supply (fan or instrument air)
	D-ISC 100 C, M, P with extended temperature range of −40 … +60 °C (−40 … +140 °F)

Table 3.2: System overview legend

3.2 Variants, design types

The Universal control unit is available in a range of different variants.

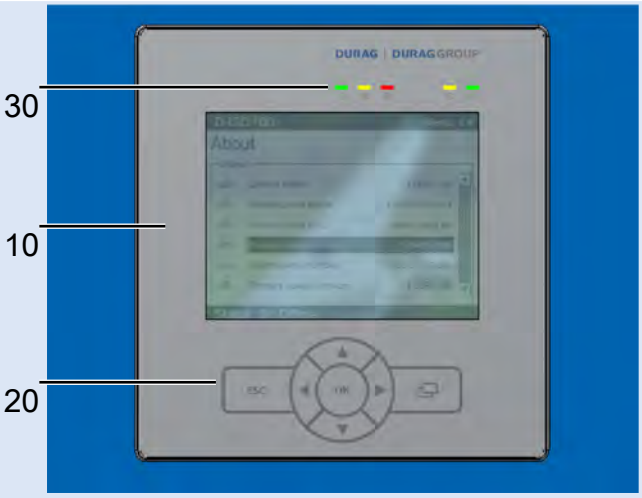
Design	Description	
with purge air blower:		
D-ISC 100 P	• Operation unit in a field housing with integrated purge air blower • option of extending with extra software modules • option of extending with up to 2 top-hat-rail modules	

Design	Description	
without purge air blower:		
D−ISC 100 C	• Operation unit in compact field housing • option of extending with extra software modules	
D−ISC 100 M	• Operation unit in field housing • Option of extending with extra software modules • Option of extending with up to 4 top-hat-rail modules	
D−ISC 100 R	• Operation unit for 19" installation • option of extending with extra software modules • option of extending with up to 4 top-hat-rail modules	

Table 3.3: Model versions

3.3 Designation of device components

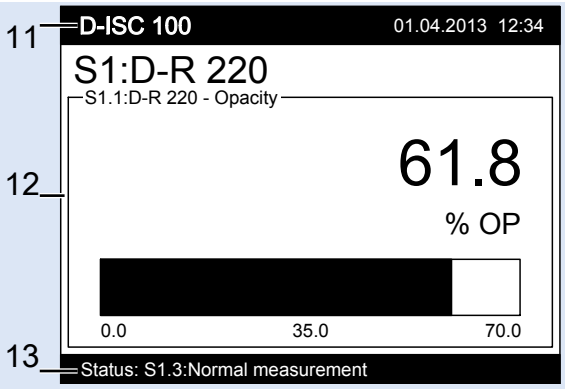
3.3.1 Display and keyboard

Overview
D-ISC 100 C, M, P, R


10	The display	20	Keyboard	30	LEDs

Table 3.4: Overview

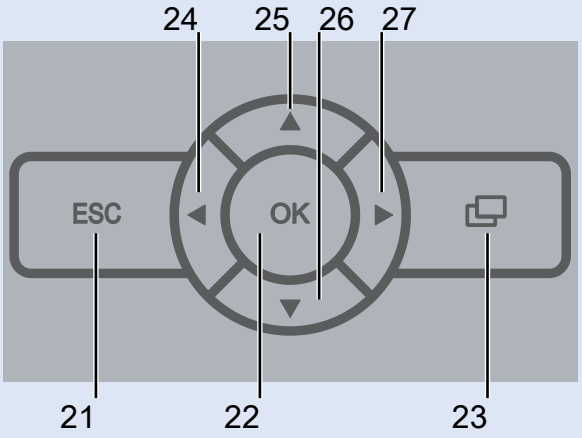
Display (example)
D-ISC 100 C, M, P, R



11	Header	12	Display area	13	Status bar

Table 3.5: The display

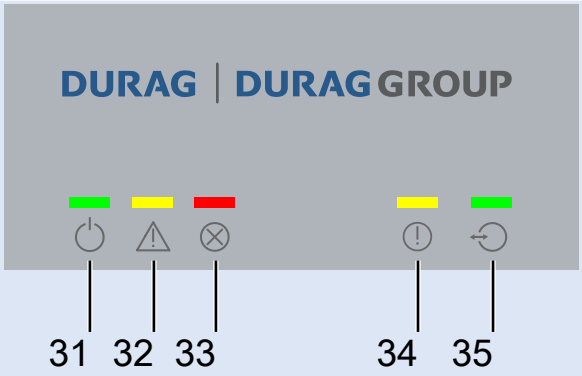
Keyboard
D-ISC 100 C, M, P, R



21	ESC	Escape key (to cancel and to go to higher-level menu)	22	OK	Enter key (to confirm the input)	23	⧉	Screen button (menu button)
24	◀	"left" arrow key (menu selection, display selection)	25	▲	"upwards" arrow key (display selection)	26	▼	"downwards" arrow key (display selection)
27	▶	"right" arrow key (menu selection, display selection)						

Table 3.6: Keyboard

LEDs
D-ISC 100 C, M, P, R

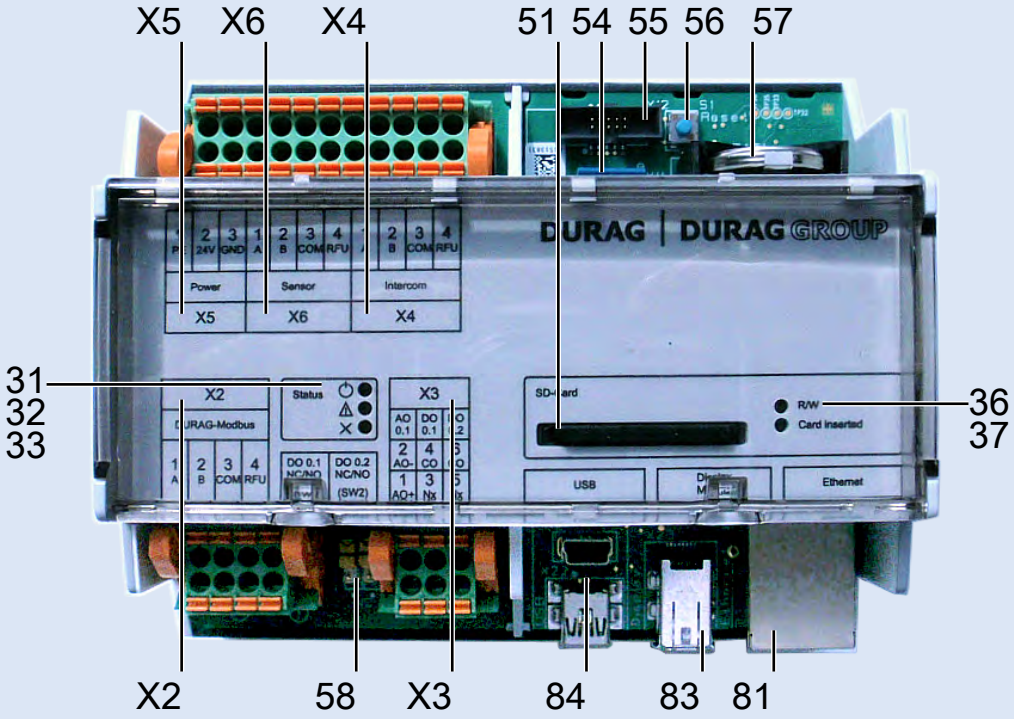


31	⏻		Ready for operation	32	⚠		Warning/maintenance	33	⊗		Fault
34	ⓘ		Bus data error	35	⇄		Bus active				

Table 3.7: LEDs

3.3.2 CPU module

CPU module
D-ISC 100 C, M, P, R



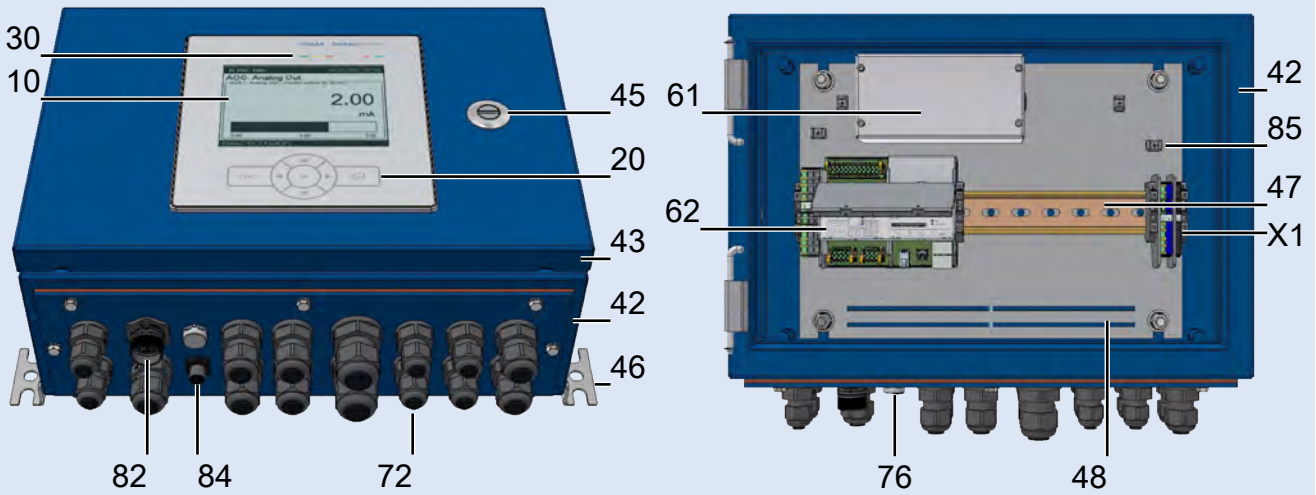
31	LED status ready for operation	32	LED status warning/maintenance	33	LED status fault
36	LED R/W read/write access to SD card	37	LED SD card inserted	51	(Slot for) SD card

54	internal	**55**	internal	**56**	internal
57	Battery (CR 2032)	**58**	NC/NO relay switching	**81**	Ethernet (for internal Modbus TCP module)
83	Display unit connection	**84**	USB port (2x)	**X2**	DURAG Modbus connection
X3	Analogue/digital out connection	**X4**	Connection between two measuring heads (pre-wired)	**X5**	Connection of operating voltage 24 V (pre-wired)
X6	Connection of sensor Modbus (pre-wired)				

Table 3.8: CPU module

3.3.3 D-ISC 100 M

D-ISC 100 M

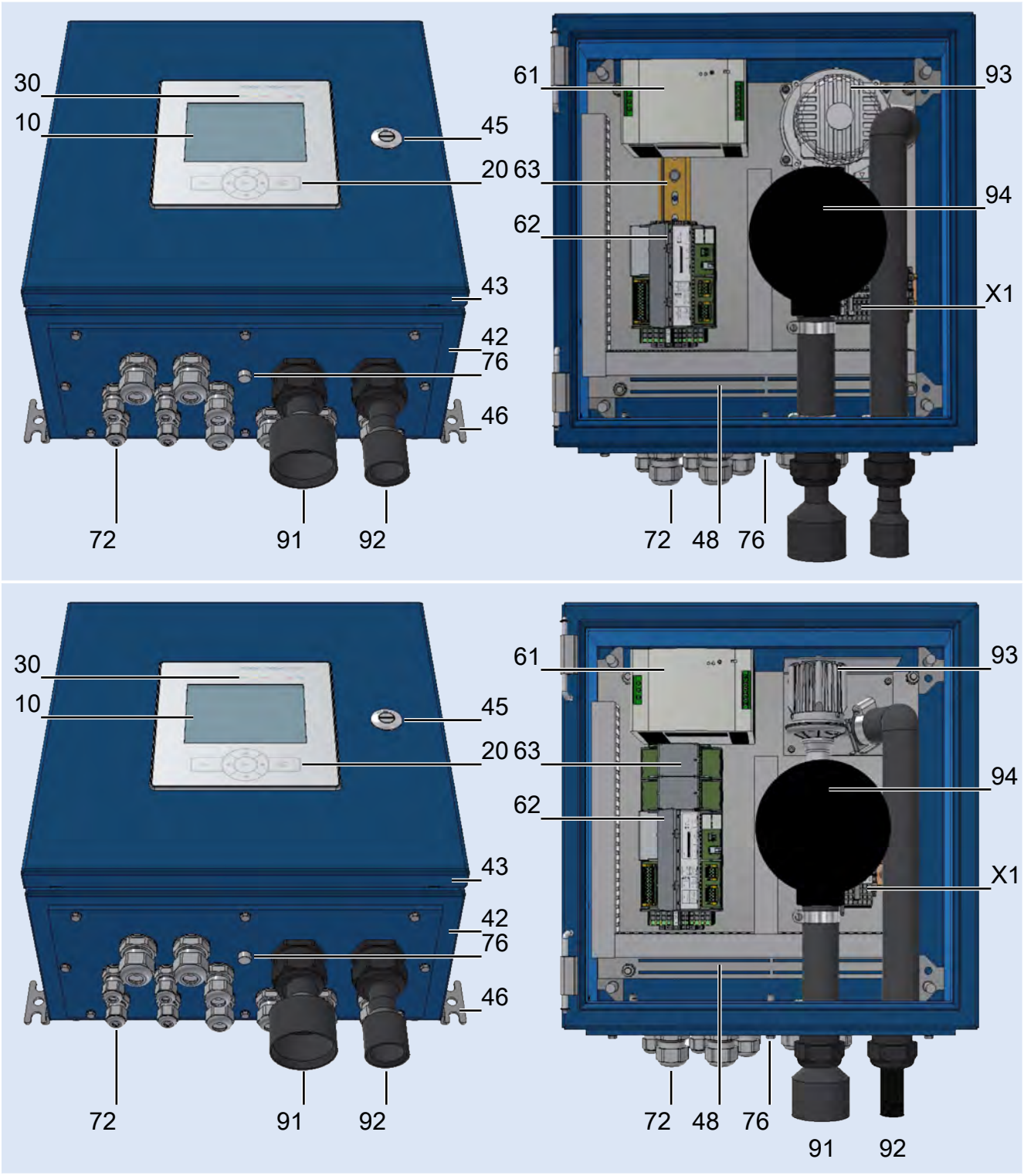


10	Display	**20**	Keyboard	**30**	LEDs
42	Lower housing part	**43**	Housing door	**45**	Lock
46	Device fastening	**47**	Top hat rail	**48**	Rails for shield terminals
61	Power supply unit	**62**	Top hat rail module D-ISC 100 CPU module (3.3.2 CPU module [▶ 19])	**72**	Cable glands
76	Vent plugs	**82**	Socket for 2nd measuring head	**84**	USB port
X1	Plug terminals for device connection (see Technical data for operating voltage)				

Table 3.9: Parts designation D-ISC 100 M

3.3.4 D-ISC 100 P

D-ISC 100 P



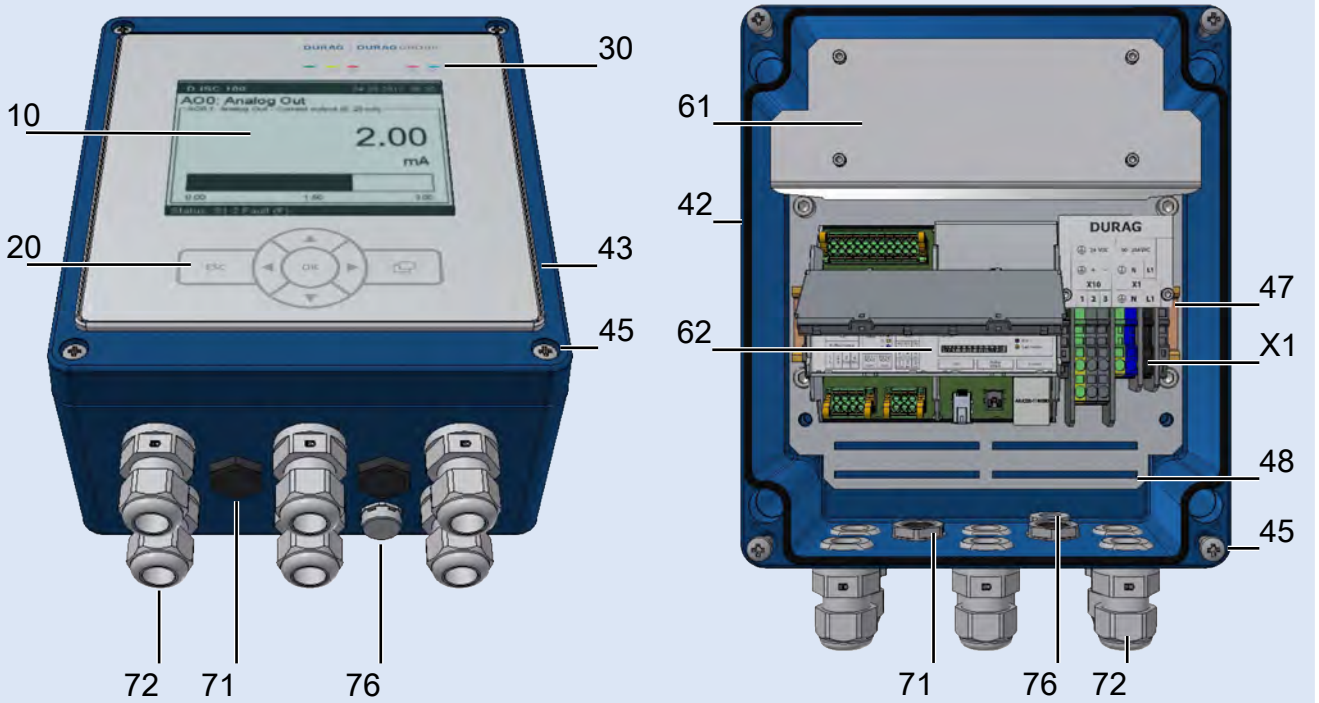
10	Display	**20**	Keyboard	**30**	LEDs
42	Lower housing part	**43**	Housing door	**45**	Lock
46	Device fastening	**48**	Rails for shield terminals	**61**	Power supply unit
62	Top hat rail module D-ISC 100 CPU module	**63**	Expansion module (top hat rail module)	**72**	Cable glands

76	Vent plugs	**83**	Display unit connection	**91**	Fresh air purge air feed
92	Purge air connection	**93**	Fan	**94**	Purge air filter
X1	Plug terminals for device connection (see Technical data for operating voltage)				

Table 3.10: Parts designation D-ISC 100 P

3.3.5 D-ISC 100 C

D-ISC 100 C

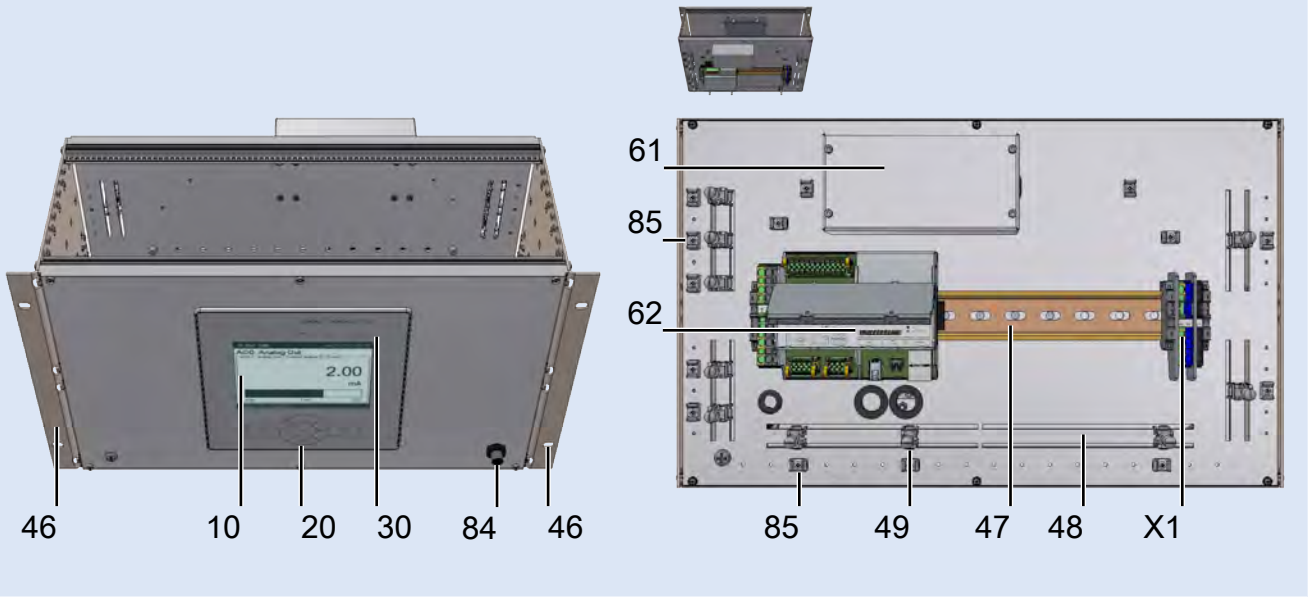


10	Display	**20**	Keyboard	**30**	LEDs
42	Lower housing part	**43**	Housing cover	**45**	Fastening (screws)
47	Top hat rail	**48**	Rails for shield terminals	**61**	Power supply unit
62	Top hat rail module D-ISC 100 CPU module (3.3.2 CPU module [▶ 19])	**71**	Blind plugs	**72**	Cable glands
76	Vent plugs	**X1**	Plug terminals for device connection (see Technical data for operating voltage)		

Table 3.11: Parts designation D-ISC 100 C

3.3.6 D-ISC 100 R

D-ISC 100 R

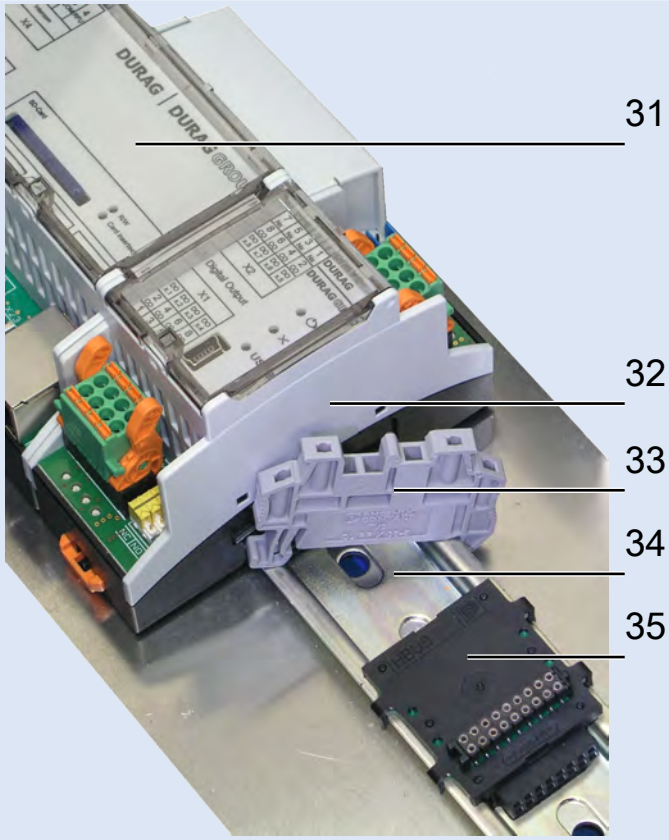


10	The display	**20**	Keyboard	**30**	LEDs
46	Device fastening	**47**	Top hat rail	**48**	Rails for shield terminals
49	Shield terminals	**61**	Power supply unit	**62**	Top hat rail module D-ISC 100 CPU module (3.3.2 CPU module [▶ 19])
84	USB port	**85**	Cable tie holder	**X1**	Plug terminals for device connection (see Technical data for operating voltage)

Table 3.12: Parts designation D-ISC 100 R

3.3.7 Expansion modules

Designation of components on the top hat rail

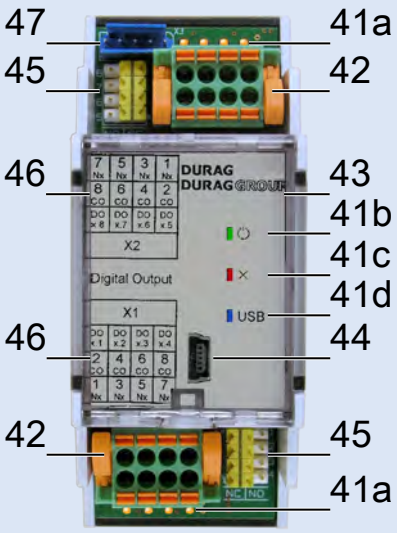


31	D-ISC 100 CPU module	**32**	Top hat rail module	**33**	Terminal end holder
34	Top hat rail	**35**	Bus connector		

Table 3.13: Components on the top hat rail

Designation of the top hat rail module components (*in this case* digital output module)

Top hat rail module



41a	LED (orange): there is current at the relay *coil*	**42**	Module connecting terminals	**45**	Changeover switch for relay NO / NC
41b	Ready-for-operation LED (green); flashes during internal communication	**43**	Hinged cover	**46**	Terminal assignment of module connecting terminals
41c	Fault LED (red) expansion module	**44**	USB port	**47**	Service
41d	USB connected LED (blue)	Some of the described components are type-specific, and are not present on all modules			

Table 3.14: Top hat rail module

3.4 Expansion modules

Top hat rail expansion modules and software expansion modules are available for the D-ISC 100.

Top hat rail expansion modules

Top hat rail expansion modules are fitted onto the top hat rail inside the device.
The usability depends on the D-ISC 100 version being used (see 3.2 Variants, design types [▶ 16]).

Analogue output (AO)

Top hat rail expansion module

see also 4.3.4 Analogue output [▶ 53]

One analogue output is integrated into the universal operation unit.
An optional analogue output expansion module D-ISC 100 (module - analogue OUT) is available for 4 additional analogue outputs per device.

- 4 x analogue output 0-20 mA/400 Ohm
- Zero point (live zero) 4 mA

The analogue output expansion module allows the determined measured values from the D-ISC 100 to be issued as current signals.

Analogue input (AI)

Top hat rail expansion module

see also 4.3.3 Analogue input [▶ 52]

An optional analogue input expansion module D-ISC 100 (module - analogue IN) is available for 4 additional analogue inputs per device.

- 4 x analogue input 0-20 mA/50 Ohm
- Zero point (live zero) 0/2/4 mA, adjustable

The analogue input expansion module allows external sensors with current output (e.g. temperature sensor) to be connected to the D-ISC 100.

Digital output (DO)

Top hat rail expansion module

see also 4.3.6 Digital output [▶ 56]

Two digital outputs DO0 are integrated into the universal operation unit.
An optional digital output expansion module D-ISC 100 (module - digital OUT) is available for 8 additional digital outputs per device.

- 8 x relay output, potential-free, 48 V, 0.5 A
- Configurable function

The digital output expansion module allows the status (e.g. maintenance mode, zero point measurement, 0/1) to be issued by the D-ISC 100.

Digital input (DI)

Top hat rail expansion module

see also 4.3.5 Digital input [▶ 55]

An optional digital input expansion module D-ISC 100 (module - digital IN) is available for 8 additional digital inputs per device.

- 8 x digital input
- Configurable function
- The digital input expansion module allows actions or functions (e.g. maintenance mode, zero point measurement) to be triggered by the D-ISC 100 via an external status signal (0/1).

Software expansion modules

Software modules are available either included with the D-ISC 100 or as optional extras.

Optional software expansion modules must be activated before use. Activation is performed by a software certificate with an activation key, which is only valid for *one* specific D-ISC 100 Universal control unit.
For information on activation, see Section 15.13 Example: Activate modules [▶ 190]

Modbus RTU

When the optional Modbus RTU software expansion module is activated, this makes the Modbus RTU slave interface of the D-ISC 100 accessible.
The Modbus RTU software expansion module includes:

- A software certificate with activation key
- Two M12 installation connectors. This guides the interface outwards and makes it accessible at the device housing.

The module enables communication with the universal operation unit via the Modbus RTU protocol. The register definitions are listed in table format in an extended handbook.

The module also allows for Modbus communication in accordance with VDI 4201-3.

Modbus TCP

This software expansion module is available as an additional option; i.e. it can be released with a software certificate and the respective activation key for a specific D-ISC 100 (see Section 15.13 Example: Activate modules [▶ 190] for activation information).

This module enables communication with the D-ISC 100 via the Modbus TCP protocol.

The Modbus TCP software expansion module includes:

- A software certificate with activation key
- Ethernet cable with M12 socket and RJ45 plug to connect to the D-ISC 100 CPU module.

Mixed channel

This software expansion module is included with the device.It enables different measured values (channels) of *different* sensors to be summarised in a measurement display in order to obtain a quicker overview of the important measured variables within a measuring system. Possible sources are sensors S, external sensors SX and media conditions MC.

For example, the following 4 measured values could be displayed *together* in a single measurement display:

- Dust concentration in mg/m³
- Volumetric flow in m³/h
- Media temperature in °C

- Media pressure in hPa

A maximum of two "Mixed channel" software expansion modules can be used together in a D-ISC 100, each with 4 channels.

External sensors

This software expansion module is included with the device. It makes it possible to evaluate and display signals from external sensors (measured value transmitters). As the measured value transmitters are connected via analogue inputs (expansion modules available as optional extras), measuring devices from external manufacturers can also be integrated in this manner.

The measured value signals from the connected transmitters are converted to measured values and displayed by assigning the source measured value (analogue inputs) to the individual channels and adjusting the signal ranges and units.

A maximum of two "External sensors" software expansion modules can be used together in a D-ISC 100, each with 4 channels.

Media conditions

This software expansion module is included with the device. This module enables the media conditions for the measured medium (temperature and absolute pressure) to be recorded and displayed for the entire measurement system and to be forwarded to all connected DURAG sensors in order to *standardise the measured values*.

The following sources can be used as measured values for these media conditions:

- The respective standard value (as a fixed value, standardised measured value = measured value under operating conditions).
- A measurement signal provided to an analogue input by a measured value transmitter.
- A measured value from a connected DURAG sensor.
- A fixed value (definable).
- An external value = a corresponding measured value, for example, one that is provided by a higher-level emissions evaluation system via Modbus.

4 Installation and commissioning

4.1 Installation

Transport to the installation location

Suitable lifting devices should be used to load and unload the packages if necessary.
Avoid rough impacts. If possible, use the original packaging for transport.
If there are large temperature or humidity fluctuations, condensation can cause moisture to form within the devices. This can cause an electric short circuit. Following transportation, do not put the devices into operation until the inside of the devices has reached ambient temperature.

Personnel

The D-ISC 100 must only be installed by specialist personnel (see 2.2 Personnel, qualifications [▶ 11]).

Installation location

The installation location is selected taking into account

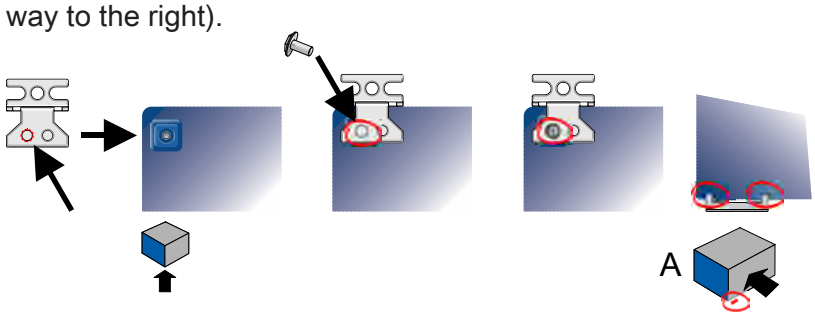
- the 13 Technical data [▶ 146],
- the length of the sensor cables that can be connected to the D-ISC 100 unit,
- the space requirements (14 Dimensioned drawings [▶ 151]).

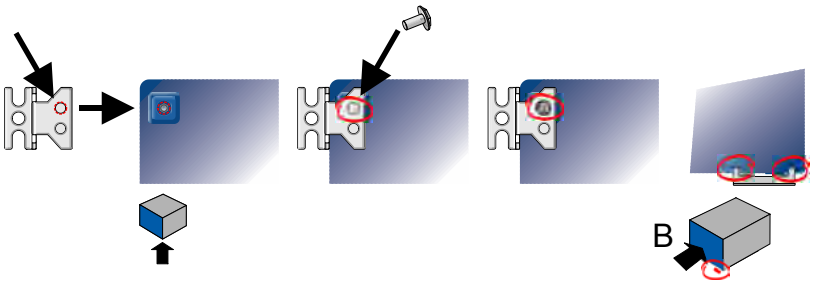
The Universal control unit must be freely accessible for operation and maintenance at all times.

4.1.1 D-ISC 100 P, M

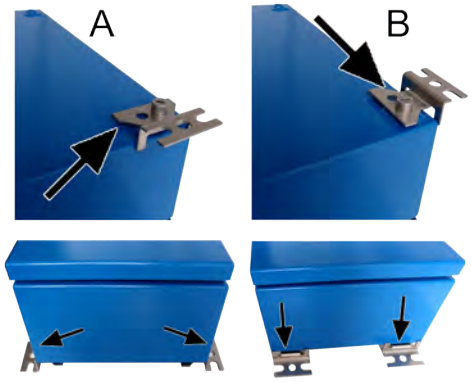
Standard installation

1. Firstly screw the four supplied external clips onto the housing. Depending on the circumstances, the clips can be fitted parallel to the long edge (**A**) and/or parallel to the short edge (**B**) of the housing (see figures below).
   We recommend fitting them to the short edge, as this makes it easier to access them at a later date when fitted to the wall (no cables in front of the wall attachment).
   The clips are fitted with both the guide tongues facing in the direction of the top of the housing (see figures below, all the way to the right).





The clips should not project laterally beyond the outline of the casing. Therefore, for the fastenings use the hole in the clip next to the outer edge. The figure below shows attachment to the long edge (**A**) and the short edge (**B**).



Maximum torque when tightening the screws: 10 Nm.

2. Install the Universal control unit onto the wall clips on the wall. The **installation drawing** can be found in Section 14 Dimensioned drawings [▶ 151].

Installation of the D-ISC 100 P (purge air supply)

- When choosing the installation location and during the installation of the D-ISC 100 P, the parameters specified in the technical data must be complied with.
- The intake air must be as dry as possible (< 95 % relative humidity), and free from dust and oil.
- The D-ISC 100 P is installed with the cable glands facing downwards. Unused openings must be sealed to prevent the ingress of moisture.
- The D-ISC 100 P must be freely accessible for air filter changes.

Laying the purge air hoses

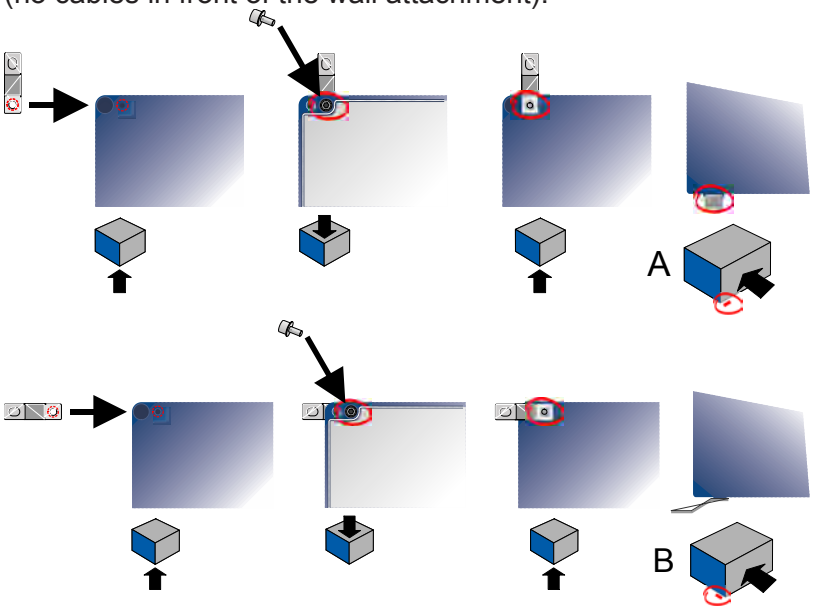
- The purge air hose is designed for a default ambient temperature of approx. −25 … +80 °C. Alternative hoses are available.
- Do not select too narrow a bend radius in comparison to the hose diameter (risk of kinking, leading to: purge air failure).
- The hoses are not resistant to tension. Do not hang the hoses in free loops under their own weight. Fit supports at reasonable intervals.
- Do not use force, e.g. to drag the hose through excessively narrow openings in walls.

- Do not use hoses as attachments or supports for other objects.
- The purge air hose for the sensor is attached to the hose connection on the D-ISC 100 P using a hose clamp.

4.1.2 D-ISC 100 C

Standard installation

1. Firstly screw the four supplied external clips onto the housing. Depending on the circumstances, the clips can be fitted parallel to the long edge (**A**) and/or parallel to the short edge (**B**) of the housing (see figures below).
   We recommend fitting them to the short edge, as this makes it easier to access them at a later date when fitted to the wall (no cables in front of the wall attachment).



Maximum torque when tightening the screws: 10 Nm.

2. Install the Universal control unit onto the wall clips on the wall. The **installation drawing** can be found in Section 14 Dimensioned drawings [▶ 151].

4.1.3 D-ISC 100 R

Standard installation

The D-ISC 100 R version is intended for installation in a 19" rack (48.26 cm).

1. Start by connecting the D-ISC 100 R as necessary. The relevant Sections are listed below.
2. Slide the unit into the rack. An installation height of 6 HE [U] is required.
3. Secure the D-ISC 100 R against falling from the rack by screwing the side bracket into the rack through the pre-punched oval holes.

A description of the connections can be found in Section 4.2 Connecting the network and data cables [▶ 32].

4.2 Connecting the network and data cables

DANGER

Danger of death due to electric current!

An immediate danger of death exists in case of contact with live parts. Damage to the insulation or individual components can present a danger of death.

- In the event of damage to the insulation, turn off the power supply immediately and initiate repairs.
- Only have work on electric systems performed by specialised electricians.
- Before opening the housing or removing the touch guard, disconnect the device, check that no voltage is present and secure against reactivation.
- Keep moisture away from live parts. This may lead to a short-circuit.

Sensor connections

All connecting cables for connecting the sensors (including those connected in the factory) must be ordered separately.

Additional information on the connections of the D-ISC 100 can be found in the following Sections.

4.2.1 Instructions for planning the electrical connections to the system

The electrical connection in the housing is established at the terminal strips in accordance with the wiring diagram.

- The cables for the mains and data cables should be routed separately.
- The mains cable should use H 07 RR – U 3 G 1.5 or the equivalent. The material of the conductors and sheath must be appropriate to the conditions at the operating site.
- To protect the mains cable, a 16 A automatic circuit breaker should be installed as near to the measuring system as possible. Label the MCB so that it can be identified as the isolation switch for the device.

A D-ISC 100 can power a maximum of one sensor consisting of one or two measuring heads. Additional sensors are powered via a terminal box (D−TB 100 or D−TB 200) or by additional D-ISC 100.

The connections between the D-ISC 100 and the sensors are usually established by means of pre-assembled connecting cables with plugs. No special installation work is required here.

4.2.2 Notes on connecting data cables

- Data cables for the transfer terminals in the D-ISC 100: shielded cables (e.g. LiHCH (TP) 8 x 2 x 0.5 mm²), twisted pairs of fine-wire flexible cores, operational capacitance approx. 80 nF/km.
- Use the respective twisted pairs of cores (e.g. RS 485 A and B, 4 … 20 mA + and –) for the associated connections!

Cable lengths

Sensor connecting cable:

The maximum length of the pre-assembled connecting cable between the D-ISC 100 and a sensor is 12 m.

DURAG Modbus:

Please refer to the figures in Section 4.2.5 Sensor network bus architecture (one D-ISC 100) [▶ 41] and 4.2.6 Sensor network bus architecture (multiple D-ISC 100) [▶ 43]. A, B, C and D represent the cables for the A, B, C or D bus respectively. The total length of all cables for a bus must not exceed a length of 1000 m (with 9600 Baud and AWG 26).
Stub cables, e.g. between the D-TB XXX and the measuring head (not shown in the figures) are included in these cable lengths.
A stub cable must be no longer than 20 m. With n stub cables, each individual stub cable must be no longer than 40 m divided by n.

Bus termination

- Enabling/Disabling the bus termination
- Terminating DURAG Modbus at both ends. To do so, activate the termination at the devices at the ends of the bus

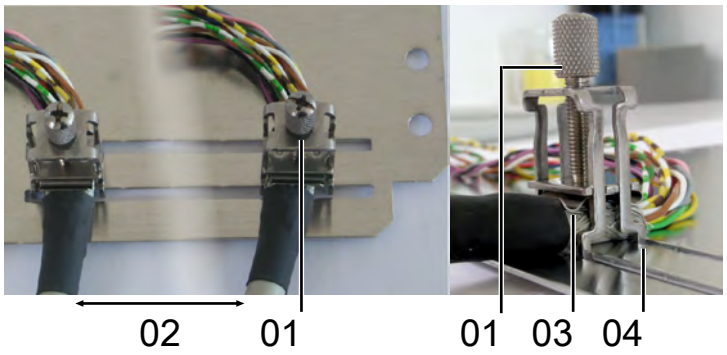
To carry out the bus termination, see also the information in the operation manuals for the connected sensors.

Data cables

The DURAG Modbus data cables are connected via terminal X2 in the D-TB 100 and 200 and via terminal X2 or X6 in the D-ISC 100 (see also Section 4.2.5 Sensor network bus architecture (one D-ISC 100) [▶ 41] and 4.2.6 Sensor network bus architecture (multiple D-ISC 100) [▶ 43]).

As an alternative to direct wiring, the bus can be connected via pre-assembled bus cables with M12 connectors. To do this, the appropriate connectors for the housing installation will need to be ordered together with the devices. The connectors will then be fitted at the factory. Details on this can be found in Section 4.2.3 Electrical connection [▶ 35].

Data cable connection



01	Loosen/tightly screw in the knurled screw	02	Moving the terminal
03	Shield terminals	04	Terminal holder

Fig. 4.1: Shield terminals

1. Strip back approx. 20 mm of the outer insulating layer of the data cable above the screen in addition to the free cores.
2. Guide the data cable through the cable gland of the Universal control unit and lay it onto the base plate in the required position (see top right image).
3. Click the shielding terminal above the stripped back cable shield with the terminal holder (04) into the guide rail in the base plate.
4. Use the knurled screw (01) to simultaneously secure both the terminal in the guide rail and also the shielding between the shield terminal (03) and the base plate.
   - ✓ If the knurled screw is loosened, the terminal can be moved to any position on the rail (02).
   - ✓ **Always connect both ends of the shielding.**
   - ✓ To remove the terminal, the knurled screw is screwed completely upwards. The terminal holder (04) is spread apart by the shield terminal which is also guided through, and the terminal can be pulled out of the rail.
5. Connect the wires in accordance with the connection diagram.

4.2.3 Electrical connection

DANGER

Danger of death due to electric current!

An immediate danger of death exists in case of contact with live parts. Damage to the insulation or individual components can present a danger of death.

- In the event of damage to the insulation, turn off the power supply immediately and initiate repairs.
- Only have work on electric systems performed by specialised electricians.
- Before opening the housing or removing the touch guard, disconnect the device, check that no voltage is present and secure against reactivation.
- Keep moisture away from live parts. This may lead to a short-circuit.

D-ISC 100 operating voltage connection

Make sure that the D-ISC 100 is supplied with suitable electrical voltage. Information on the necessary operating voltage and the switching capacity of the switch contacts can be found in Section 13 Technical data [▶ 146] and on the type label.

The operating voltage of the D-ISC 100 is connected to X1 via terminal strips in the terminal compartment in accordance with the wiring diagram.

The individual wires of the mains cable must be secured, e.g. using cable ties. When the wires are released, there must be no contact with the adjacent terminals.

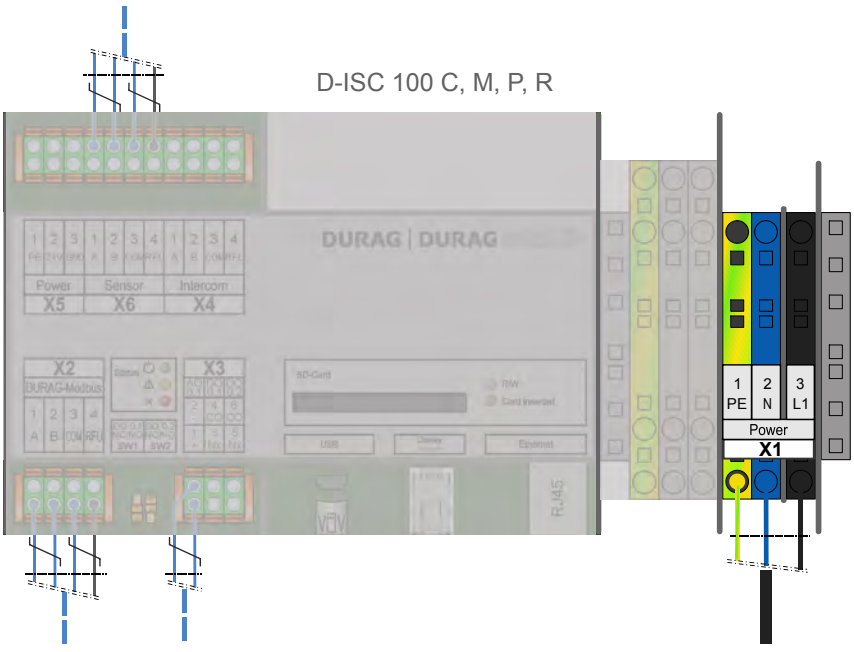


Fig. 4.2: Wiring diagram for the D-ISC 100 C, M, P, R operating voltage

Analogue and digital output connection

The analogue and digital output is connected via terminal X3 on the CPU module of the D-ISC 100. The function of the digital outputs can be switched between NC (normally closed) and NO (normally open) using the switches SW1 and SW2.

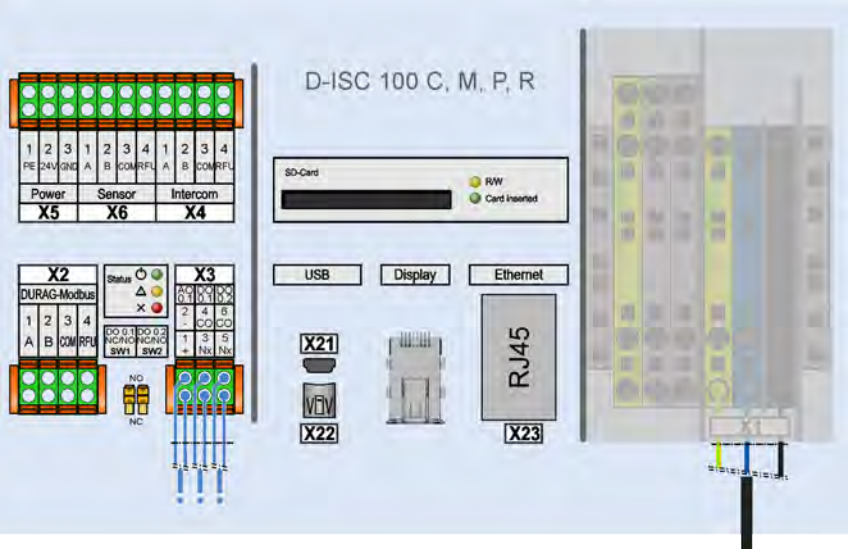


Fig. 4.3: Wiring digram for the analogue and digital output

The plug assignment for X3 can be found in the following table.

Plug position		Description
X3		
X3.1	AO 0.1	AO +, evaluation system +
X3.2		AO -, evaluation system -
X3.3	DO 0.1	Nx digital output (Nx≙SW1)
X3.4		CO digital output (common)
X3.5	DO 0.2	Nx digital output (Nx≙SW2)
X3.6		CO digital output (common)
SW1…2		NO/NC switch-over for DO 0.1…2 switch position shown corresponds to NO

Table 4.1: Switch and plug assignment for the analogue and digital output

4.2.4 Bus connection

D-ISC 100 bus connection (conventional)

Bus cables can be connected directly at the terminals of the D-ISC 100 CPU module or using M12 connectors. Additional information on this is provided in this section.

The wiring of the individual components in a DURAG sensor system is described in the following sections.

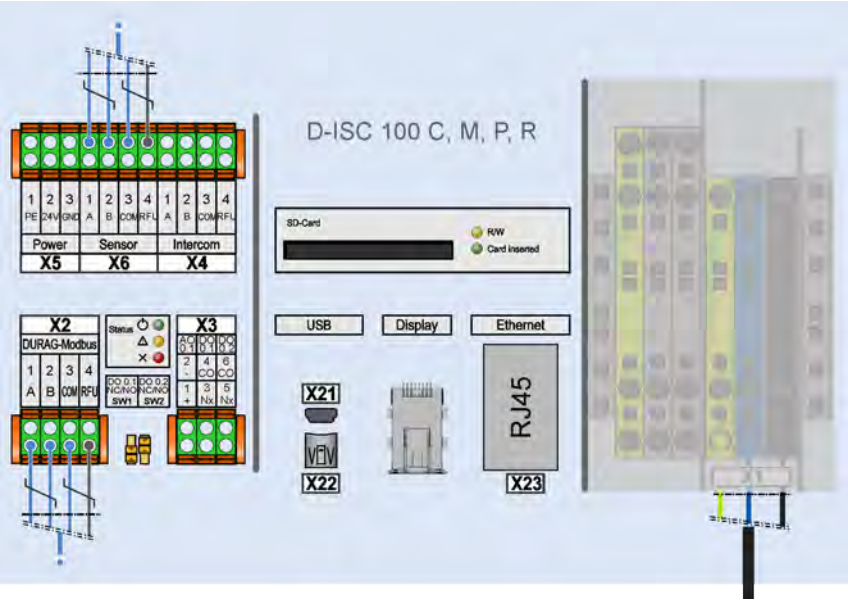


Fig. 4.4: Wiring diagrams for the D-ISC 100 C, M, P, R bus cables

(RFU: Reserved for further use)

Connector descriptions can be found in the following table.

Connector	Description	Comments
X6	Sensor – Modbus (Modbus – master)	Connection of a sensor or an upstream D-ISC 100*.
X2	Durag – Modbus (Modbus – slave)	Only available with Modbus RTU – slave expansion module. Connection of an evaluation system or a downstream D-ISC 100*.
X23	Ethernet (Modbus TCP server)	Only available with Modbus TCP expansion module.

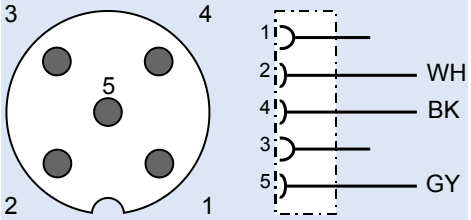
*See also:

- 4.2.5 Sensor network bus architecture (one D-ISC 100) [▶ 41]
- 4.2.6 Sensor network bus architecture (multiple D-ISC 100) [▶ 43].

D-ISC 100 bus connection (with M12 connectors)

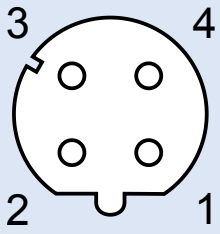
The bus connections can in principle be established via pre-assembled cables with M12 connectors in accordance with EN 61076-2-101. The following pin assignments apply for the different bus systems:

RS485 (Modbus over serial line)



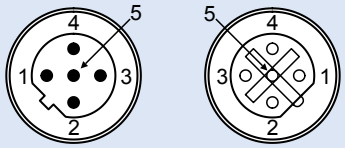
Connector	Cable	Comment	Colour
1			
2	RS485 - A	Data cable A	WH
3			
4	RS485 - B	Data cable B	BK
5	RS485 - COM	Reference potential	GY
Screen	Screen	Cable screen	

Ethernet (Modbus TCP)



Connector	Cable	RJ-45 connector
1	Receive -	6
2	Transmit -	2
3	Receive +	3
4	Transmit +	1
Screen	Cable screen	Screen

Profibus DP



Connector	Cable	Colour	Comment
1			
2	A	GR	Data cable A
3			
4	B	RE	Data cable B
5	Screen	Screen	Cable screen

The following expansion modules are delivered with the listed installation connectors as standard. If the expansion modules are ordered together with a D-ISC 100, they will already have been installed at the factory.

Expansion module Modbus RTU (X2, DURAG Modbus)

Quantity	Name	Type	Pos*
1	M12 A-coded	male	1
1	M12 A-coded	female	2

Expansion module Modbus TCP (X23, Ethernet)

Quantity	Name	Type	Pos*
1	M12 D-coded	female	3

Expansion module Profibus DP

Quantity	Name	Type	Pos*
1	M12 B-coded	male	1
1	M12 B-coded	female	2

The "sensor" X6 connection is usually connected to the factory-installed sensor connection cable. With the D-ISC 100 M and D-ISC 100 P, the connection can also be guided out of the housing with an M12 connector **(must be ordered separately):

X6: Sensor (Modbus Master)

Quantity	Name	Type	Pos*
1	M12 A-coded	male	4
1	Y adapter M12 A-coded	female →**male/female	

* Pos. see Fig. 4.5 to Fig. 4.7

Position of the connector in the housing

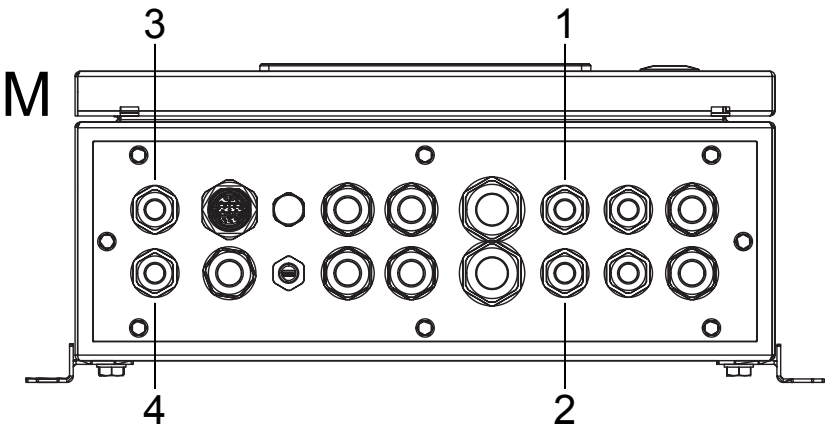


Fig. 4.5: Position of the connector with D-ISC 100 M

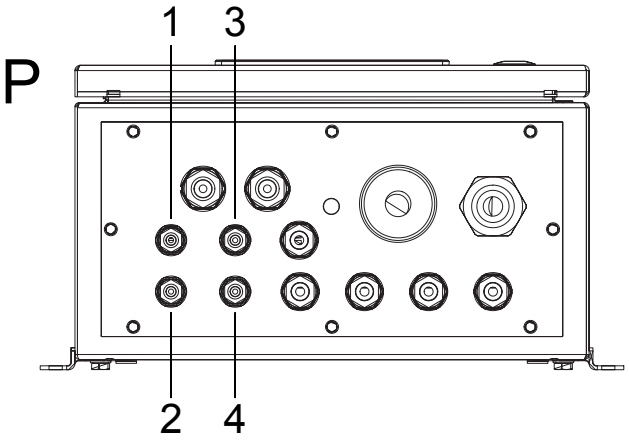


Fig. 4.6: Position of the connector with D-ISC 100 P

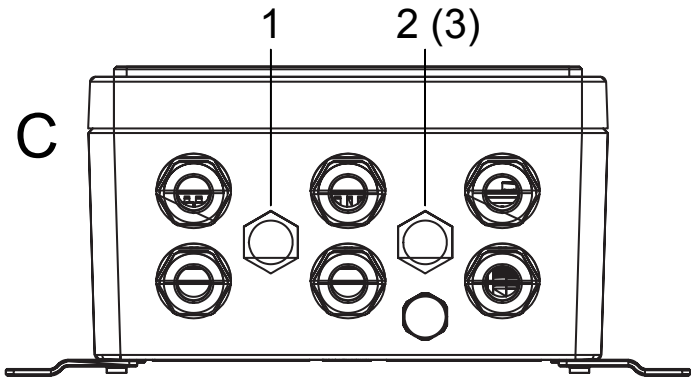
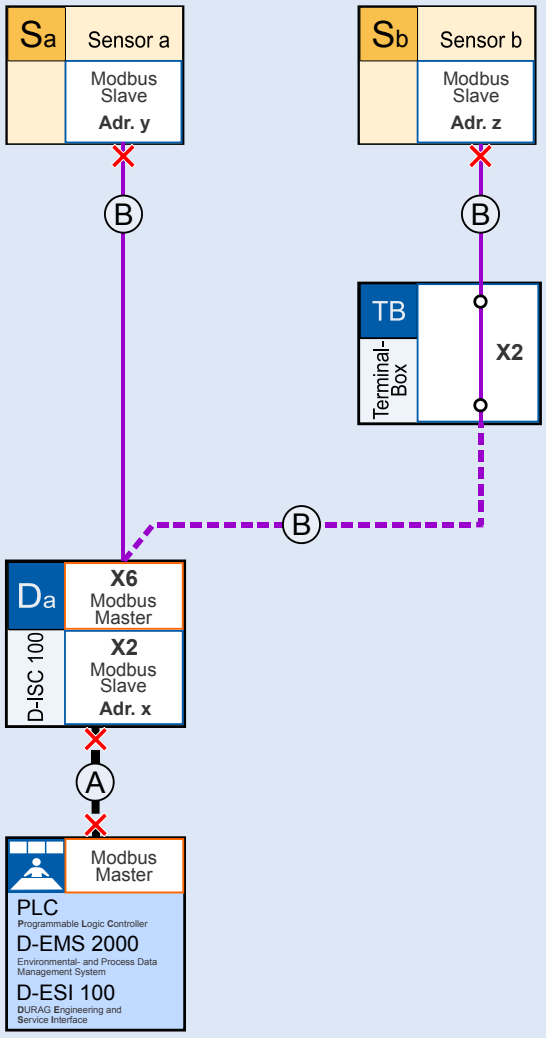


Fig. 4.7: Position of the connector with D-ISC 100 C

4.2.5 Sensor network bus architecture (one D-ISC 100)



D_x	D-ISC 100		Central monitoring room
S_x	Sensor	A	Modbus A (Modbus RTU/TCP or analogue/digital interfaces)
TB	Terminal box	B	Modbus B (Modbus RTU)
✕	Bus termination	------	Bus cable
———	Pre-assembled cable with connector (max. 12 m)		

Table 4.2: Example system components and their bus connections (one D-ISC 100)

One D-ISC 100 can control up to 8 different sensors.

In the example above, the D-ISC 100 (Da) supplies sensor Sa with voltage, and the terminal box (TB) supplies sensor Sb with voltage.

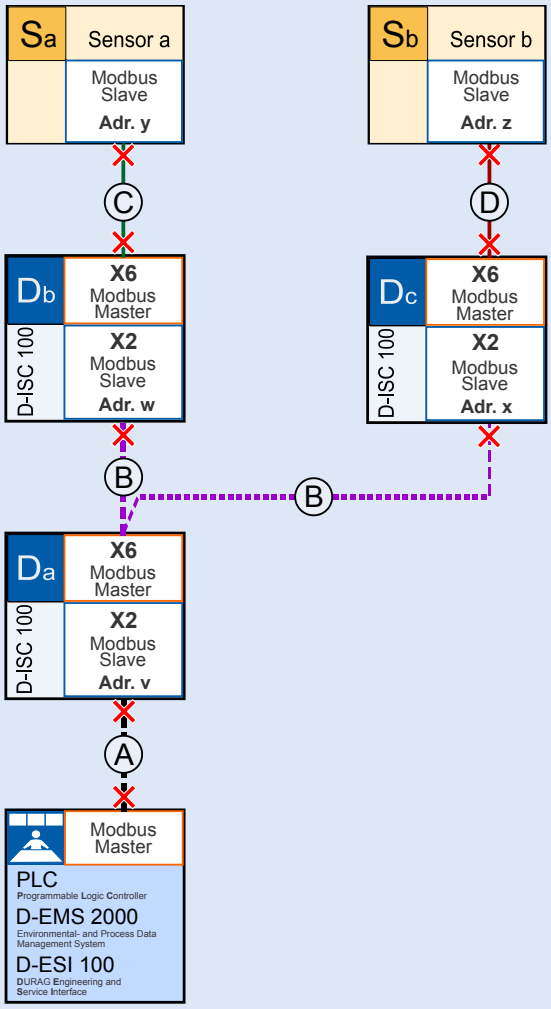
The connecting cables to the sensors (Sa and Sb) are pre-wired at the terminals of the D-ISC 100 and the D−TB 100. There are connectors on the other ends of the cables. The sensors are connected exclusively via this connector. The operator does not need to carry out any local wiring work on the terminals!

Communication between the D-ISC 100 and the sensors is performed via a serial Modbus connection.
In this example, the D-ISC 100 (Da) acts as the Master at Modbus B, and sensors Sa and Sb act as Slaves. The bus must be terminated at each end. This termination can be switched on and off in the individual devices (see relevant manual).

In this example, the D-ISC 100 (Da) also serves as an interface between the sensor system and the PLC [▶ 204]. The PLC can be connected via analogue and digital I/O [▶ 203]s, Modbus RTU [▶ 204] or Modbus TCP [▶ 204]. Optional expansion modules may be required here.

The terminals are defined in Section 4.2.4 Bus connection [▶ 36], together with further details on the connection of the data cable. The connections X2 and X6 can be guided out of the housing via an M12 connector. Therefore, bus wiring via pre-assembled bus cables can be used as an alternative to direct wiring.

4.2.6 Sensor network bus architecture (multiple D-ISC 100)



D_x	D-ISC 100	A	Modbus A (Modbus RTU/TCP or analogue/digital interfaces)
S_x	Sensor	B	Modbus B (Modbus RTU)
TB	Terminal box	C	Modbus C (Modbus RTU)
✕	Bus termination	D	Modbus D (Modbus RTU)
	Central monitoring room	------	Bus cable
——	Pre-assembled cable with connector (max. 12 m)		

Table 4.3: Example system components and their bus connections (multiple D-ISC 100)

Overview of bus architecture

If more than one operation unit is required for a sensor, the bus architecture specified above must be used. Up to two sensors and three D-ISC 100s can be installed within this architecture. Each of the two sensors can therefore be equipped with one on-site operation unit (Db and Dc). (Da) acts as the central control unit for the two sensors here, and as the interface to the evaluation system. (Sb) and the associated (Dc) are optional; (Sb)

cannot be operated without (Dc). Note: The operation of multiple D-ISC 100s within one sensor network is only possible from D-ISC 100 firmware version 02.02R0000.

Parameterisation

When parameterising a sensor system with this architecture, proceed as follows:

- Set the "network mode" for each D-ISC 100:

D-ISC 100	Network mode
(Da)	D-ISC 100 network
(Db) and (Dc)	Sensor network

- Allocate the correct sensor position to each sensor in the user interface of the corresponding D-ISC 100. Start with the configuration of (Db).

D-ISC 100	Sensor	Sensor position
(Db)	(Sa)	S1
(Dc)	(Sb)	S1
(Da)*	(Sa)	S1
	(Sb)	S2

*(Da) access to (Sa) is performed via the Modbus address of (Db).

This path will take you to the required menu:

D-ISC 100 menu path:
Standard display (e.g.: S1.1) User mode (menu 1) ▼ ▼ System setup (menu 3) Date/Time ▼ ▼ DURAG Modbus Communication Settings ▼ ▼ Network mode

Power supply

A D-ISC 100 can supply a sensor with the necessary operating voltage. The D-ISC 100 P also supplies the necessary purge air. In the example, the D-ISC 100 (Db) is supplying sensor Sa with voltage, and the D-ISC 100 (Dc) is supplying sensor Sb with voltage. The connecting cables to the sensors (Sa and Sb) are pre-wired at the terminals of the D-ISC 100. There are connectors on the other ends of the cables. The sensors are connected exclusively via this connector. The operator does not need to carry out any local wiring work on the terminals.

Communication

Communication between the D-ISC 100 and the sensors is performed via a serial Modbus connection. The following applies here:

Modbus	Master	Slave
C	(Db)	(Sa)
D	(Dc)	(Sb)
B	(Da)	(Db) and (Dc)

In principle, a D-ISC 100 can only operate/parameterise those sensors that are connected via the Modbus Master interface of a D-ISC 100. The following therefore applies:

D-ISC 100	Operates/parameterises sensor
(Db)	(Sa)
(Dc)	(Sb)
(Da)	(Sa) and (Sb)

All buses must be terminated at each end. This termination can be switched on and off in the individual devices (see relevant manual).

In this example, the D-ISC 100 (Da) serves as an interface between the sensor system and the PLC [▶ 204] .

The PLC can be connected via analogue and digital I/O [▶ 203]s, Modbus RTU [▶ 204] or Modbus TCP [▶ 204]. Optional expansion modules may be required here.

Details regarding the connection of the data cable can be found in Section 4.2.4 Bus connection [▶ 36].

4.2.7 Individual sensor connection

For the connection of an (individual) sensor, ordered connecting cable is connected to the Universal control unit at the factory. It just needs to be inserted into the respective socket on the sensor via the connector.

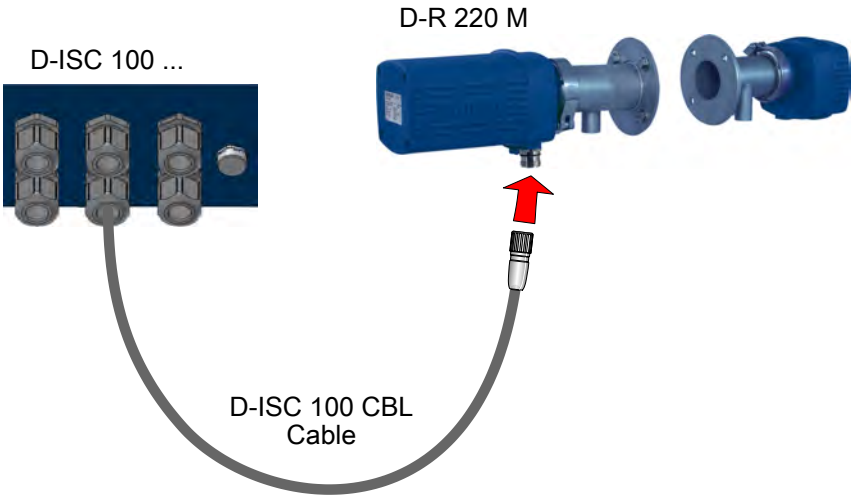


Fig. 4.8: Using the D-ISC 100 with the D-R 220

1. Insert the cable with M23 connector that has already been connected to the D-ISC 100 at the factory into the panel jack on the sensor (e. g. D-R 220, see figure above).
2. Secure the connection using the connecting nut on the connector.

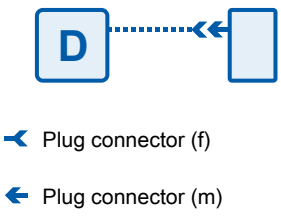


Fig. 4.9: Individual sensor connector

3. If the sensor has not yet been operated with the D-ISC 100, it will firstly need to be assigned.

✓ Following successful assignment, the new sensor can be operated using the D-ISC 100.

4.2.8 Dual sensor connection

With dual sensors (e.g. D-FL 220), the connection to both sensors and both sides of the D-ISC 100 is established via plug connector. The second sensor is connected via a separate cable with connectors on both sides. There is also the option of connection to a terminal box (D-TB x00).

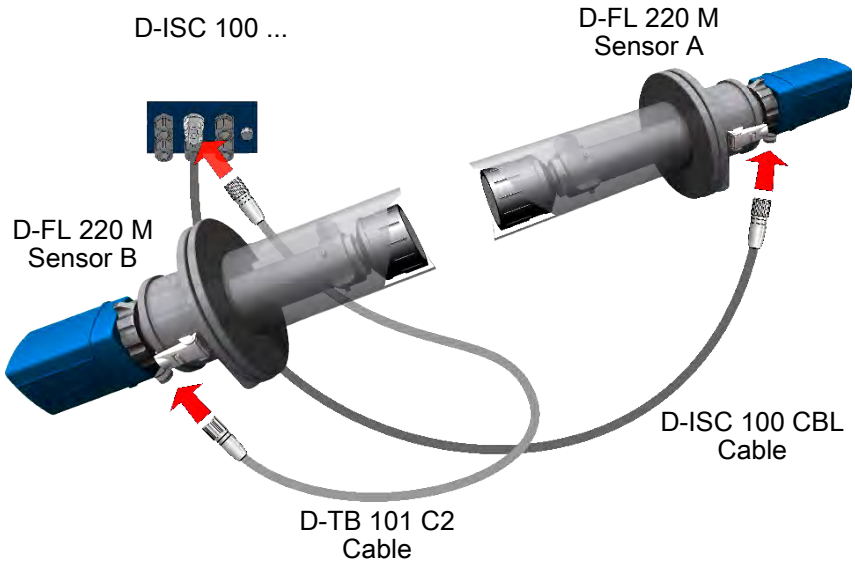


Fig. 4.10: Using the D-ISC 100 with the D-FL 220

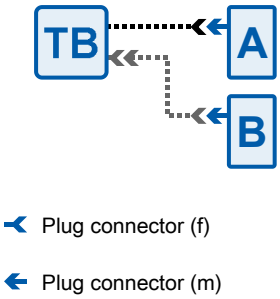


Fig. 4.11: Dual sensor plug connection

1. Insert the connecting cable with M23 connector that has already been connected to the D-ISC 100 at the factory into the panel jack on the sensor A (e. g. D-FL 220, see figure above).
2. Secure the connection using the connecting nut on the connector.

   ✓ The D-ISC 100 version for use with the dual sensor has an additional M23 panel jack.
3. Insert the cable for the D-FL 220 D-ISC 100 CBL into this panel jack on one side.
4. The other end of the cable is connected to the M23 panel jack on the sensor.
5. Secure both plug connections with the respective union nuts.
6. If the sensor has not yet been operated with the D-ISC 100, it will firstly need to be assigned.

✓ Following successful assignment, the new dual sensor can be operated using the D-ISC 100.

4.2.9 Basic Modbus information

Basic information about the Modbus RTU [▶ 204] Modbus can be obtained from the Internet at the home page of the **Modbus Independent User Organisation (IDA)***.

- "Modbus Protocol specifications"

`http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf`

(Describes the datagrams (protocol data units) that are exchanged between master and slave).

- "Modbus over Serial Line Specification and Implementation Guide"

`http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf`

(Describes how the datagrams are packed into telegrams (application data units)).

The specifications of the cables to be used for operating the Modbus can be found on the Internet under the address*

- `http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf`

in the Chapter 3.6 Cables.

- `http://modbus.org/docs/Modbus_Messaging_Implementation_Guide_V1_0b.pdf`

Information on using Modbus TCP.

***(DURAG GmbH **offers no guarantee of the correctness of the Internet addresses.** DURAG GmbH **offers no guarantee of the correctness of the pages listed. The presenters of those pages take sole responsibility for them).**

4.2.10 Information on the DURAG Modbus protocol

This information is intended for operating and maintenance personnel who already have the necessary basic information technology and networking knowledge:

- The Modbus protocol is a communications protocol. Since 1979, because of its open structure, Modbus has become a de facto standard in the industry.
- The data are transmitted in binary form. This form of the Modbus is designated as **RTU**.
- The DURAG Modbus is based on the Modbus protocol, and also defines *additional* information such as register assignments.
- The D-ISC 100 uses an RS485 serial interface [▶ 204] for connection in accordance with the DURAG Modbus specification.

We have summarised in the appendix the most important technical data that you require for the D-ISC 100 - Universal control unit in relation to the Modbus (see 13.5.5 D-ISC 100 software module - Modbus RTU Slave [▶ 149]).

4.3 Top hat rail expansion module

DANGER

Danger of death due to electric current!

An immediate danger of death exists in case of contact with live parts. Damage to the insulation or individual components can present a danger of death.

- In the event of damage to the insulation, turn off the power supply immediately and initiate repairs.
- Only have work on electric systems performed by specialised electricians.
- Before opening the housing or removing the touch guard, disconnect the device, check that no voltage is present and secure against reactivation.
- Keep moisture away from live parts. This may lead to a short-circuit.

Top hat rail modules are installed in the housing of the Universal control unit. Installation is dependent upon the device model.

4.3.1 Assembly of top hat rail expansion modules

Assembly notes

- The D-ISC 100 **must be disconnected** during the assembly/ disassembly of modules on the top hat rail.
- Operating voltage is required at the module in order to add the module to the D-ISC 100 configuration.

Installing a new module

1. New, additional top hat rail modules must **in principle always be installed to the right** next to the last available module (de-energised condition).
2. After the D-ISC 100 is switched on, the module is automatically added to the D-ISC 100 configuration.
3. The settings and signal assignment for the module should be take from Section 10.4.3 Modules (M) (expansion module, hardware) [▶ 126].

Removing the module

1. A top hat rail module that is no longer needed is firstly removed from the D-ISC 100 configuration using the D-ISC 100 user interface. See also Section 10.4.2 Mx: Remove module [▶ 126].
2. Disconnect the D-ISC 100 from the power. Then disassemble the module from the top hat rail.
3. All remaining modules on the top hat rail **must** then be moved to the left.
   (The same applies even if a new module is to be assembled afterwards).

Replacing an existing module (with the same module type)

- ☐ An existing module is to be replaced with another module of the same type.

1. The old module is **not** removed from the D-ISC 100 configuration using the D-ISC 100 user interface.
2. Disconnect the D-ISC 100 from the power. Then disassemble the module from the top hat rail.
3. Assemble the new module in the location of the old module on the top hat rail. The remaining modules are not moved.
4. Switch the power to the D-ISC 100 back on.
5. Correct the parameterisation of the new module using the D-ISC 100 user interface. See also Section 10.4.3 Modules (M) (expansion module, hardware) [▶ 126].

Replacing an existing module (with a different module type)

- ☐ An existing module is to be replaced with a module of a different type.

1. To this end, the module being replace is removed (as described under "Remove module").
2. The new module is then added to the system (as described under "Installing a new module).

Assembly:

The following assembly is explained using the example of the D-ISC 100 M.

You can find the parts designation on page [▶ 24].

Proceed as follows:

- ☐ The D-ISC 100 is de-activated.
- ☐ The housing of the D-ISC 100 is opened.

1. Undo the terminal end holder on the right-hand side of the CPU module (or the most recently assembled module). Use a screwdriver to do so. Lever the terminal end holder out of the top hat rail as shown in the figure on the left.

Fig. 4.12: Undo the terminal end holders.

2. Engage a bus connector onto the top hat rail (figure on the left - 1). The plug connection at the top is on the right-hand side.
3. Slide the bus connector that has been engaged on the top hat rail along the rail towards the left (figure on the left - 2) until it is connected to the existing plug connection underneath the CPU module (or the most recently installed module).

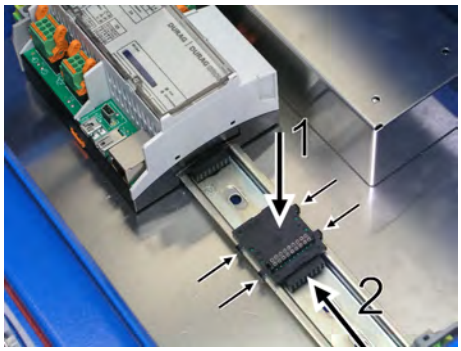


Fig. 4.13: Engaging the bus connector

4. Hold the top hat rail module immediately to the right of the CPU module (or the most recently installed module) above the top hat rail. The module's plug connection (figure on the left) must be aligned above the top plug connection of the bus connector.

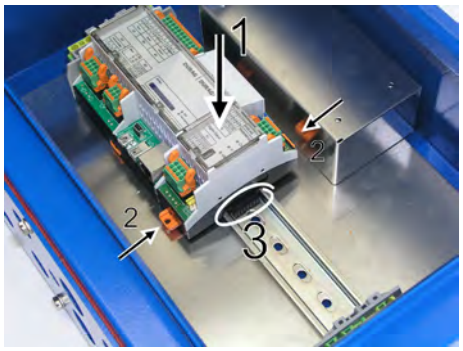


Fig. 4.14: Attaching the top hat rail module

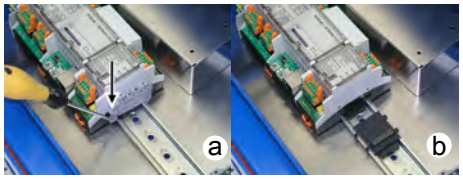


Fig. 4.15: Completing installation

5. Now carefully push the top hat rail module onto the top hat rail (figure on the left - 1).
6. Lock the top hat rail module onto the rail by pushing both tabs (figure on the left - 2) towards the top hat rail.
   ✓ The plug connection for the bus connector is visible underneath the installed top hat rail module (figure on the left - 3). The next module can be connected here.
7. Installation is completed by attaching the terminal end holder (figure on the left - a).
   Position the terminal end holder as closely as possible against the right-hand side of the installed module. Mount the terminal end holder here, with the upper part inside the top hat rail.
8. Push the bottom part downwards using a screwdriver placed into the notch above the retaining lug. At the same time, push it towards the centre of the top hat rail until the terminal end holder engages in the top hat rail.

□ If multiple modules are to be installed, leave out the final terminal end holder to start with. Repeat the installation steps for each additional module as described from step 2.

1. Then switch on the power to the D-ISC 100.
2. After installation, the new module will be found by the D-ISC 100 user interface and will be automatically added to the system (see Section 10.4.3 Modules (M) (expansion module, hardware) [▶ 126] et. seq.).

✓ Configure* the module using the D-ISC 100 user interface, i.e. enter the required parameters for the new module. Installation is then complete. The device can now be used.

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* see also
15.10 Examples: Assignment of the analogue output (current output) [▶ 173] ff.
15.11 Example: Assignment of digital outputs [▶ 184] ff.
15.12 Example: Assignment of digital inputs [▶ 187] et. seq.

4.3.2 Disassembling top hat rail modules

Proceed as follows to disassemble a top hat rail module:
(You can find the parts designation on page [▶ 24])

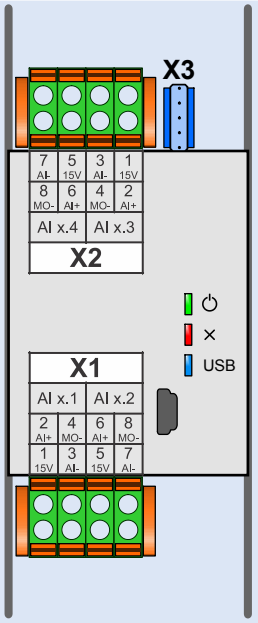
- ☐ Before disassembly, a top hat rail module that is no longer needed is firstly removed from the system using the D-ISC 100 user interface (see Section 10.4.2 Mx: Remove module [▶ 126]).
  Otherwise, an error message indicating that a moduleis missing will be displayed after system start.

1. For disassembly, **disconnect** the D-ISC 100 from the power.
2. Open the D-ISC 100 housing.
3. Undo the terminal end holder on the right-hand side of the most recently assembled module. Use a screwdriver to do so. Lever the terminal end holder out of the top hat rail as shown in the figure on the left.
4. Unlock the top hat rail module on the rail. Pull the two orange tabs on the base of the module away from the top hat rail. Use a suitable screwdriver to do so.
5. Carefully pull the top hat rail module upwards away from the top hat rail.
6. Pull the exposed bus connector on the top hat rail a little to the right until it is released from the connection to the bus connector of the previous module.
7. Lever the two holders on one side of the bus connector (top or bottom) away from the top hat rail. Remove the bus connector from the top hat rail.
8. Repeat steps 3 to 6 for each module to be removed.
9. Disassembly is completed by attaching the terminal end holder onto the right-hand side of the remaining module. Position the terminal end holder as closely as possible against the right-hand side of the remaining module. Mount the terminal end holder here, with the upper part inside the top hat rail.
10. Push the bottom part downwards using a screwdriver placed into the notch above the retaining lug. At the same time, push it towards the centre of the top hat rail until the terminal end holder engages in the top hat rail.

✓ Disassembly is complete once the operating voltage has been switched back on again. The D-ISC 100 can then be used again.

Fig. 4.16: Undo the terminal end holders.

4.3.3 Analogue input



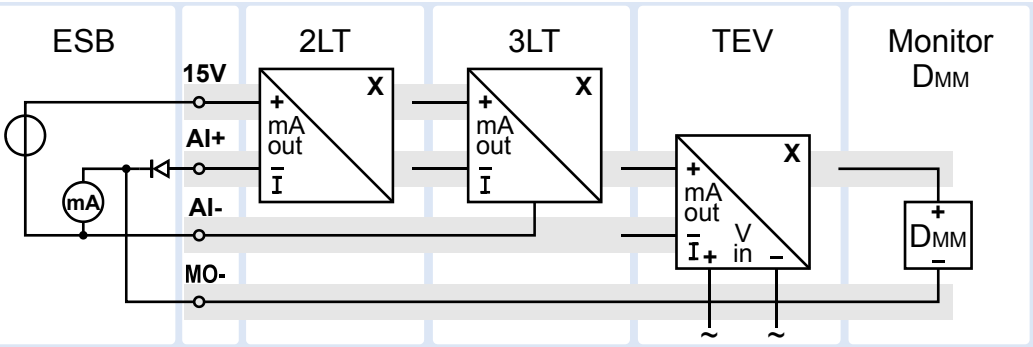
Pos	Description	
X1	Module connecting terminals	
X2	Module connecting terminals	
X3	Service	
LED 9	green	LED ON when in operation; FLASHING during communication (internal)
LED 10	red	LED ON in event of expansion module fault
LED 11	blue	LED ON when USB connected

Table 4.4: Connecting terminals and LED functions of the analogue input expansion module

Plug position		Description	Plug position		Description
X1			X2		
X1.1	AI x.1	+15 V	X2.1	AI x.3	+15 V
X1.2		AI+ analogue signal +	X2.2		AI+ analogue signal +
X1.3		AI− analogue signal −	X2.3		AI− analogue signal −
X1.4		MO− monitor pick-up	X2.4		MO− monitor pick-up
X1.5	AI x.2	+15 V	X2.5	AI x.4	+15 V
X1.6		AI+ analogue signal +	X2.6		AI+ analogue signal +
X1.7		AI− analogue signal −	X2.7		AI− analogue signal −
X1.8		MO− monitor pick-up	X2.8		MO− monitor pick-up

Table 4.5: Plug assignment for analogue input expansion module

Connection of various transmitters using the example of AIx.1
connection contacts for each of the 4 measurement channels
AI x.1: X1.1-4
AI x.2: X1.5-8
AI x.3: X2.1-4
AI x.4: X2.5-8



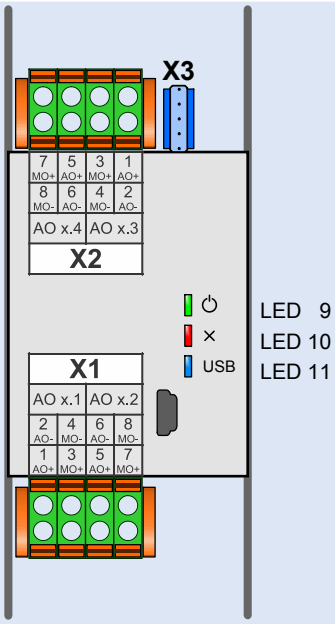
X / I	Measured value converter with current output		Voltage source
DMM	Digital multimeter/monitor	mA	Current measurement

Table 4.6: Connection of analogue input module

Type	Description
ESB	Equivalent circuit for the analogue input expansion module
2LT	2-wire transmitter
3LT	3-wire transmitter
TEV	Transmitter with its own power supply
DMM	External digital multimeter for test purposes

Table 4.7: Plug assignment for the analogue input expansion module, example AIx.1

4.3.4 Analogue output



Pos	Description	
X1	Module connecting terminals	
X2	Module connecting terminals	
X3	Service	
LED 9	green	LED ON when in operation; FLASHING during communication (internal)
LED 10	red	LED ON in event of expansion module fault
LED 11	blue	LED ON when USB connected

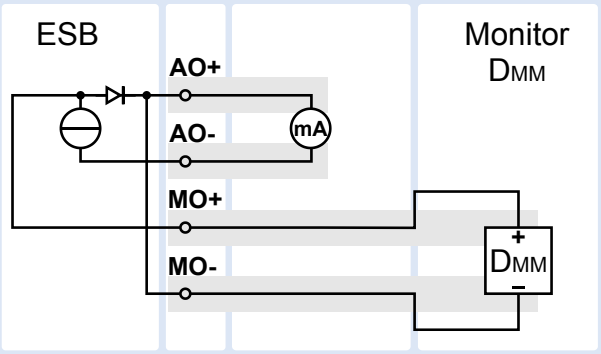
Table 4.8: Connecting terminals and LED functions of the analogue output expansion module

Plug position		Description	Plug position		Description
X1			**X2**		
X1.1	AO x.1	AO+ evaluation system +	X2.1	AO x.3	AO+ evaluation system +
X1.2		AO−evaluation system-	X2.2		AO−evaluation system-
X1.3		MO+ measuring instrument + (monitor pick-up)	X2.3		MO+ measuring instrument + (monitor pick-up)
X1.4		MO−measuring instrument- (monitor pick-up)	X2.4		MO−measuring instrument- (monitor pick-up)
X1.5	AO x.2	AO+ evaluation system +	X2.5	AO x.4	AO+ evaluation system +
X1.6		AO−evaluation system-	X2.6		AO−evaluation system-
X1.7		MO+ measuring instrument + (monitor pick-up)	X2.7		MO+ measuring instrument + (monitor pick-up)
X1.8		MO−measuring instrument- (monitor pick-up)	X2.8		MO−measuring instrument- (monitor pick-up)

Table 4.9: Plug assignment expansion module analogue output

Connection of various evaluation units/monitors
using the example of AOx.1
connection contacts for each of the 4 measurement channels

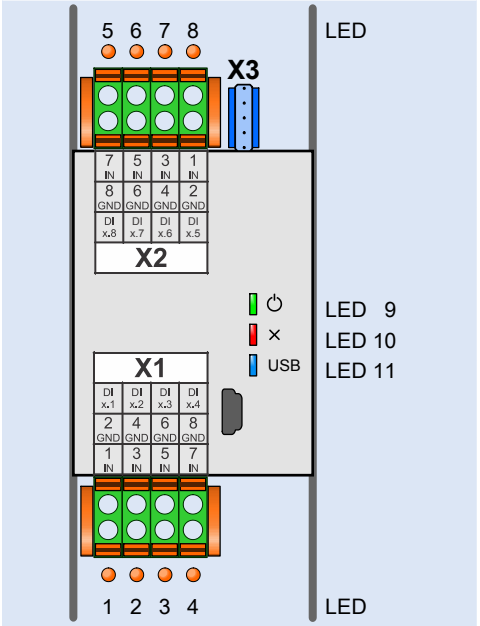
AO x.1: X1.1-4
AO x.2: X1.5-8
AO x.3: X2.1-4
AO x.4: X2.5-8



DMM	Monitor	⊖	Current source
		mA	Current measurement
ESB		Equivalent circuit for the analogue output expansion module	

Table 4.10: Connection of analogue output module

4.3.5 Digital input



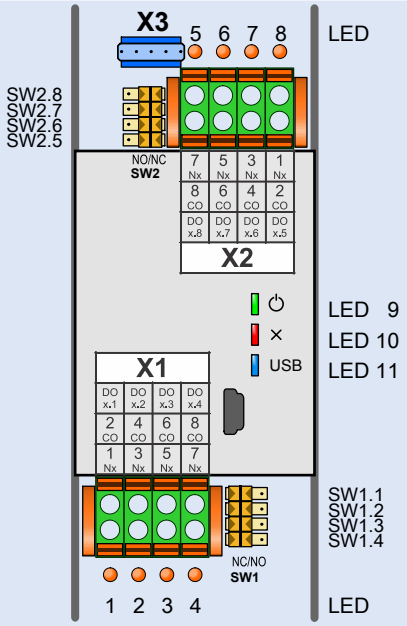
Pos	Description	
X1	Module connecting terminals	
X2	Module connecting terminals	
X3	Service	
LED 1–4	orange	LED ON when IN and GND are conductively connected
LED 5-8	orange	LED ON when IN and GND are conductively connected
LED 9	green	LED ON when in operation; FLASHING during communication (internal)
LED 10	red	LED ON in event of expansion module fault
LED 11	blue	LED ON when USB connected

Table 4.11: Connecting terminals and LED functions of the digital input expansion module

Plug position		Description	Plug position		Description
X1			**X2**		
X1.1	DI x.1	IN digital input (contact input)	X2.1	DI x.5	IN digital input (contact input)
X1.2		GND digital input (contact input)	X2.2		GND digital input (contact input)
X1.3	DI x.2	IN digital input (contact input)	X2.3	DI x.6	IN digital input (contact input)
X1.4		GND digital input (contact input)	X2.4		GND digital input (contact input)
X1.5	DI x.3	IN digital input (contact input)	X2.5	DI x.7	IN digital input (contact input)
X1.6		GND digital input (contact input)	X2.6		GND digital input (contact input)
X1.7	DI x.4	IN digital input (contact input) IN	X2.7	DI x.8	IN digital input (contact input) IN
X1.8		GND digital input (contact input) GND	X2.8		GND digital input (contact input) GND

Table 4.12: Plug assignment expansion module digital input

4.3.6 Digital output



Pos	Description	
X1	Module connecting terminals	
X2	Module connecting terminals	
X3	Service	
LED 1−4	orange	LED ON when there is voltage at the relay *coil*.
LED 5-8	orange	LED ON when there is voltage at the relay *coil*.
LED 9	green	LED ON when in operation; FLASHING during communication (internal)
LED 10	red	LED ON in event of expansion module fault
LED 11	blue	LED ON when USB connected
SW1.1…4	NO/NC switching for DOx.1…4 shown switch position means NC	
SW2.5…8	NO/NC switching for DOx.5…8 shown switch position means NC	

Table 4.13: Connecting terminals, LED functions and switches for digital output expansion module

Plug position		Description	Plug position		Description
X1			**X2**		
X1.1	DO x.1	Nx digital output (Nx≙SW1.1)	X2.1	DO x.5	Nx digital output (Nx≙SW2.1)
X1.2		CO digital output (common)	X2.2		CO digital output (common)
X1.3	DO x.2	Nx digital output (Nx≙SW1.2)	X2.3	DO x.6	Nx digital output (Nx≙SW2.2)
X1.4		CO digital output (common)	X2.4		CO digital output (common)
X1.5	DO x.3	Nx digital output (Nx≙SW1.3)	X2.5	DO x.7	Nx digital output (Nx≙SW2.3)
X1.6		CO digital output (common)	X2.6		CO digital output (common)
X1.7	DO x.4	Nx digital output (Nx≙SW1.4)	X2.7	DO x.8	Nx digital output (Nx≙SW2.4)
X1.8		CO digital output (common)	X2.8		CO digital output (common)

Table 4.14: Plug assignment expansion module digital output

4.3.7 Expansion module Profibus DP

Installing and connecting the module in the D-ISC 100 housing.

The Profibus DP expansion module is factory-installed on the right next to the main board as an external converter. The Modbus RTU Slave software module is needed to connect the Profibus DP module.

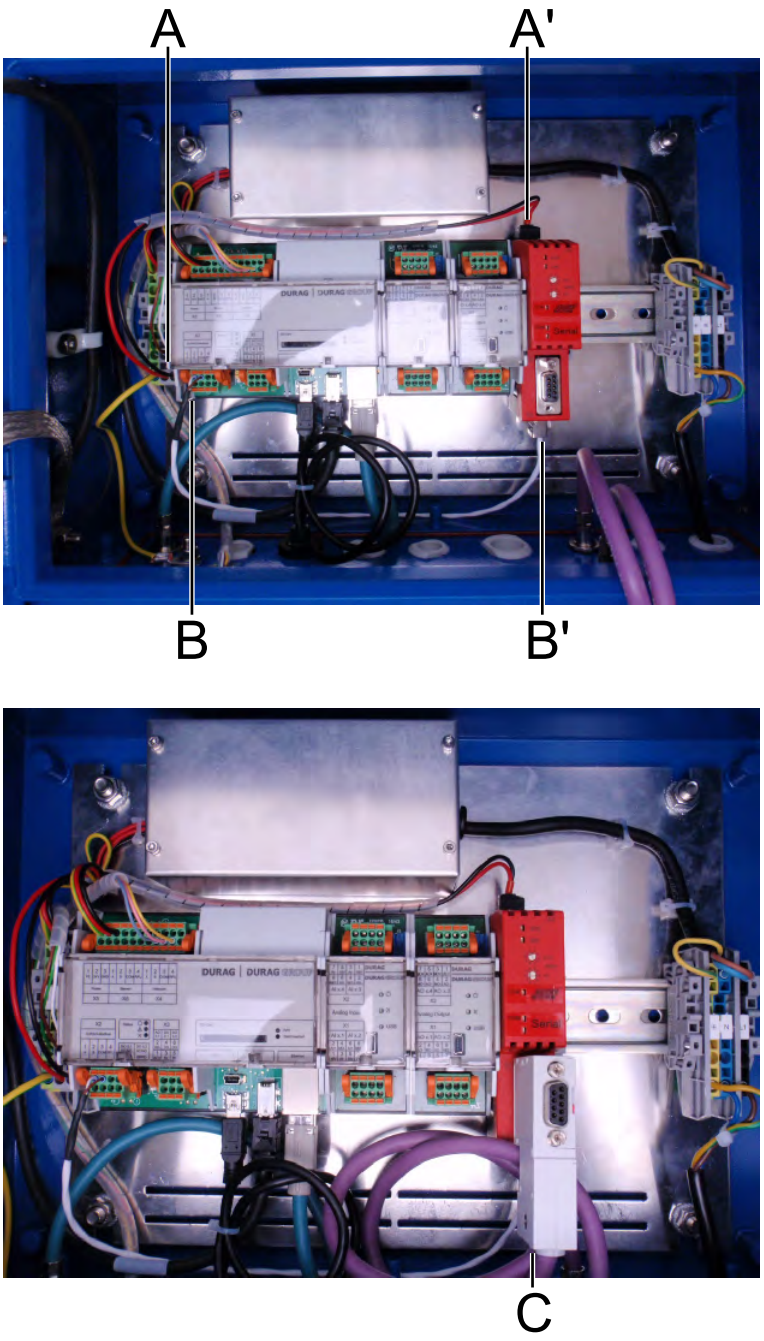


Fig. 4.17: Connecting cable in the D-ISC 100 housing

A	Profibus DP module; internal connecting cable 24V
B	Profibus DP module; internal connecting cable for Modbus RTU

C	Internal Profibus plug with Sub-D connector (incl. termination and diagnostic plug), for pin assignment and external connectors see Section 4.2.4 Bus connection [▶ 36], for connections see Section 4.3.7.2 Connections and termination [▶ 59]).

Table 4.15: Legend for [▶ 57]

The location of the customer connection for the Profibus DP in the D-ISC 100 housing is indicated in Fig. 4.5 through to Fig. 4.7 .

The D−ISC 100 Profibus DP module provides the measured values and status of the D−ISC 100 and sensors S1 and S2 for the cyclical communication via Profibus DP V0 (PROFIBUS DP V0 [▶ 204]). It is also possible to start maintenance functions using the cyclical communication and to check their execution status.

The required GSD file [▶ 203] is provided on a USB stick.

The D−ISC 100 Profibus DP (A) module uses the Modbus RTU protocol for internal communication. For flawless operation, use the factory setting of the D-ISC 100 Modbus RTU slave module communication parameters:

Modbus RTU communication setting (factory setting)				
Modbus address	20		Stop bits	1
Baud rate	19200		Termination	On
Parity	None			

Table 4.16: Modbus RTU module factory setting communication parameters

Additional user information is available for the Profibus DP module. This publication provides the register maps and definitions of the register contents. Contact your DURAG representative (see [▶ 211]) if necessary.

4.3.7.1 Address setting

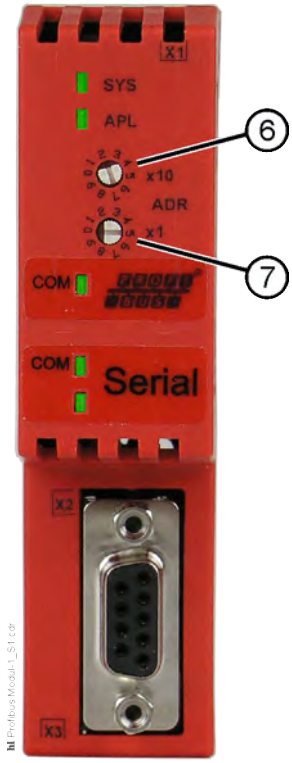


Fig. 4.18: Profibus module rotary switch

6	Rotary switch for Profibus Slave address (10)	7	Rotary switch for Profibus Slave address (1)

The Profibus slave address is set between 1 and 99 using the rotary switch (see figure on the left, position 6 and 7). Rotary switch (6) has a value of 10, while rotary switch (7) has a value of 1. The factory setting is 20; i.e. rotary switch (6) is set to 2, while rotary switch (7) is set to 0 (zero).

The flat side of the switch is always located in front of the selected setting.

In the example on the left, the switch is set to 2.

4.3.7.2 Connections and termination

For the connection of the Profibus cable, there is one B-coded M12 panel jack (Fig. 4.5 to Fig. 4.7 – pos 2) and one panel plug (pos. 1) in the lower part of the D−ISC 100 housing, in accordance with Profibus specifications.

If the D-ISC 100 is located at the end of a bus, the plug connector (pos. 1) is used.

In addition, the termination on the internal Profibus plug (see figure on the left) is also switched on.

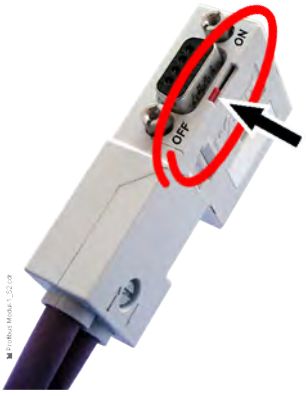
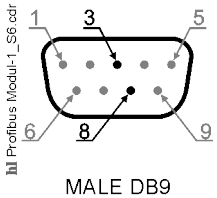


Fig. 4.19: Internal Profibus plug

If the D−ISC 100 is *not* located at the end of a bus, both plug connectors (pos. 1 and 2) are used, and the termination at the internal Profibus plug is switched off (see figure on the left).

Fig. 4.20: Profibus sub-D-plug connector

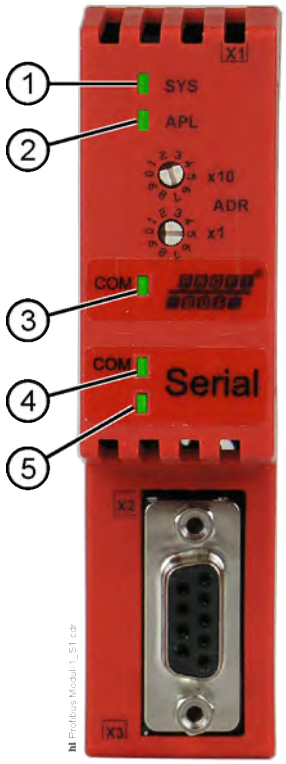
The 9-pole sub-D plug connector for the internal Profibus plug (see figure on the left) can be used for diagnostic purposes.



Connector	Cable	Colour	Comment
3	A	green	Data cable A
8	B	red	Data cable B
Screen	Screen	Screen	Cable screen

Table 4.17: Profibus sub-D plug connector pin assignment

4.3.7.3 LEDs



In the Profibus module, LEDs for information are installed across 3 different areas (see figure on left).

1	System LED 1	2	System LED 2
3	Field bus LED	4	Internal communications LED
5	(not used)		

Table 4.18: LEDs in the Profibus MD module

The LED displays have the following meaning:

4.3.7.3.1 Meaning of system LED 1

No./ colour(s)	LED	Status	Meaning
1	Duo LED yellow/green System LED (SYS)		
green		On	firmware started
yellow		On	Status must only arise briefly If the LED is permanently yellow, this may indicate a hardware defect.
yellow/green		Alternate flashing	Bootloader active
Off		Off	• no operating voltage or • hardware defect is present.

Table 4.19: Flash code meaning of system LED 1 (SYS)

4.3.7.3.2 Meaning of system LED 2

No./ colour(s)	LED	Status	Meaning
2	Duo LED red/green System LED (APL)		
green		On	Field bus and internal communication are operating in cyclical data exchange
green		Flashing 2 s off, 0.5 s on	Module initialised, *field bus* is not operating in cyclical data exchange
green		flashes 2 s off, 0.5 s on 0.5 s off 0.5 s on	Module initialised, *internal communication* is not operating in cyclical data exchange
red		Flashing 2 s off, 0.5 s on	Module initialised, the configuration for the *field bus protocol* is missing
red		flashes 2 s off, 0.5 s on 0.5 s off 0.5 s on	Module initialised, the configuration for the *internal communication protocol* is missing
red		On	An error occurred during initialisation: • no / faulty configuration, • internal fault

Table 4.20: Flash code meaning of system LED 2 (APL)

4.3.7.3.3 Meaning of the field bus LED

No./ colour(s)	LED	Status	Meaning
3	Duo LED red/green	Field bus LED (COM)	
green		On	RUN, cyclical communication
red		On	Incorrect Profibus DP configuration
red		flashes cyclically	STOP, no communication, connection error
red		flashes acyclically	not configured

Table 4.21: Flash code meaning of the field bus LED (COM)

4.3.7.3.4 Meaning of the internal communications LED

No./ colour(s)	LED	Status	Meaning
4	Duo LED red/green	Internal communication LED (COM)	
green		On	valid configuration for Modbus RTU device • ready for Modbus communication, • sends/receives Modbus RTU telegrams
red		On	Communication error: Device operates as a Modbus RTU Master: • The slave device has identified an error (Modbus exception), e.g. function code is not supported, access to invalid register addresses or coil addresses • Receive error identified, e.g. parity error or checksum error • Timeout occurred (slave device is not responding).
Off		Off	• during initialisation • in the event of an invalid Modbus RTU configuration • no operating voltage

Table 4.22: Flash code meaning of the internal communications LED (COM)

4.4 Storage, dismantling and disposal

4.4.1 Dismantling

DANGER

Risk to life due to electric current!

There is an immediate risk to life when touching parts carrying live voltage.

- Only have work on electric systems performed by specialised electricians.
- Before opening the housing or removing the touch guard, disconnect the device, check that no voltage is present and secure against reactivation.

1. De-energise the device, check to verify the voltage-free state, and secure against re-activation.
2. Remove all cable or plug connections connected to the system components.
3. Opening the housing cover
4. Remove all the electrical connections by disconnecting the wires at the terminal strip.
5. Loosen the knurled screw of the (screen) terminal either by hand or using a suitable tool (such as a screwdriver). Once the screw has been sufficiently unscrewed, the cable with its screen can be pulled out between the terminal and the base plate.
6. Uninstall all the connected cables.
7. It is the operating company's responsibility to organise the removal of the D-ISC 100 - Universal control unit and the connected sensors from the overall system.

4.4.2 Storage

- Close the housing door.
- Protect open cable glands from the ingress of moisture and dirt using suitable measures.
- Protect the connecting cable plug from moisture and dirt using suitable measures.
- With the D-ISC 100 P, use suitable means to protect the air suction opening and the connection for the purge air hose against the ingress of moisture and dirt.
- Store device parts in a clean and dry location (see also 13 Technical data [▶ 146]).

4.4.3 Disposal

After reaching the end of its useful life, the product must be disposed of in accordance with regulations. Do not treat the product as normal domestic waste. Observe the relevant local and country-specific regulations.

5 Basic operation of the D-ISC 100

Prerequisite

- You have selected clear display language:
  - **Language setting** (menu 3.2) – [System setup > Language]
  - see also Section 9.2 [Language] [▶ 90].
- PIN protection is deactivated (symbol in the status bar) or enabled:
  - **Login** (menu 6) – [Login / Logout]
  - see 15.4 Example: Clearing the PIN protection (logging in) [▶ 159].
- You have selected the Expert mode [Expert mode] for the display of all menus and menu items:
  - **User mode** (menu 1) – [User mode]
  - see also Section 7.2 [User mode] menu 1 [▶ 81].

Please note that the existence of certain screen displays is dependent on the connected sensors and installed modules.

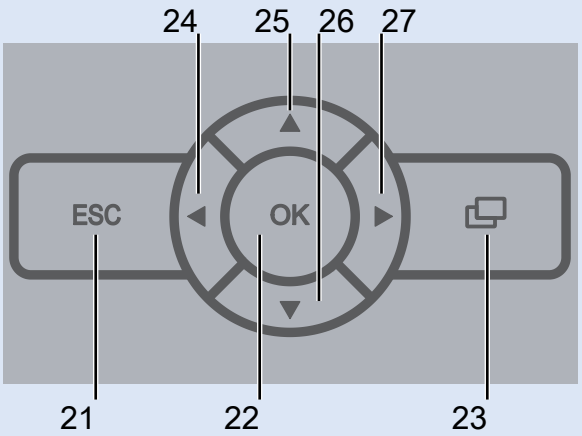
Control elements

The following items are incorporated into the device door/housing cover of the D-ISC 100:

- A **display** for measured values and settings.
- A **keypad** for the operation and parameterisation of the Universal control unit and connected units.

5.1 Keypad

The keypad keys have the following functions:



No.	Meaning	Applies to (for example)
24	to the left ◀	• for input: cursor position • for a display (e.g. measured value): call up the preceding display • in a list view: Check box OFF • in the virtual keyboard: select character

No.	Meaning	Applies to (for example)
25	up ▲	• for input: change value (via the cursor) (increase) • for a menu: call up the next higher menu • in the menu list: change / scroll through the selection (menu bar) • for the virtual keyboard: change the selection
21	Key ESC ESC key [▶ 203]	• abort, back (without loading) • for input: switch to the next higher menu • for a menu: call up the previous menu
27	to the right ▶	• for input: cursor position • for a menu: call up the next menu • for a display (e.g. measured value):call up the next display • in a list view: Check box ON • in the virtual keyboard: select character
23	Key ⧉ Screen key [▶ 204]	• change-over between the various display options • for input: call up the virtual keyboard • for selection: filter ON/OFF
26	down ▼	• for input: change value (via the cursor) (decrease) • for a menu: call up the next lower menu (submenu) • in the menu list: change / scroll through the selection (menu bar) • for the virtual keyboard: change the selection
22	Key OK Enter key [▶ 203]	• for input: confirm the input or adopt the selection • for a menu: open the next lower menu • from the Measurement display: call up the channel menu (short-cut key) • for the virtual keyboard: move the selected character to the input

Table 5.1: Function of the keys

5.2 D-ISC 100 display

The user interface is available in different languages.
In this manual, screenshots are generally shown in English.
Reference to the text in local language is provided by the additional English description.
The key terms are shown in square brackets, and start with the ⧉ symbol.
Example: [⧉ Measuring values] …
The menu number in the header bar can also be used for clarification. The menu numbers and associated menu items are identical in all languages.

5.2.1 Presentations in the display

Fig. 5.1: Display

- **Displays** show measured values and messages. It is not possible to edit these or to adjust any settings here!
  Displays can be identified by the date and time in the header bar (see example on the left).

Fig. 5.2: Menu

- **Menus** are used to perform parameterisation and configuration tasks.
  Menus can be identified by the work "Menu" followed by a combination of letters and numbers in the header bar (see example on the left).

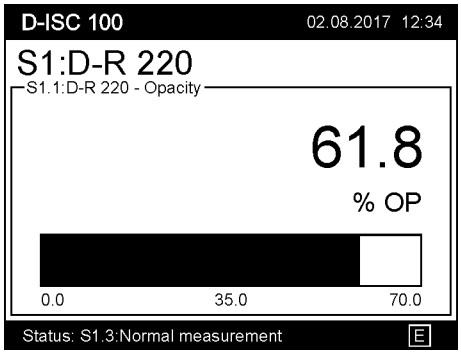


Fig. 5.3: Presentations (display)

The combination of letters and numbers is the unique address for the displayed menu.

The measured value and status displays, together with the available menus, are prepared by the system as required for the connected sensors. This means that the number of available displays and menus varies with the number of connected sensors.

5.2.2 Display of measured values and status

After the D-ISC 100 has been switched on, the system first goes through an initialisation phase with a sequence of displays shown on the screen. Once this phase is complete, the unit will show the configured measured value display or displays in the selected display mode.

For information on the configuration of the measured value displays, see also Section

- 15.9 Examples: Selection of the displayed data [▶ 170]
- 15.1 Example: Display setup [▶ 156]
- 8.2.1 Type and option [▶ 87]
- 8 Display setup menu 2 [▶ 85]

Measurement display after system start

The following figures show example selections for the measurement display after system start [▶ 204].

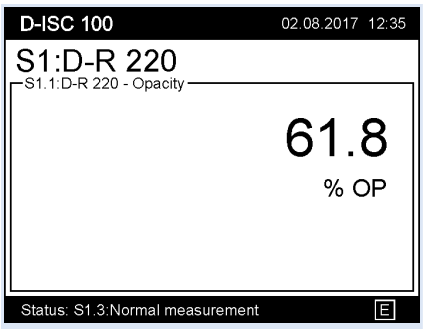
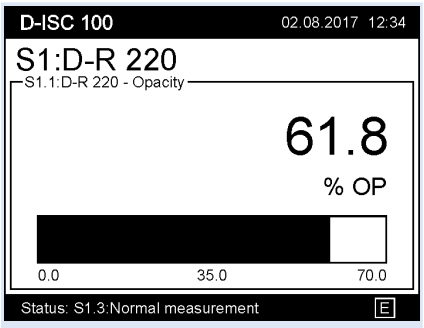
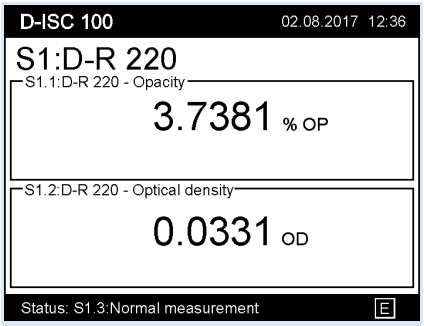
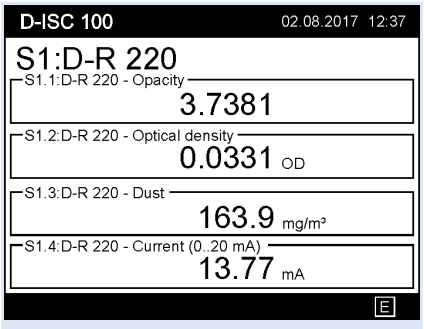
	Output of *one* measured value
	Output of *one* measured value with additional bar graph display
	Output of *two* measured values (additional bar graph displays can be shown for both values)
	Output of *four* measured values (additional bar graph displays *cannot* be shown for the values)

Table 5.2: Value display in the D-ISC 100 display

Press the ⏎ key to switch from the measured value display to the main menu (menu: 1).

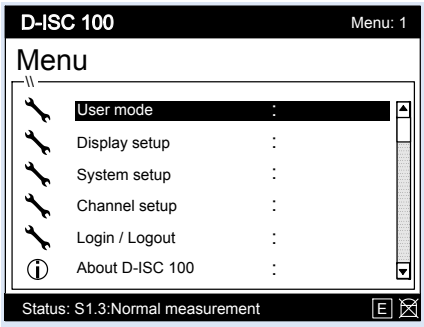
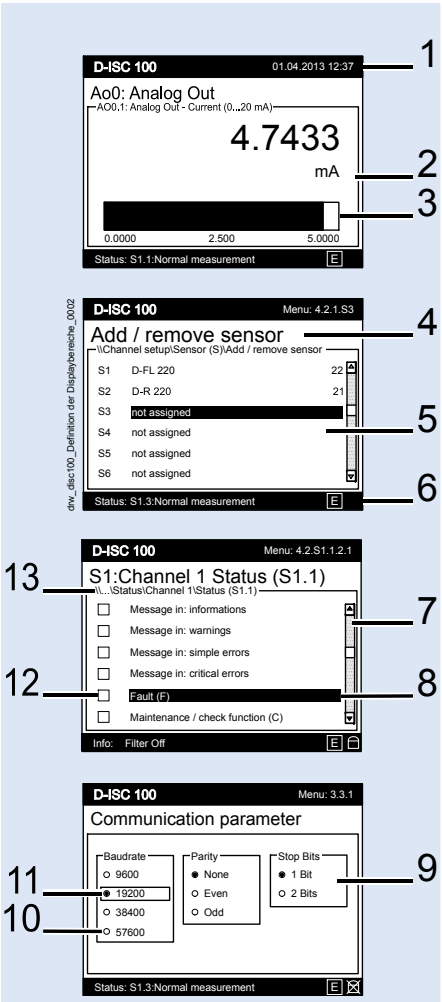


Table 5.3: Main menu

Note the menu address shown on the right-hand side of the header bar (here
menu: 1). It always shows the current location in the menu tree. The "□ User mode" (menu 1) is currently highlighted in black. Pressing the ▼ key switches to "□Display setup" (menu 2) etc. An address 1.2.3 defines the location as menu 1, in sub-menu 2 and then in sub-menu 3.

Definition of terms in the display area



1	Header
2	Display area
3	Bar graph
4	Window title
5	Menu range
6	Status line
7	Scroll bar
8	Current selection
9	Selection box
10	Radio button (not selected)
11	Radio button (selected)
12	Checkbox deactivated ☐ activated ■
13	In the display: Channel name for a menu: Menu path:

Table 5.4: Term definitions

Meaning of the symbols in the screen menu

	PARAMETERS	Display (read only)		DISPLAY status	Checkbox: Status inactive
	PARAMETERS	Setting (can be edited)		DISPLAY status	Checkbox: Status active
	PARAMETERS	Setting (can be edited after entering a valid PIN)		DISPLAY status	Checkbox: Status active with activated inversion
	MENU/MESSAGE	Information/message (read only)	B	DISPLAY status	User mode status: Basic Mode
	MESSAGE	Warning (read only)	C	DISPLAY status	Status: in maintenance (check function)
	MESSAGE	Fault (read only)	F	DISPLAY status	Status: Fault
	MESSAGE	Critical fault (read only)	E	DISPLAY status	User mode status: Expert Mode
	MENU	Setup	M	DISPLAY status	Status: Maintenance demand
	ASSIGNMENT	Carry out	S	DISPLAY status	Status: Out of specification)
	ASSIGNMENT	Carry out (only after entering a valid PIN)	T	DISPLAY status	Status: Simulation/function test active
	FUNCTION	Carry out or menu		DISPLAY status	Status: PIN lock deactivated
	FUNCTION	Carry out (only after entering a valid PIN)		DISPLAY status	Status: PIN lock activated (blocked)
	SUB-ITEM	Additional information on the above point		DISPLAY status	Status: PIN lock activated (unblocked)
	LOGIN	Device; new PIN coed adopted		LOGIN	Device; new PIN coed not adopted
	LOGIN	Device; no protection via PIN code possible			

Table 5.5: Legend for the screen menu

5.2.3 Virtual on-screen keyboard

Using the on-screen keyboard

In fields where a character input is expected, you can open up a "virtual on-screen keyboard" by pressing the screen key ⌨.

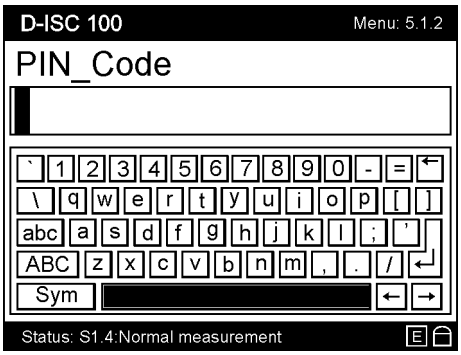


Fig. 5.4: Menu 5.1.2 with the virtual on-screen keyboard I

The arrow keys (▲◀▶▼) on the keypad [▶ 203] (on the device housing) can be used to select the characters on the on-screen keyboard [▶ 204] (display). The current character is shown against a black background (*in this example the space bar*).

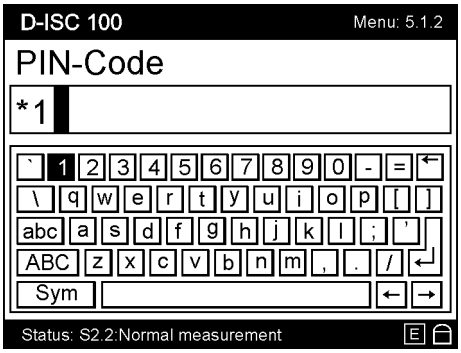


Fig. 5.5: Virtual on-screen keyboard II

After pressing the OK (keypad) key, the selection (*in this example: "1"*) is adopted into the input field of the on-screen keyboard (see figure above).
When entering the PIN, the adopted character is quickly replaced by a *.

You can go back a step (delete the last character) by pressing the Back key (⮌) at the top right-hand side of the **on-screen keyboard.**

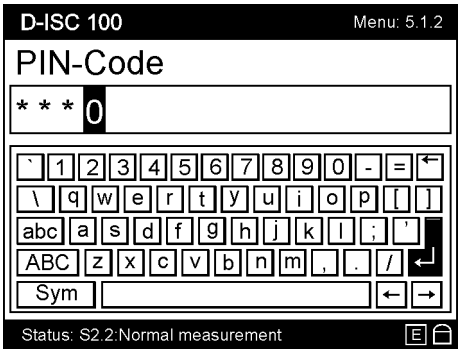


Fig. 5.6: Menu 5.1.2 On-screen keyboard with Enter key selected

If all characters have been entered correctly, send the characters (or the code when entering the PIN) to the program by pressing the Enter key on the **on-screen keyboard**. To do so, select the Enter key on the on-screen keyboard (See figure above) using the arrow keys on the **keypad**, and confirm by pressing OK.

5.2.4 Menus, structure and navigation

There are various menus for the configuration of:

- The display
- D-ISC 100
- Connected sensors
- Used modules

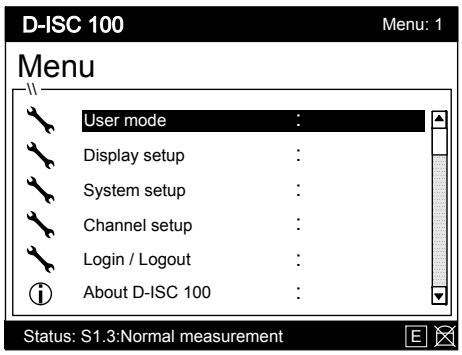


Fig. 5.7: Menu selection Hauptmenüdrw_disc100_Display_0001-0_Statusanzeige DO0

Pressing the key from a measured value display opens up the main menu.

From here you can switch to the various different sections of the menu (details and examples for this can be seen further below).

Menus contain many levels within their structure. The menus are nested alongside and within each other.

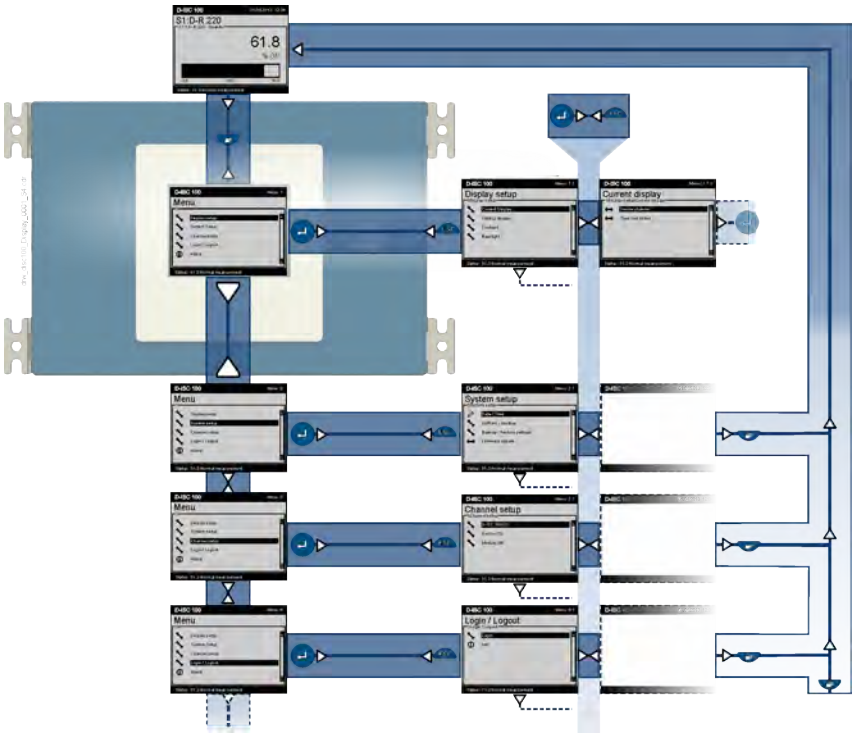


Fig. 5.8: Menu – navigation

The keys used for moving back and forth between the displays are shown in the Fig. 5.8 .

Brief description of the menu navigation

The basic operation of the keypad and display is quick and easy to explain:

1. Pressing the key takes you from the display of the measured values to the menu display, for example.
2. The downward ▼ or upward ▲ arrow keys can be used to select a menu item. Selected menu items are highlighted with a black bar.
3. The OK key can be used to select the highlighted menu item and to go to the corresponding sub-menu.
4. To go back to the next level, press the ESC key.

5. Pressing the ⏎ key again generally leads directly back to the measured value display. You will always be taken back to the place at which you previously left the measured value display.

Info box message:
⏎ Changes on system settings saved successfully]

If you have moved within the settings menu, even *without* making any changes, you may still receive an info box message confirming a save action when you leave this menu.
In this case, it is the existing (**unchanged**) settings that have been saved.

5.3 Measured value and status displays

Depending on the configuration, the D-ISC 100 has several measured value and status displays, which are arranged in a loop as shown in the following figure. You can scroll through the displays using the arrow keys (◀▶).

Fig. 5.9: Measured value and status displays (display loop)

The display settings can be adjusted for the system components listed below:

Sensors and modules are marked in the screen menu by corresponding abbreviations, which allows them to be easily identified. If several similar units of these sensors or modules are installed in/on a Universal control unit the abbreviation is supplemented by numbers (depending on the component: m, n, o, p).

The following components each have one measured value or status display:

Component	Function	Status display	Measurement display
D-ISC 100	Universal control unit (D)*	X	
Sensor	divers (Sn)*		X
Software module	Channel composition (MXo)*		X
Software module	External devices (SXp)*		X

Component	Function	Status display	Measurement display
Software module	Media conditions (MC0)		X
Software module	Modbus TCP (NE0)	X	
Software module	Modbus RTU (NS0)	X	
Expansion module	Analogue output (AOm)*		X
Expansion module	Analogue input (AIm)*		X
Expansion module	Digital output (DOm)*	X	
Expansion module	Digital input (DIm)*	X	
Expansion module	Profibus DP	-	-

Table 5.6: Measured value/status display

* identification in the display, e.g. in the window title (see [▶ 69] for an explanation of terms)

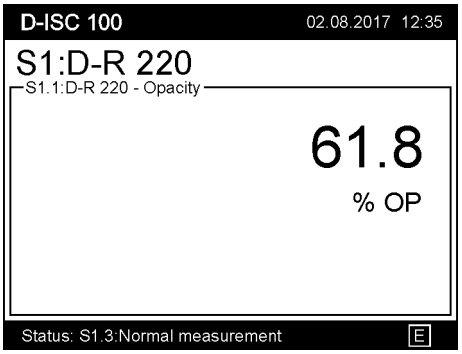


Fig. 5.10: Example measured value and status display

Every measured value and status display contains a **header bar**: Device name (D−ISC 100, left) and system date / time (right).

Every measured value and status display contains a **status bar**: Status – messages about the status display (D) are continuously displayed in this line.

Pressing the (OK) key takes you directly back to the channel menu for the current channel. In this menu, you can access additional information about the channel in question, adjust the settings and carry out functions.

Parameters for external devices and expansion modules are saved in the respective devices/modules (not in the D-ISC 100).

Status display (D)

- Lists the most important status reports from all the channels of the overall system
- Each status is prefixed by the respective channel identifier (D, S1, …)
- The list may be longer than the display can show. This can be identified by the scroll bar (which will only be shown in this case); use the cursor keys ▲ ▼ to scroll.

Measurement display (MXo)

Compilation of a measured value display from different channels by the user
(selectable source channels: Sn, SXp, MC0)
provides a quick overview of a system's key measured values at a glance (see Section 10.4.1.4 [Mixed channel] (MX1...2) [▶ 116]).

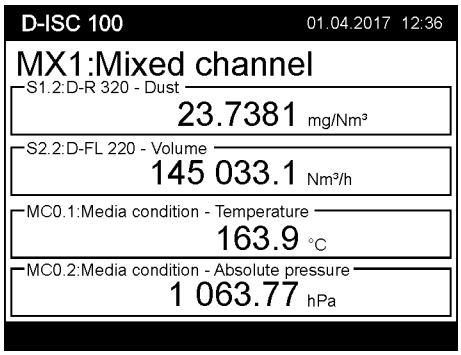


Fig. 5.11: Measurement display MXo

- Display of the measured values selected for the respective sensor, together with the respective unit.

Measurement display (Sn)
Measurement display (SXp)

- Displays the measured values selected for the respective external device, together with the respective unit

Measurement display (MC0)

- Displays the recorded media conditions with the respective unit

Measurement display (AOm, AIm)

- Displays the analogue output and input values (current in mA)

Status display (DOm, DIm)

The status of the individual inputs or outputs is displayed in the status display for the digital in/digital out modules.

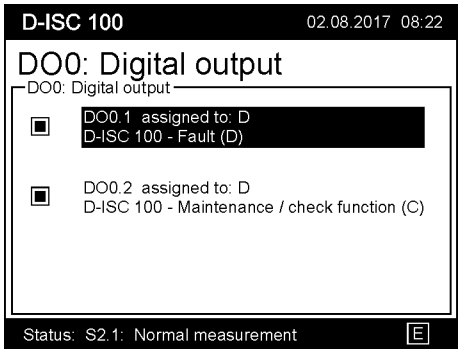


Fig. 5.12: Status display DO0

Checkbox empty ☐ = not active:
- Digital out module: there is voltage at the relay coil (relay energised).
- Digital in modul: There is voltage at the input.

Checkbox completed ■ = active:
- Digital out module: there is no voltage at the relay coil (relay de-energised).
- Digital in modul: There is no voltage at the input.

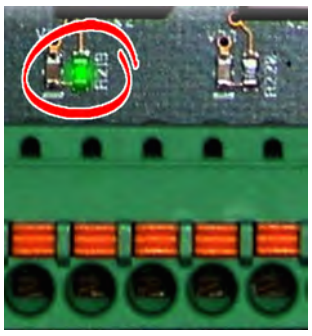


Fig. 5.13: Relay LED

The statuses of the inputs and outputs are also signalled by LEDs near to the the connecting terminals (see figure on the left).
e.g. DO0.1: Checkbox active -> there is voltage at the relay coil -> LED on the terminal lights up.

The signals can be inverted in the D-ISC 100. See also Section 15.11.1 Example: Signal inversion setup (digital outputs) [▶ 185].

Status display (NEm/NSm)

Status display for network modules.
- Check box "On-line" indicates active communication with this module
- Check box "Rx" is active when data are being received
- Check box "Tx" is active when data are being sent
- Check box "Error" is active when defective packets are detected

- The "Count" fields are counters for the respective events
- The into field displays the communications settings that are in use

6 Initial commissioning (Quickstart)

Prerequisite

- You have selected clear display language:
  - **Language setting** (menu 3.2) – [▭ System setup > Language]
  - see also Section 9.2 [Language] [▶ 90].
- PIN protection is deactivated (symbol ⊠ in the status bar) or enabled:
  - **Login** (menu 6) – [▭ Login / Logout]
  - see 15.4 Example: Clearing the PIN protection (logging in) [▶ 159].
- You have selected the Expert mode [▭ Expert mode] for the display of all menus and menu items:
  - **User mode** (menu 1) – [▭ User mode]
  - see also Section 7.2 [User mode] menu 1 [▶ 81].

6.1 General Start configuration (Quick start)

Before using the D-ISC 100 for the first time, a few settings need to be stored in the device.

The basic configuration may have already been set at the factory. In any case, the user will need to check the necessary settings with regard to the local field of application, and make any adjustments as necessary.

As a general rule, the following must be taken into account for the start configuration:

Setting	See Section	
Check the time (set to local time if necessary)	15.2 Example: Setting/checking the time [▶ 157]	❑
Adding a sensor	15.7 Example: Adding a sensor [▶ 165]	❑
Check the sensor settings and adjust if necessary	15.8 Examples: Parameterising sensors [▶ 167]	❑
Parameterise the analogue outputs (current outputs) *(as required)*		
Assigning the source of the measured value	15.10 Examples: Assignment of the analogue output (current output) [▶ 173]	❑
Set the signal range (should match the signal range of the source of the measured value)	15.10.1 Example: Setting the signal range [▶ 177]	❑
Setting the error information	15.10.2 Example: Setting the error information [▶ 181]	❑
Setting the overruns / underruns	15.10.3 Example: Setting the overruns / underruns [▶ 182]	❑
Parametrise the digital outputs (*as required*)		
Assigning the source of the status signal	15.11 Example: Assignment of digital outputs [▶ 184]	❑

Setting	See Section	
Set the signal inversion	15.11.1 Example: Signal inversion setup (digital outputs) [▶ 185]	❑
Parametrise the digital inputs (*as required*)		
Setting the target function	15.11 Example: Assignment of digital outputs [▶ 184]	❑
Set the signal inversion	15.12.1 Example: Signal inversion setup (digital inputs) [▶ 189]	❑
Parametrise the digital communication interfaces (*as required*)		❑
Setup communication parameters	15.3 Example: Setting / checking DURAG the Modbus [▶ 158]	❑

Table 6.1: Checklist for the start configuration

7 Main menu

All functions and settings of the D-ISC 100 and also the connected sensors and modules can be accessed, viewed and adjusted (parameterised) via the menus.

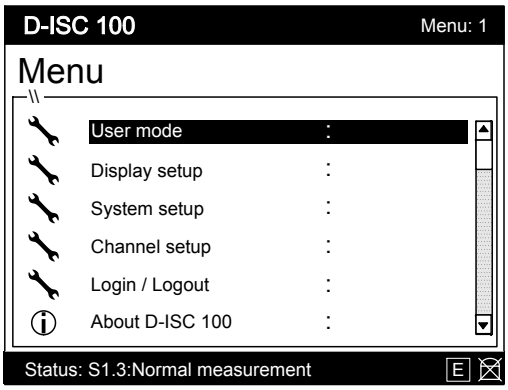


Fig. 7.1: Main menu

The settings for the measuring system can be protected against changes by a PIN code.

Deactivated system protection can be identified by the ☒ symbol at the bottom right-hand side of the status bar (see also Section 3.3.1 Display and keyboard [▶ 17]).

Enabling PIN protection (logging in)

To make system settings, the system protection needs to either be deactivated or enabled. When protection is activated, if the correct PIN code is not entered, the system only allows data to be read, but no changes made to the settings.

For information on activation, deactivation and enabling, see also Section 7.3 Login/logout menu 5 [▶ 81] et. seq.

7.1 Navigation guide within this manual

The operation of the D-ISC 100 is described in the following sections. The basis for this is the progression through the display and parameterisation menus.

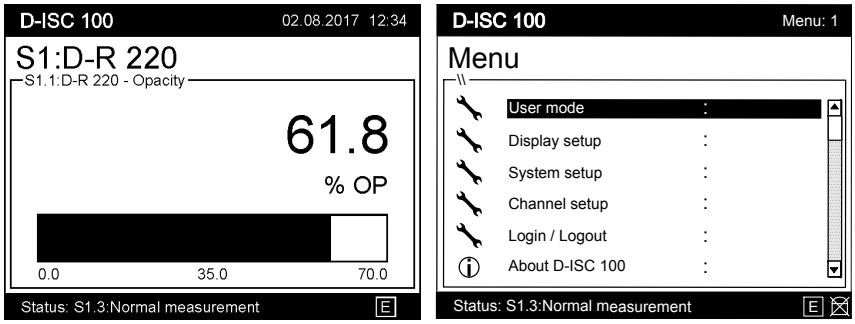
To ensure secure navigation through the entire menu structure of the D-ISC 100 in a way that can be traced at every point, refer if necessary to a "D-ISC 100 menu path" box at the start of the description. This shows the path that will take you to the menu item at which you can perform the action you require. For reasons of clarity, we have always used only one symbol.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ Display setup (menu 2) ▼ Measurement display after system start (menu 2.2) ▼ ▼ Type and option (menu 2.2.3) =
Setup display type and option MENU 2.2.3

The menu name is displayed in the bottom line (in the box at the top - *in this example:* Setup Display Type and Option) and the unique menu address of the line - *in this example:* MENU 2.2.3 – located in the header bar at the top right-hand side of the Universal control unit display).

The entry is to be interpreted as follows:



1. Starting from the standard (measured value) display (top left), press the screen key to go to the menu in which the entry "Display Setup" (menu 2) can be found (top right).
2. Use the downward arrow key (▼) to mark the entry "Display Setup", and select by pressing the key.
3. Use the downward arrow key (▼) to move to the entry "Measurement display after system start" (menu 2.2). Confirm this selection by pressing the key.
4. Pressing the downward arrow key (▼ ▼) twice moves the current selection to the "Types and Options" menu item (menu 2.2.3). Pressing to confirm will take you back to the target display (takes you to the target display (also menu 2.2.3).
5. In this example, the target display matches the figure below.

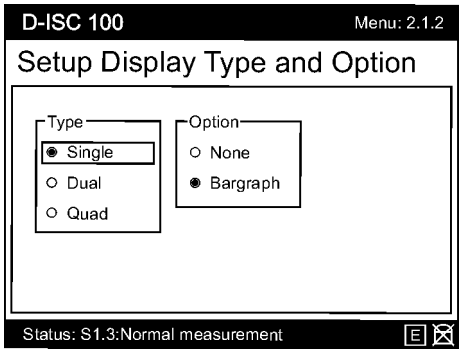


Fig. 7.2: Example Display

7.2 [User mode] menu 1

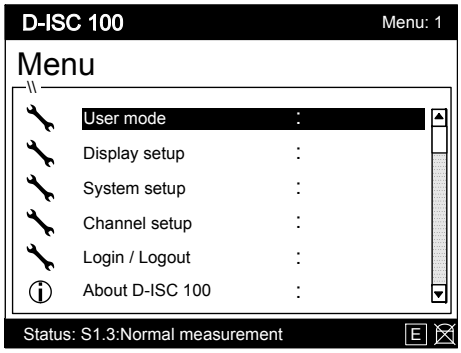


Fig. 7.3: Selecting the user mode

The clarify of the information shown in the display is attuned to the user for the tasks in question.

Go to ["User mode"] in the main menu:

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1)
= User mode MENU 1

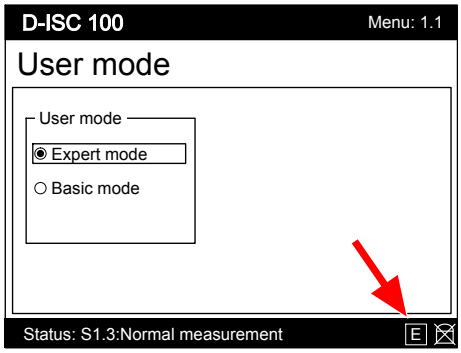


Fig. 7.4: User mode

1. [Basic mode].
   In this mode, no entries are displayed that allow for settings to be changed. Tests can be carried out on the connected sensors (contamination test, linearity check etc.) and the measured values and messages can be read out.
2. [Expert mode]. In this mode, all menus are displayed in full.

The current user mode is shown in the status bar at the bottom right.

E stands for Expert mode (Fig. 7.4),

B stands for Basic mode.

7.3 Login/logout menu 5

7.3.1 [Login/logout] menu 5

The Login/Logout menu (see also Section 7.3.2 General information on the PIN lock [▶ 81]) can be found underneath the Channel setup menu.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼▼▼▼ Login/Logout (menu 5)
Login MENU 5.1
= Login

7.3.2 General information on the PIN lock

Access to essential settings for the measuring system can be protected with a PIN lock.
We recommend first starting-up and configuring the entire measuring system (incl. sensors and modules) before PIN protection is introduced.
The protection is then propagated by the Universal control unit to the sensors and modules.

Under normal safety conditions, we recommend setting the same PIN code for the D-ISC 100 and all modules and sensors within *one* measuring system.
All of the units within the system can be edited after entering the PIN code. Otherwise, the user will have to go to the Login menu for every unit with a different PIN code in order to enter the respective code.

Make sure that the PIN code is available for use if needed. This PIN code is also required for parameterising the modules, sensors or the D-ISC 100 using the D-ESI 100 (user login).

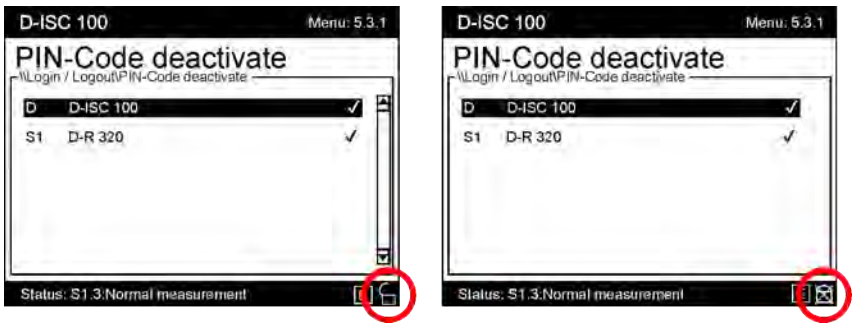


Fig. 7.5: Status of the PIN protection

The Status of the PIN protection is displayed bottom right in the respective menu. The PIN status of the D-ISC 100 is displayed in the main menu; the PIN status of the sensors and modules is displayed in the menu for the respective unit.

The system is delivered with PIN protection deactivated (PIN: 0000). The PIN code consists of 4 digits. When PIN protection is activated,"0000" is not a valid PIN code.

The subsequent sub-menus depend upon the login status!

7.3.3 Login

The login name generally adopted is "user" Login details can also be entered via the on-screen keyboard (see Section 5.2.3 Virtual on-screen keyboard [▶ 70]). There is no distinction between lower-case and upper-case here. The PIN/password for a device where the PIN code is deactivated is "0000" (four zeros).

All DURAG devices are delivered with a deactivated PIN code!

If PIN protection is already activated (status bar shows 🔒), you will need to enter the correct 4-digit code. For safety reasons, a * will be shown in the display after entering a digit.

See our 15.4 Example: Clearing the PIN protection (logging in) [▶ 159] for details of how to enter the PIN code.

Once the PIN code has been entered, the login details will be checked to verify that they are correct. If the details are correct, the menu will change to "Logged in" after leaving the Login menu (status bar shows 🔓).

7.3.4 Logout

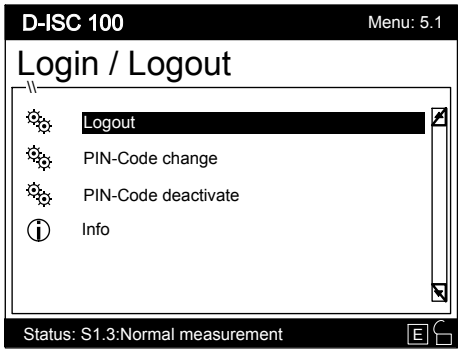


Fig. 7.6: Logout

After performing the "setting work", log out from the system again.

This protects the system against unauthorised and unwanted changes.

D-ISC 100 menu path:

Standard display (e.g. S1.1) Display setup (menu 1) ▼▼▼▼ Login/Logout (menu 5)
Login MENU 5.1
= Logout

7.3.5 Change PIN code

This menu entry is used to activate PIN protection or to change the PIN code.

The new PIN code is entered twice in succession.

A window shows whether the changes have been made successfully for the D-ISC 100 and each connected sensor or module.

See our 15.5 Example: Change PIN code [▶ 162] for details of how to change the PIN code.

7.3.6 Deactivate PIN code

This menu item allows the user to deactivate the PIN protection for the entire measuring system (with the same PIN).

A window shows whether the changes have been made successfully for the D-ISC 100 and each connected sensor or module.

See our 15.6 Example: Deactivate PIN lock [▶ 164]. for details of how to deactivate the PIN code.

7.3.7 Information

You will see a pop-up window with the following information:

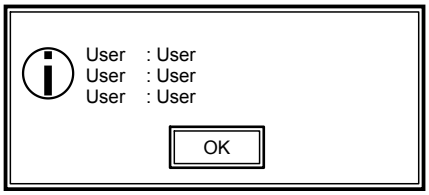


Fig. 7.7: Pop-up info in the Login/Logout menu

- User: User / Login name (default: User)
- Name: Plain text name of the user (default: User)
- Role: Role of the user who has logged in (default: User*, or after logging in with a PIN: Specialist*)

---

* Depending on the language version (e.g. English: User and Specialist), while User and Name use the standard "User" entry in all languages.

7.4 About D-ISC 100 menu 6

The [About menu] contains device information on the D-ISC 100 Universal control unit.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▲
About D-ISC 100 (menu 6)
= Device name (MENU 6.1)

- [Device name]
- [Manufacturer name]
- [Manufacturer URL]
- [Device serial number]
- Mainboard ID
- [Silicon serial number]
- [Primary device firmware revision]
- [Device hardware revision]
- [Device protocol revision common]
- [Device protocol revision specific]
- [Language revision common]
- [Language revision specific]

8 Display setup menu 2

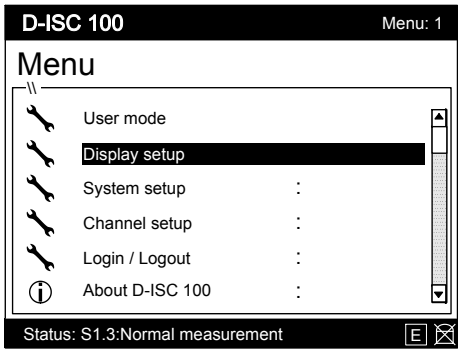


Fig. 8.1: - Display setup selection

In the display settings, the user can configure on the one hand WHAT is to be shown in the display (in the "Current measurement display", in the "Measurement display after system start"), and on the other hand HOW the screen is displayed (contrast, backlight).

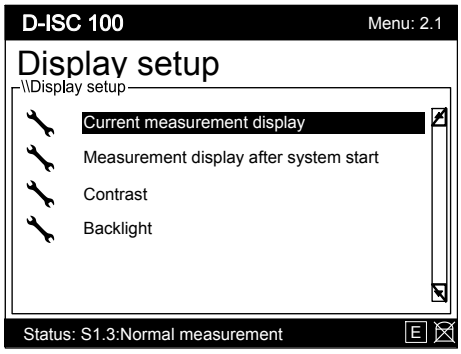


Fig. 8.2: Display setup

Go to [Display setup] in the main menu:

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) Display setup (menu 2)
= Current measurement display (menu 2.1)

8.1 Configuration of the measured value and status displays

Selection:

The user defines the following:

- Which measurement or measurements
- From which connected sensors
- As combined display as applicable
- Display only as numerical value or numerical value and bar graph [▶ 203]
- Display of input and output assignment

Current Measurement display

[Current measurement display]

The required displays for the D-ISC 100 are firstly configured, and will then be shown in the display during operation (current measurement display).

Currently set display configurations are *not* saved automatically, i.e. they are only available following a restart or reset of the D-ISC 100.

Measurement display after system start

[8.3 Measurement display after system start [▶ 87]

Following a system start, the "Measurement display after system start" display configuration for the D-ISC 100 is always used. This can also be configured.

If displays are changed or additionally configured, the D-ISC 100 uses these settings as a new ["Current measurement display"].

A restart and the resulting application of the "Measurement display after system start" therefore sets the "Current measurement display" back to the default setting.

The "Current measurement display" can be stored as the "Measurement display after system start".

Scrolling through the measurement displays

Fig. 8.3: Measured value and status displays (display loop)

The two arrow keys (▶ ◀) can be used to scroll through the configured measurement or status displays.

Example display:

In the example from Fig. 8.3 , a dust concentration measuring instrument D−R 320 is connected to the Universal control unit. The following displays could be configured in the ☐["Measurement display after system start"]:

1. Measurement from the dust concentration measuring instrument D−R 320 (Fig. 8.3 : -1-). The graphic depiction of the value is also shown in this display (configuration: bar graph).
2. Current output value ☐ AO0: Analogue out] (Fig. 8.3 : -2-), also with graphic depiction.
3. Configuration of the digital outputs ☐ DO0: Digital out]. This shows the relay assignment (Fig. 8.3 : -3-).
4. Configuration of the digital input ☐ DI0: Digital in] (not assigned in this example) (Fig. 8.3 : -4-). This display could mean that a control room could initiate a maintenance cycle at a sensor, for example.
5. Device status for the overall system (D:) and for each individual measurement channel of a sensor (S:) (Fig. 8.3 : -5-).

If several sensors are connected to the D-ISC 100, these displays are repeated for each connected sensor. Each sensor and each sensor display can be configured individually in its own menu.

Displays are shown sequentially in a circle, i.e. after the last display, "paging on" takes you round to the first display again. This circle structure in which all the displays are shown in succession means that no branching is necessary. Therefore, only the arrow keys are use for navigation through the displays.

Also see about this

Current measurement display [▶ 87]

8.2 Current measurement display

- Setting the display of measurements and statuses.
  All inputs relating to the contents and the depiction of the measurement display(s) are held here temporarily (in the volatile storage) and are applied until they are changed.
- The settings are no longer available following a system reset or restart! They will be lost if they have not previously been taken over to the permanent memory via the "Measurement display after system start" menu (menu 2.2.1, see Section 8.3.1 [Use current display setting] [▶ 88]).

8.2.1 Type and option

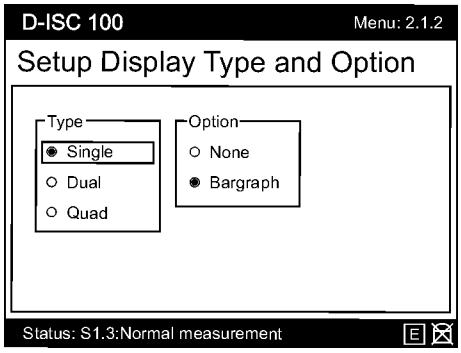


Fig. 8.4: Menu 2.1.2.- or 2.2.3.-

- Selection of the Measurement display format
- Type: Select whether 1, 2 or 4 measured values are to be displayed per screen.
- Option: Select whether the relevant bar graph is to be displayed for the measured value
- There is no bar graph display when 4 measured values are displayed.

8.3 Measurement display after system start

- Select the measurement/status display to be displayed after starting the D-ISC 100 [Measurement display after system start].
  This menu item is used to set the information (measurements, inputs/outputs, status) to be shown in the display after switching on the Universal control unit.
- [Use current display settings].
  Transfers the current measurement setting to the settings for "Measurement display after system start".
- The data sources that can be called up are listed under the ["Device"] menu item. The entries made are to an extent dependent on the sensors and modules that are connected and logged in to the D-ISC 100.

- [Type and option]
  Select the measurement display format.

8.3.1 [Use current display setting]

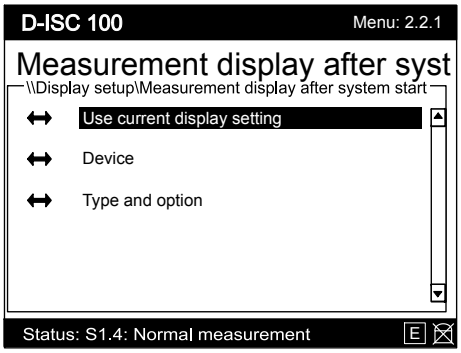


Fig. 8.5: Select the display after system start

- ["Use current display setting"] transfers the [current measurement display] into the settings for the ["Measurement display after system start"].
  The current measurement settings are written to the permanent memory, i.e. they will continue to be used even following a reset or restart.

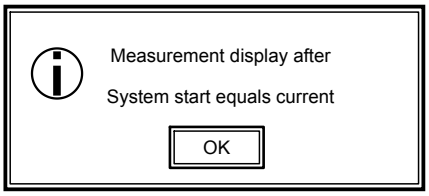


Fig. 8.6: Confirmation prompt

Please note: When the current display settings are transferred to the "Measurement display after system start", the previously used measurement display will be overwritten after system start. It is not possible to restore the settings. There is therefore a confirmation prompt before the settings are transferred (see figure on the left). Pressing the **ESC** key (keypad) prevents transfer.

8.3.2 [Device]

- Select the measuring devices for which the measured value/ status display(s) are to be shown.
  From the selection made here, the left/right arrow keys (◀▶) can be used to call up the required displays in the measurement display (see also Fig. 8.3).

8.3.3 [Type and option]

see 8.2.1 Type and option [▶ 87]

8.4 [Contrast]

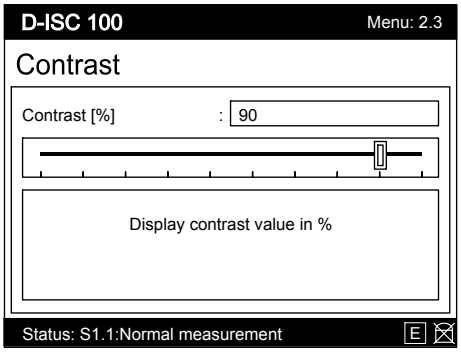


Fig. 8.7: Setting the contrast

- Setting the display contrast to correspond to the operator's needs (0..100%, low...high)

8.5 [Backlight]

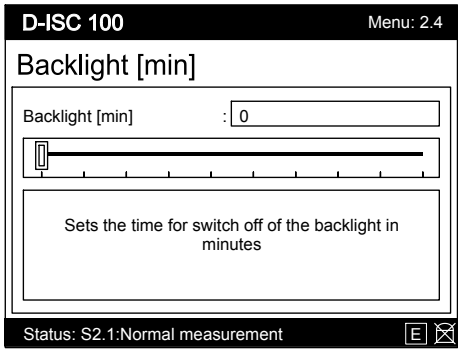


Fig. 8.8: Setting the backlight

- Time in minutes after which the backlight on the display is switched off if no keys are pressed (0…100 min, in 10 min intervals),
  0 = no automatic switch-off
  (shorter switch-off times increase the service life of the backlight and reduce power consumption)

9 System setup menu 3

In System setup, settings relating to the Universal control unit can be made.

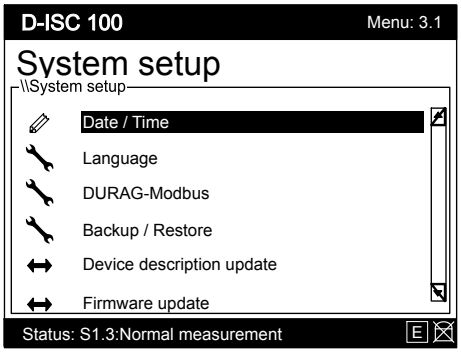


Fig. 9.1: Menu: System setup

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1)
▼ ▼ System setup (menu 3)
= Date/Time MENU 3.1

9.1 [Date/Time]

Set the current date/time]

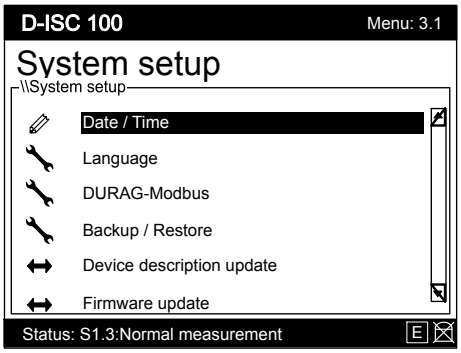


Fig. 9.2: Setting the date/time

The sensors and modules have an internal clock. The time must be set correctly in order for messages to be recorded in the message log and in order to access settings.

The D-ISC 100 also has a clock. The connected sensors and modules are automatically synchronised by the D-ISC 100 if they have been configured in the system.

See our 15.2 Example: Setting/checking the time [▶ 157] for details of how to set the date and time.

9.2 [Language]

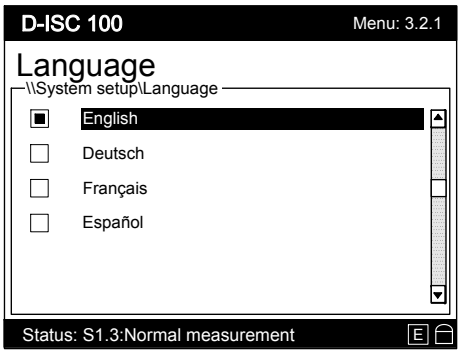


Fig. 9.3: Language selection

- Before changing the language, a current SD card (see also [▶ 92]) must be inserted, as otherwise it may not be possible to change the language.
- The available languages are displayed after selecting the menu item. The selection may vary depending on the language option purchased.
- After acknowledging the confirmation prompt, the selected system language is loaded and then displayed. This may take some time.
- If individual language files on the SD card are missing or defective, it is possible that individual menus may not be able to be displayed in the selected language. In this case, the default language (English) is used.
- To rectify this problem, an up-to-date and undamaged SD card must be inserted and the language setup must be performed once again.

9.3 DURAG Modbus

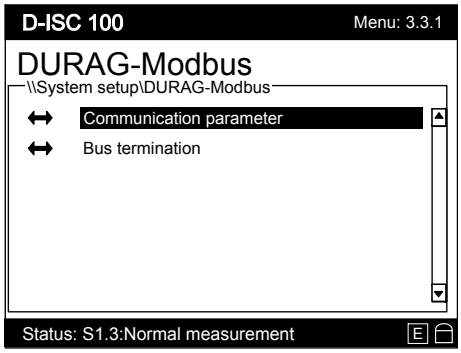


Fig. 9.4: DURAG Modbus settings

relates to the bus settings.

Communication parameters:

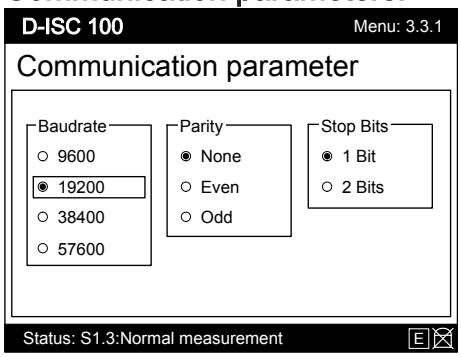


Fig. 9.5: Setup communication parameters

[Communication parameters:

- Set/select the Baud rate, parity and number of stop bits Parameterise all connected devices with the same settings.

All devices connected to the bus must use the same communication parameters. If necessary, check the settings of the other devices beforehand. If a different Baud rate, parity or number of stop bits is selected, no further data exchange can be performed between the Universal control unit and that device. If changes are made to these parameters, all connected devices must therefore be parameterised with the same settings.

For the default settings, see 13.4 D-ISC 100 communication settings [▶ 148].

See our 15.3 Example: Setting / checking DURAG the Modbus [▶ 158] for details of how to set the communication parameters.

Bus termination:

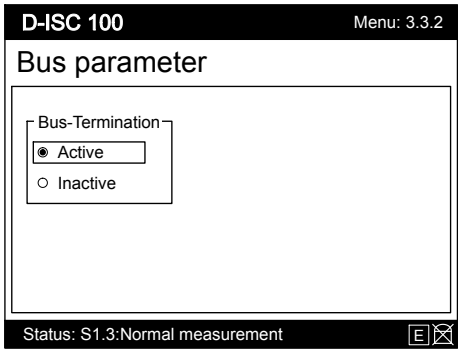


Fig. 9.6: Switch the terminating resistor on/off.

[Bus−Termination]:

- Enabling/Disabling the bus termination
- Terminating DURAG Modbus at both ends. To do so, activate the termination at the devices at the ends of the bus

Depending on where the Universal control unit - D-ISC 100 is located within the bus (see also Sections 4.2.5 Sensor network bus architecture (one D-ISC 100) [▶ 41] and 4.2.6 Sensor network bus architecture (multiple D-ISC 100) [▶ 43]), a terminating resistor can be attached (active).

The DURAG Modbus *must* be terminated at each end. This is done by activating the termination at the devices at the ends of the bus If a sensor is connected directly to the D-ISC 100, the termination is activated at the D-ISC 100 *and* at the sensor.

See our 15.3 Example: Setting / checking DURAG the Modbus [▶ 158] for details of how to switch on the terminating resistor.

9.4 [Backup/Restore]

D−ISC 100 C, M, P, R

Table 9.1: Supplied SD card in the device

For work described in this section, the *supplied* memory card *must* be inserted into the Universal control unit.

This SD card is an industrial version which differs from the standard card in certain respects, such as an extended specification for the temperature range.

On delivery, the SD card is inserted into the slot on the D-ISC 100 Universal control unit. It can be withdrawn briefly to allow the data to be saved or viewed *additionally* on the PC.

The settings of the D-ISC 100 basic system can be saved to the SD card or can be read from it.

Settings for the connected sensors and expansion modules *cannot* be saved. These settings are saved in the respective sensor/module. These settings can be saved using the D-ESI 100 [▸ 203].

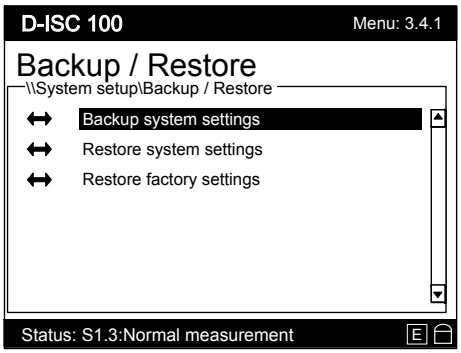


Fig. 9.7: Backup/Restore selection menu

The "Backup/Restore" menu item is divided up as follows:

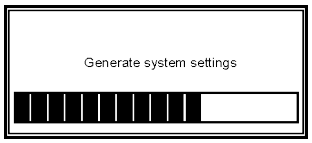
- Backup system settings]
- Restore system settings]
- Restore factory settings]

9.4.1 [Backup system settings]

Calling up this menu item automatically saves the settings of the D-ISC 100 basic system to the SD card. The backup is performed immediately, without a further questions or confirmations.

Any backups of the system settings already present on the SD card are overwritten without any confirmatory questions!

If you wish to keep any previous backups of the system settings already present on the SD card, they must be saved elsewhere (e.g. to a data stick or hard disk via a PC) **before** running the backup,

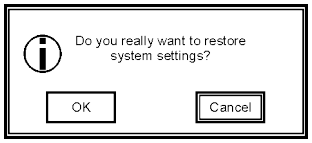


A pop-up window shows the progress of the backup.

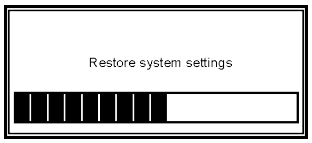
Once complete, either the message "Backup generated successfully" will appear, or "Error: Backup could not be generated".

9.4.2 [Restore system settings]

Calling up this menu item restores the previously saved settings of the D-ISC 100 basic system (see Section 9.4.1 [Backup system settings] [▶ 92]) from the SD card. (If there is no backup found on the SD card, a message to this affect will appear).



A confirmation prompt appears. If denied, the restoration is aborted.
If a restoration is required, use the arrow key (◀) to activate the OK button and press the ↵ key to start the restoration.
Loading the saved system settings irretrievably overwrites the current settings!



A pop-up window shows the progress.

When the restoration is finished, a message appears. This conveys the information, that a restart necessary is.

After confirming with the ↵ key, the system will be restarted.

9.4.3 [Restore factory settings]

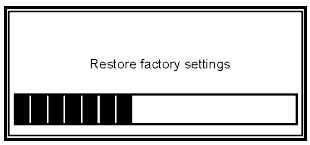
For security purposes, make a backup of the system settings (see Section 9.4.1 [Backup system settings] [▶ 92]) **before** restoring the factory settings.

Once this menu item has been called up, the factory settings for the Universal control unit will be loaded from the SD card (FACTORY.BST).

If no factory settings file is found on the SD card, a message to this effect will appear.

The file with the factory settings must be compatible with the currently installed firmware on the Universal control unit.

A confirmation prompt appears, which provides the opportunity to abort the activation of the factory settings.
If a factory settings reset is required, use the arrow key (◀) to activate the OK button and press ↵ to start the reset.
Loading the factory settings overwrites the current settings! (The system settings backup previously made can however be used to restore the current settings.)



A pop-up window shows the progress.

When the restoration is finished, a message appears. This conveys the information, that a restart necessary is. The system will be restarted following confirmation (↵).

9.5 [Device description update]

In order to ensure that the D-ISC 100 can access all DURAG sensors and expansion modules without any problems, it needs device descriptions that are up to date at all times.

Device descriptions are updated in the system via the "Device description update" menu item.

An update to the current device description is required if the D-ISC 100 reports a "Newer protocol version" for a connected sensor or expansion module (D-ISC 100 status display). In this case, the connected sensor/expansion module version is newer than the device description in the system.

A current SD card must be used for the update.

Start the update by pressing the ↵ key. This can be aborted by pressing the **ESC** key. The entire process may take some time. A system restart may be required after completion.

The update process is performed automatically. The individual steps can be tracked on the display.

9.6 [Firmware update]

This menu item allows the firmware [▶ 203] of the D-ISC 100 to be updated.

An SD card with the firmware file must be inserted (see [▶ 92], the file name starts with swf_D−ISC_100_fw….drg). If there is no firmware file stored on the SD card, an appropriate message is displayed and the function is aborted.

After calling up (↵) the firmware update, you are guided through the update process step by step.

The firmware update starts after pressing the ↵ key to confirm.

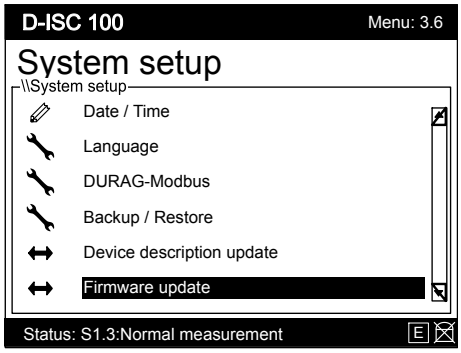


Fig. 9.8: Firmware update I

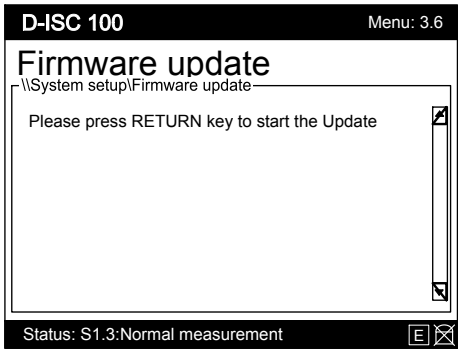


Fig. 9.9: Firmware update II

Another window now opens. A list shows all the firmware files available on the SD card. Normally however there is only one file available.

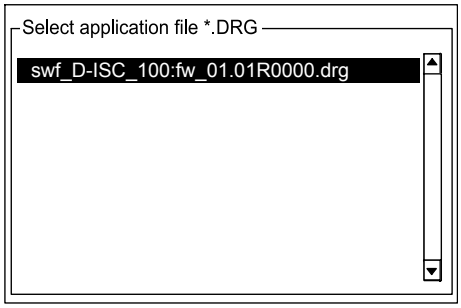


Fig. 9.10: Firmware file list

Use the arrow keys (▼ ▲) to select the desired firmware file and confirm the selection by pressing the ↵ key.

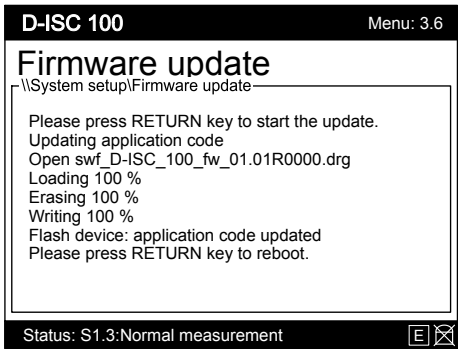


Fig. 9.11: Firmware update III

The update process starts. The progress is shown in the window. The procedure requires some time. The system then reports that the update process and has been closed. Press the ↵ key once again to restart the device.

This completes the firmware update. Once the Universal control unit has been re-initialised after restarting, it will then be working with the new firmware.

10 Channel setup menu 4

In Channel setup, administration tasks can be performed for the D-ISC 100 and the sensors and modules. Sensors and modules can be added to the system and removed or configured. Software modules are also switched on and off via the channel menu.

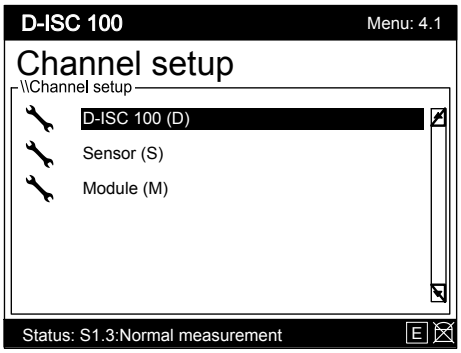


Fig. 10.1: Menu: Channel setup

The menu is divided into the three device types:

- D-ISC 100
- Sensors]
- Modules

The menus have largely the same structure.
(The generally available "Status" and "Messages" sub-menus are explained in advance for all three menus).

The "Channel setup" menu can be accessed as follows:

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ ▼ ▼ Channel setup (menu 4) D−ISC 100 (D) menu 4.1 ▼ Sensor (S)
= Sensor (S) MENU 4.2

Quick access

Quick access to the individual channel menus is possible directly from the "Measured value and status display" of the corresponding device. Select the required display using the ◀, ▶ keys. The corresponding channel menu (figure below) will open after pressing , OK.

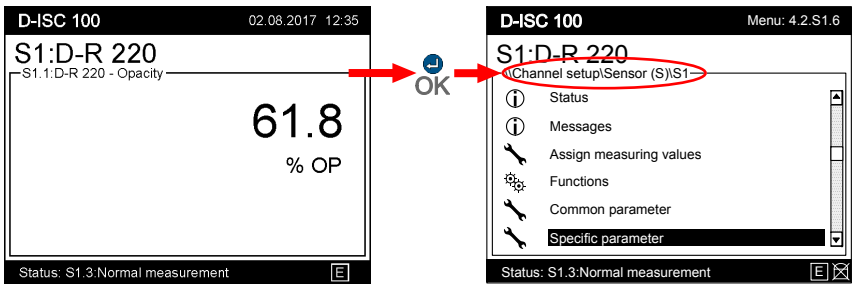


Fig. 10.2: Quick access

Press the key to return to your starting point in the "Measured value and status display" menu.

10.1 [Status and Messages] []

General information

The "Status" and "Messages" items appear in all sub-menus of the "Channel setup" menu listed below.

For this reason, we have summarised the descriptions of these items in the following sections.

Term definition:

- **Status**
  What is a status?
  The status of a device gives an overview of its current function.
  - The status "Normal measurement" means, for example, that the device is currently carrying out the appropriate measuring task.
  - If the device is currently carrying out a maintenance function, for example, the status "Maintenance/Check function (C)" will be displayed.
  - The status "Fault" indicates a device fault.
- **Combined status**
  The following statuses are combined statuses:
  - "Fault" (F),
  - "Maintenance/Check function" (C)
  - "Maintenance demand" (M),
  - "Out of specification" (S)

  sind Sammelstatus.
  A combined status means that the status of an individual sensor or module channel (e.g. S1.1) is adopted (inherited) by the overall device status (e. g. S1) and then by the overall status of the measuring system (D-ISC 100 device status).
- **Message**
  What is a message?
  A message is a text-based description of a noteworthy event or status. Some message examples are:
  - "SD card missing"
    This message appears when the SD card has been removed from the D-ISC 100.
  - ["Hardware fault"]
    This message appears when the D-ISC 100 has detected a hardware fault. When this message appears, the device status of the D-ISC 100 changes to "Fault".
  - "Contamination > 15%"
    This message is issued by the D-R 320 dust measuring device, for example, when the contamination level on the device's lens exceeds 15%. In this case, the status of the measuring device will change to "Maintenance demand".
  - Messages are split up into **categories** (see Section 12.1 System message categories [▶ 137]).

Sub-menus:

- **Sub-menu**D-ISC 100 **(D)**
  - Device status (see also Section 10.1.1 [Device status]D-ISC 100 (D) [▶ 98])
  - Device status extended (see also Section 10.1.2 [Device status extended] D-ISC 100 (D) [▶ 99])
  - Messages]

- **Sensor (S) sub-menu**
  - Status
  - Messages]

- **Module (M) sub-menu**
  - Status
  - Messages (not in software modules)

Filter

When a status or message menu is opened, the displayed status or messages are initially output in filtered format, i.e. only active information is displayed.
Active information is preceded by the ■ icon, and inactive information by the □ icon.

In order to see *all* entries, the filter will need to be removed (see figures on the left and Filter (Status D-ISC 100) [▶ 203]).
The ⊏ key can be used to switch between [Filter on] and [Filter off], i.e. inactive filter.

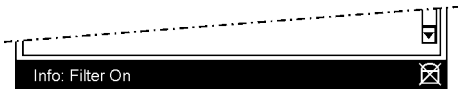


Fig. 10.3: Filter on

When the filter is switched on, all non-active statuses and messages will be hidden -> see "Info: Filter on" status bar

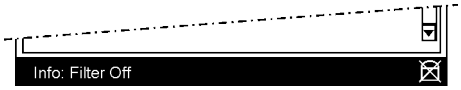


Fig. 10.4: Filter off

Once the ⊏ key has been pressed (again), all statuses and messages will be shown -> see "Info: Filter off" footer.

10.1.1 [Device status]D-ISC 100 (D)

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1)▼▼▼ Channel setup (menu 4)
= D-ISC 100 MENU 4.1

A list of active statuses for the overall system of the D−ISC 100 can be found in the "Device status" sub-menu. These are combined statuses. The source can be one or more of the system components.

The statuses of the system D-ISC 100 (D), the sensors (S) and the modules (M) are displayed in "Device status" (menu D-ISC 100 (D)).

The status of the system D-ISC 100 (D) is particularly suitable for troubleshooting within the system. The individual statuses of the connected sensors and expansion modules are reported there as combined statuses.

The different statuses are signalled by the corresponding LEDs.

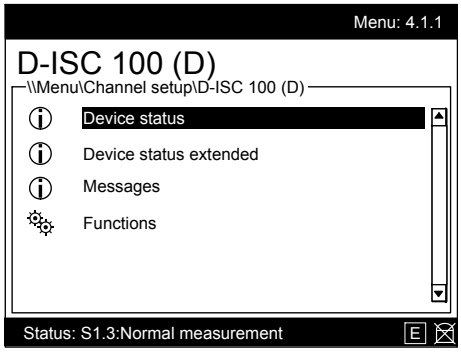


Fig. 10.5: Device status D-ISC 100

A detailed analysis of the status (e.g. for troubleshooting) can then be carried out via the "Status" and "Messages" menus in the menus for the individual system components, or alternatively via the "Device status extended" menu.

10.1.2 [Device status extended] D-ISC 100 (D)

Sensor S1 (also S2 – S8)

Status of the sensor channel (e.g. S1) from the perspective of the D-ISC 100:

- The D-ISC 100 Universal control unit can work with various different DURAG sensors. The number of the connected sensors can vary. The connections are made via the DURAG Modbus. Sensors within a bus system may be replaced by sensors that supply completely different measured values (e.g. opacity instead of volumetric flow).
  As a result, it is necessary to constantly monitor and signal the status of the individual sensor channels.
- Example:
  - For maintenance purposes, a sensor has been disconnected from the D-ISC 100/DURAG Modbus-> Loss of communication with the sensor. -> Status: [Offline]
  - Maintenance work has resulted in another sensor (with the same DURAG Modbus address) being connected to the D-ISC 100/DURAG Modbus -> the other sensor is delivering measured values which are incompatible with the configured sensor. -> Status: Other device online]
  - For maintenance purposes, a sensor has been disconnected from the D-ISC 100/DURAG Modbus
    No sensor is initially registered there. -> Status: Not available
- The (actual) status of the sensor can be found in the channel menu for the sensor.

Modul M1 (also M2 – M4)

Status of the module channel (e.g. M1) from the perspective of the D-ISC 100:

- The D-ISC 100 can work with various different expansion modules. The number of the connected modules can vary. The connections are made via the DISC Modbus. Modules within the module bus system may be replaced by modules that have completely different functions and also supply different data.
  As a result, it is necessary to constantly monitor and signal the status of the individual module channels.
- Example:

- For maintenance purposes, a module has been disconnected from the DISC Modbus
  -> Loss of communication with the module. -> Status: [Offline]
- Maintenance work has resulted in another module (inserted in the same slot) being connected to the DISC Modbus -> the other module supports different functions which are incompatible with the configured module. -> Status: Other device online]
- For maintenance purposed, a module has been disconnected from the DISC Modbus
  No module is initially registered there. -> Status: Not available]

- The (actual) status of the module can be found in the channel menu for the module.

10.1.3 [Messages] D−ISC 100 (D)/Sensor (S)/Module (M)

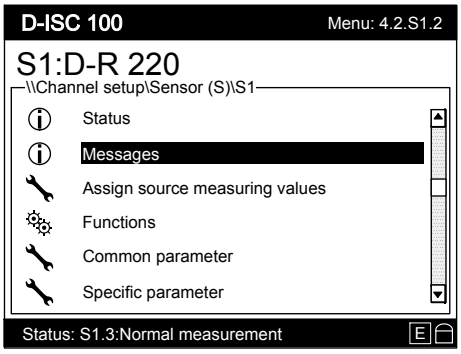


Fig. 10.6: "Messages" channel menu

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1)▼▼▼ Channel setup (menu 4)
= D−ISC 100 (D) (MENU 4.1):

− Device status (menu 4.1.1) ▼▼ Messages (menu 4.1.3)
= Messages (MENU 4.1.3.0)
(*or also*:)
− ▼ Sensor (S) (menu 4.2) Add/remove sensor (menu 4.2.1) ▼ S1 D- … or ▼▼ S2 D- … etc.
Status (menu 4.2. S1…8) ▼ Messages
= Messages (MENU 4.2. S1.2…8.2)
(*or also*:)
− ▼▼ Modules (M) (menu 4.3) Software modules (menu 4.3.1) ▼▼ AO0 Analogue output (menu 4.3.AO0)
Status (menu 4.3. AO0.1)
= Status (MENU 4.3. AO0.1.0) (example) …

The messages are divided into 4 categories, with the differentiating factors as set out in 12.1 System message categories [▶ 137]. Depending on which menu has been selected, the messages refer to theD-ISC 100, a module or a sensor. When the "Messages" menu is opened, the filter will initially be active (filter on; see also Section 10.1 [Status and Messages] [] [▶ 96] under "Filters").

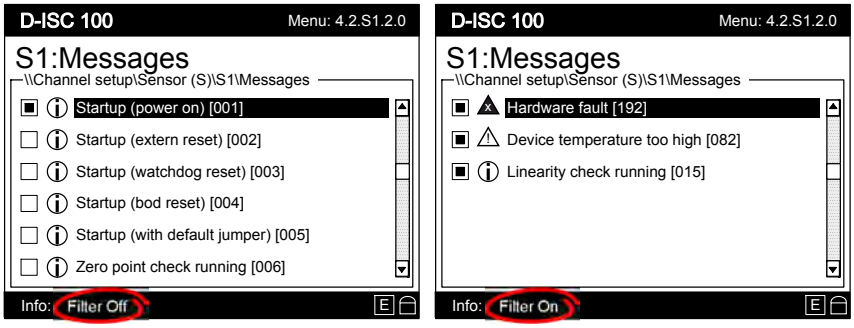


Fig. 10.7: Example: all messages (unfiltered)/messages filtered

Only the currently pending messages will be shown as active (▣). Messages that are no longer pending can be viewed in the device message log using the (optional) software DURAG Engineering and Service Interface D-ESI 100.

10.2 Menü D-ISC 100 (D): Universal operation unit

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ ▼ ▼ Channel setup (menu 4)
D−ISC 100 (D) (menu 4.1) D-ISC 100
= Device status MENU 4.1.1

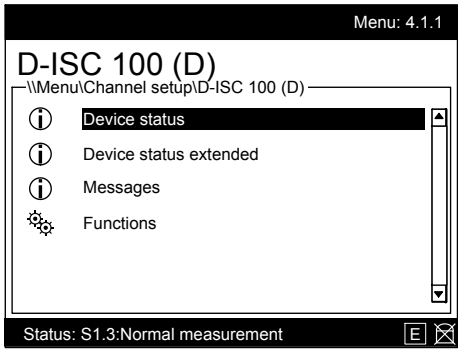


Fig. 10.8: Channel setup D-ISC 100 (D)

This menu item reports the status, messages and functions that relate to the D-ISC 100 basic system and the overall system.
All faults (F) in the system are displayed centrally in this menu item (see Combined fault [▶ 101])and can then be processed in a targeted manner.

Combined fault

A fault in the D-ISC 100 system and its connected units (sensors, modules, channels, ...) is initially only flagged in the status of the unit in which it occurs. This would mean that all the relevant menus would have to be accessed to check the status in order to determine the cause of the fault. The system triggers a combined fault in order to reduce this effort.
A combined fault is issued at the higher levels, while one or more faults are reported in one or more subordinate levels.

Status messages such as "□ Fault (F), "□ Maintenance/Check function (C)" and "□ Maintenance demand (M)" are inherited by the overall device status ("□ Device status") from the connected sensors and expansion modules and are flagged by the respective LED.
The statuses and messages for the individual system components are then investigated for a more precise fault analysis.

10.2.1 [Functions]

Functions allow for the performance of a task/action.

Maintenance functions:

[Maintenance functions]

These functions are maintenance actions such as maintaining or carrying out checking functions.

- **Set maintenance**
  Accessing this function OK places the entire system including all connected sensors into the "Maintenance/Check function (C)" status.
  After execution, this is displayed in the status accordingly.
  This function is carried out before starting maintenance activities in order to inform a downstream PLS [▶ 204] of the status that the system is currently undergoing maintenance.
  If only a subcomponent of the measuring system is undergoing maintenance, without removing it from the system (e.g. cleaning a sensor), it is possible to only assign this individual component in the maintenance status. The respective function in the channel menu for the component is used for this. This means that all other system components are not assigned the maintenance status, but the overall status (see 10.1.1 [Device status]D-ISC 100 (D) [▶ 98]) is.
  The maintenance status must be reset after completing the maintenance activities (see Reset maintenance).
- **Reset maintenance**
  Accessing this function OK sets the entire system including all connected sensors back to the "Maintenance/Check function (C)" status.
  This does *not* affect sensors that have been assigned the maintenance status by means of an internal function or by the sensor itself.

Simulation functions:

[Simulation functions]

This function can be used to compel a specific measured value to be output.

- **S1: simulation**
  (also S2 – S8)
  - S1.1: [simulation value]
    Input the measured value to be output on channel 1 (… 8) of sensor S1 (…8) during the simulation.
  - S1.1: [simulation request
    Binary table that can be activated/deactivated by the simulation. The "value" of individual status signals during the simulation can also be selected here.

10.3 "[Sensor (S)]" menu: Connected sensors

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ ▼ ▼ Channel setup (menu 4)
D−ISC 100 (D) (menu 4.1) ▼ Sensor (S) (menu 4.2)
= Sx Add/remove sensor MENU 4.2.1

Sensors are added or removed from this menu item.

All **connected** (configured) **sensors** are listed here, with the option of parameterising them or retrieving information about them.

The names and numbers of the listed sensors may vary depending on the system configuration.

Quick access to an individual channel menu is possible directly from the "Measured value and status display". To do this, select the relevant channel in the "Measured value and status display". After pressing the (, OK) key, the corresponding channel menu will open (see"Method 2 (quick access) of accessing channel menu" [▶ 105]).

Example:

To access information from a sensor or to change the settings for a sensor, you will need to be in the correct channel menu. There are two ways of getting to this menu.

Method 1 (standard) of accessing the channel menu

You are in the measurement display for the sensor in question; in this example S1:D-R 220.

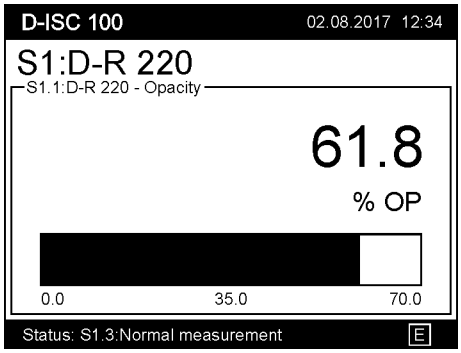
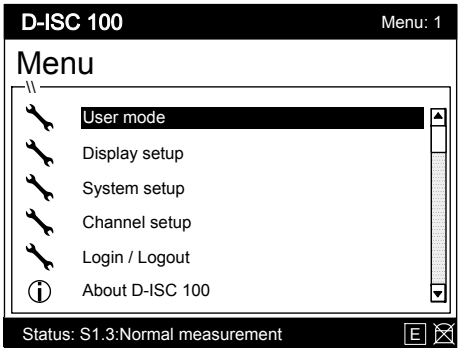


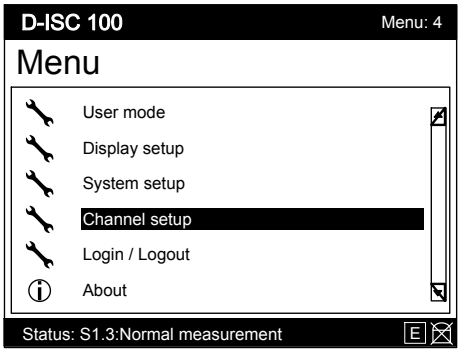
Fig. 10.9: Measurement display S1

Press the key



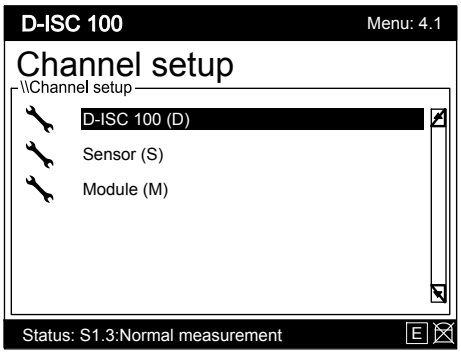
Press the down arrow key 3 times ▼▼▼

Fig. 10.10: Menu 1



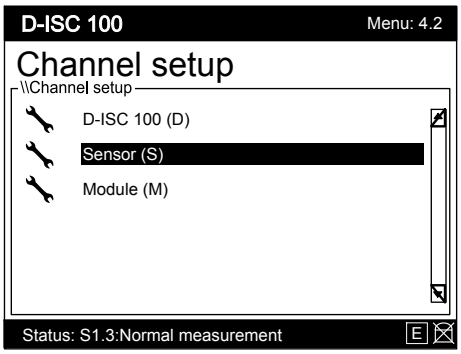
Press the ⏎, OK key

Fig. 10.11: Channel menu 4



Press the down arrow key (▼) and then the ⏎, OK key

Fig. 10.12: Channel menu: 4.1



Press the ⏎, OK key

Fig. 10.13: Channel menu: 4.2

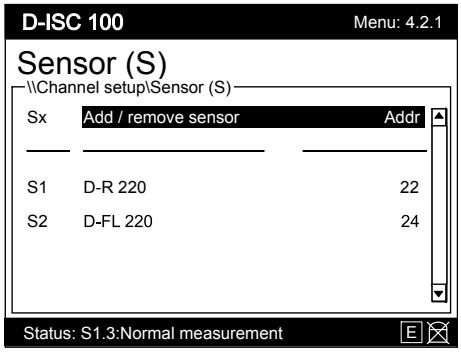


Fig. 10.14: Sensor menu: 4.21

Press the down arrow key (▼)

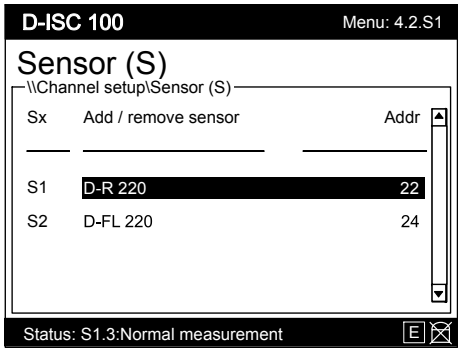


Fig. 10.15: Sensor menu: 4.2 Sensor (S1)

Press the ↵, OK key

Target:

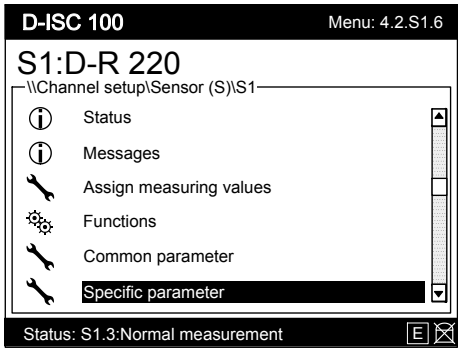


Fig. 10.16: Settings for the sensor (S1)

Method 2 (quick access) of accessing the channel menu

You are in the measurement display for the sensor in question; in this example S1:D-R 220.

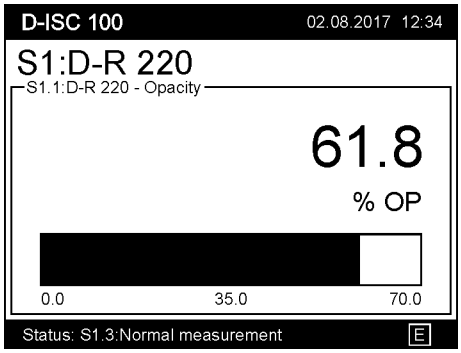


Fig. 10.17: Measurement display S1

Press the ↵, OK key

Target:

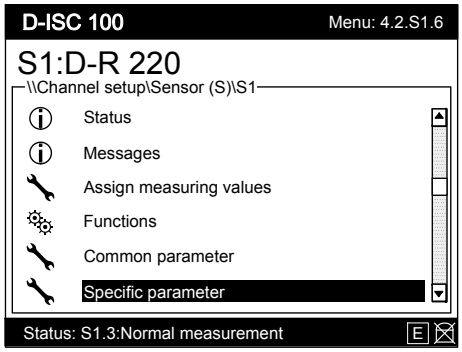


Fig. 10.18: Channel menu S1

10.3.1 [Sx add/remove sensor]

- List of all sensor locations (S1..S8)
- The device name and the Modbus address for the device is displayed at assigned sensor locations.
- ☐ "Not assigned" is displayed at unassigned sensor locations.

Adding an Sx sensor:

[☐ Add sensor]

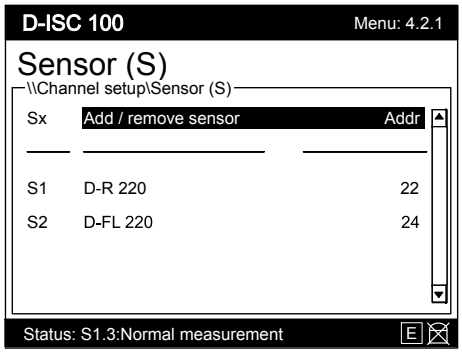


Fig. 10.19: Sensor menu

Additional sensors can be added to the system in the first line of the sensor menu (☐ Add/remove sensor).

See also 15.7 Example: Adding a sensor [▶ 165].

Remove Sx sensor:

[☐ Remove sensor]

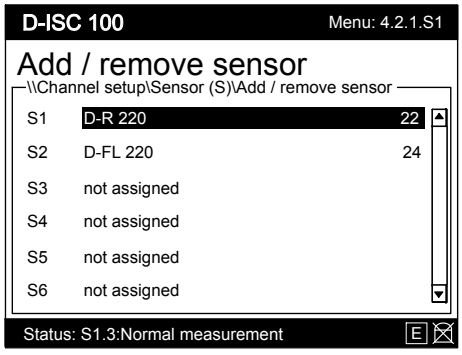
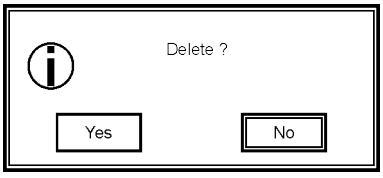


Fig. 10.20: Remove sensor

To remove a sensor, select it from the list by using the arrow keys (▼ ▲) to move the black bar to the desired entry.

Use the ↵ key to select the device for removal.



Before it is deleted from the system, a confirmation prompt is displayed, giving the opportunity to abort the process.

If you press the ↵ key for "No", the process will be aborted and the sensor will *not* be deleted. In order to actually remove the device, use the arrow key (◀) to activate the "Yes" button, and start the removal process with the ↵ key.

10.3.2 S1...S8 (sensor name) e. g. D-R 320

- The channel menu/sensor menu is accessed by selecting this menu item.
- From here, every menu structure is dynamic and depends heavily on the assigned sensor type. However, the first menu level of the sensor menus (4.2.Sx.n) has been structured as uniformly as possible and variable status / messages / parameters / functions / ... are grouped under this level.
- The menu items listed from these levels can differ for each sensor. It is possible for entire menus to be omitted or sub-items to be removed or added depending on the sensor.

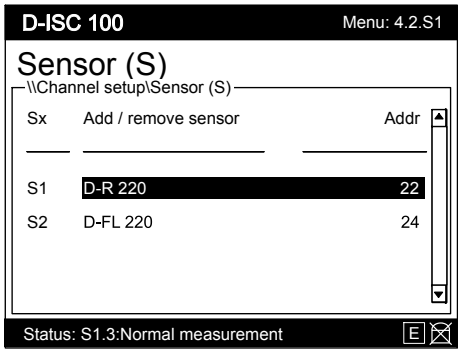


Fig. 10.21: Menu: Sensor menu

Sensor number and sensor name in the illustration are simply intended as examples and depend on the configuration and selection. The menu number here and below is 4.2.S1…

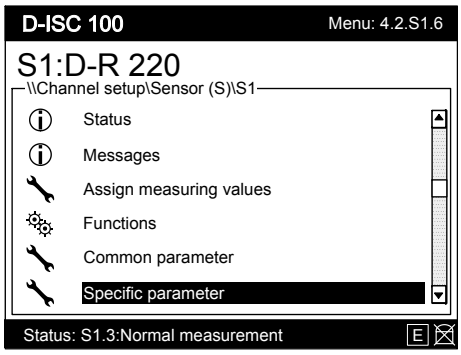


Fig. 10.22: Channel menu

Selecting this menu item takes you to the channel menu for the selected sensor (see also 10 Channel setup menu 4 [▶ 96]).

10.3.3 [Assign measuring values]

…to analogue output (AO):

[☐ Assign to analogue output (AO)]

- This menu item can be used to assign the respective sensor channel to an analogue output. The sensor channel's measured value is then output on the selected analogue output in accordance with the set signal range.
- Selecting the menu item opens a list that lists all of the analogue outputs available in the system.
- If an analogue output is already assigned, this is indicated in the list. If no assignment exists, "-" is displayed.

- Selecting the desired analogue output and pressing the ↵ key assigns the new sensor channel. This overwrites any existing assignment.
- A sensor channel can also be assigned to multiple analogue outputs. To do so, repeat the above step.

After finishing the assignments, the list can be exited by pressing the **ESC** key.

Signal range of analogue output (AO):

[▭ Signal range of analogue output (AO)]

- Quick access to the "Signal range" menu in the specific parameters of the respective analogue output (see example: "15.10.1 Setting the signal range [▶ 177]").
- Quick access is not possible if the sensor channel has not be assigned to any analogue outputs or has been assigned to multiple outputs. A corresponding message is displayed.

Assign measurement unit:

[▭ Assign measurement unit]

- This allows the sensor channel to be assigned to a measured variable/measurement unit.
- Selecting this menu item displays a list of all measured variables/measurement units that are supported by the respective sensor.
- The selection bar always indicates the measured variable that is currently set.
- The arrow keys (▲ ▼) can be used to select a new variable. Press the ↵ key to select.
- If the sensor channel is not used/not to be used, the selection is set to "not assigned"
- The sensor channel now supplies measured values in the selected measurement unit.

10.3.4 [Functions] (sensor)

- The available functions depend on the selected sensor.
- The functions can be used to start and stop certain sensor actions (see "Example" below).
- A function is activated by selecting and confirming with the OK key.
  -> Automatic reporting sequence:
  “[▭ Requested]" -> "[▭accepted"]
- These messages *only* refer to the function's execution status, *not* to the action itself.

Example:

- The sensor is to be set to the "Maintenance" status:

1. In the "Maintenance functions" menu, select the "Set maintenance" function.
2. The "Set maintenance" function is now started by pressing the OK key. The maintenance status can be checked in the status of the measuring device -> "Maintenance/Check function (C)" is active.

- The maintenance signal is reset in a similar manner:

1. In the "Maintenance functions" menu, select the "Reset maintenance" function.
   This function should be marked as "inactive".
2. The "Reset maintenance" function is now started by pressing the OK key. The maintenance status can be checked in the sensor's status -> "Maintenance/Check function (C)" is inactive.

10.3.4.1 [Maintenance functions]

Maintenance functions:

[🗀 Maintenance functions]

(Further information on the maintenance functions can be found in the relevant sensor manual.)
Maintenance functions can be stopped and started here.

[🗀 Start zero point measurement]
- This function starts the sensor's zero point measurement.

[🗀 Stop zero point measurement]
- This function stops the sensor's zero point measurement.
- The sensor returns to normal measuring mode.

10.3.4.2 [Simulation functions]

Simulation functions:

[🗀 Simulation functions]

Confirm changes with OK …

e.g.:

Measuring value n:
[🗀 enter /exit fixed output mode]

n stands for the number of possible output channels.
- This function allows a simulation value to be defined for each available output channel. This value is then output at the associated output.
- Entering a simulation value of "0" deactivates the function.

(Further information on the simulation functions can be found in the relevant sensor manual.)

10.3.4.3 [Test functions]

Test functions

[🗀 Test functions]

Carry out (!) with the OK key.

e.g.:

[🗀 Protection device test]
- Checks for proper functioning, e.g. of the fail-safe shutter, by closing and opening the shutter once.
  If a malfunction occurs, a fault message will be issued.
- Request is carried out immediately; no additional confirmation prompt.

10.3.4.4 [Service functions]

Service functions:

[🗀 Service functions]

[🗀 Restart device]
- Restarts the respective sensor.

[🗀 Save parameter]
- Permanently saves the parameters currently set in the sensor.
- This function is generally performed automatically (upon request), when returning to the measured value and status display after changing parameters.

[🗀 Restore previous parameter]
- Overwrites the currently set parameters with the parameters permanently stored in the sensor.

10.3.5 [Common parameter]

10.3.5.1 [Device information]

List of information on the sensor (this data is read only and *cannot* be changed):
- [🗀 Manufacturer name]
- [🗀 Device name]
- [🗀 Device type]
  Numerical code for device type
- [🗀 Device serial number]
- [🗀 Primary device firmware revision]
  Firmware version and revision of the main processor
- Secondary device firmware revision
  [🗀Firmware version and revision]
  of the potentially available auxiliary processor

10.3.5.2 [Bus information]

Press the OK key to change…

Setting the communication parameters:

Modbus address:

[🗀 Modbus address]

Press the OK key to change…
- Device's slave address (do not change during operation!)
- Adjustment range 1…247

Actual date/time:

[🗀 Actual date/time]

Press the OK key to change…
- Sensor's date and time. This is automatically synchronised by the D-ISC 100.

Modbus communication settings:

[🗀 Modbus communication setting]

Change using the arrow keys (▼ ▲ ► ◄)

- The device's communication settings (Baud rate, parity, stop bits) (do not change during operation!)

Modbus termination:

[□ Modbus termination]

Change using the arrow keys (▶ and ◀)
Select whether:

- Modbus termination should be switched on ■ or off □.

10.3.5.3 [Variable setup]

Variable setup: (Channel #1…#4)

[□ Variable setup]

Upper limit value 1[□]

Change with: OK key…

- If the measured value exceeds this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

Lower limit value 1 [□]

Change with: OK key…

- If the measured value falls below this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

□ Upper limit value 2]

Change with: OK key…

- If the measured value exceeds this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

Lower limit value 2 [□]

Change with: OK key…

- If the measured value falls below this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

Integration time[□]

Change with: OK key…

- The time in seconds over which a moving average is formed for the measured value.
- Adjustable between 1…180 seconds.
- **Offset a0[□]***default value a0 = 0*
- **Slope a1** *[□]default value a1 = 1*
- **Slope a2** *[□]default value a2 = 0*
- **Slope a3** *[□]default value a3 = 0*

Change in each case with: OK key…

Option to adjust the measurement signal x based on the calculation formula:
y=a3 • x³ + a2 • x² + a1 • x + a0 -> adjusted measurement signal y

[Signal range start]

Change with: OK key…

- Each channel must be assigned a measurement range with a start and end.
- The reference check value is defined based on the signal range setting
  (e.g. 70% of the signal range).
- The dimensions of the signal range setting correspond to the settings in the measurement unit.

[Signal range end]

Change with: OK key…

- Each channel must be assigned a measurement range with a start and end.
- The reference check value is defined based on the signal range setting
  (e.g. 70% of the signal range).
- The dimensions of the signal range setting correspond to the settings in the measurement unit.

[Setup]

Change with: arrow keys (▶ and ◀)
Select whether:

- The check values are to be output during the check cycle Output of control cycle values ■ or whether the last measured value is retained for the duration of the check cycle□.
- Activate Zero range: positive [Zero range: positive active] ■
- Activate Zero range: [negative Zero range: negative active] ■

[Zero range (amount)

Change with: OK key…

- Setting the zero range.

Media conditions:

Media conditions

Change with: OK …

Media temperature [°C]

- Temperature value of the measuring medium.
- This is used to standardise the measured values to standard conditions.
- With activated software module "MC0: Media conditions", the media temperature is distributed from D−ISC 100 to all connected sensors.

Media pressure [hPa]

- Absolute pressure value of the measuring medium.
- This is used to standardise the measured values to standard conditions.

- With activated software module "MC0: Media conditions", the media pressure is distributed from D−ISC 100 to all connected sensors.

Standard temperature [°C]
- Temperature used for standardisation
- If the standardised temperature value differs from 0°C, this can be set here.
- Default value = 0°C

Standard density [kg/m³]
- Standard density of the measuring medium.
- For example, this is required to calculate the mass flow.

10.3.5.4 [Maintenance setup]

Reference check set value:

Reference check set value

Press the OK key to change…
- Value in % to which the sensor's internal reference point measurement is scaled in order to output the value in the set signal range.
- Adjustment range 5…95%

Control cycle step duration:

Control cycle step duration

Press the OK key to change…
- Setting the duration of each individual step of the check cycle in seconds.

Check cycle interval:

Control cycle interval

Press the OK key to change…
- Setting the interval of the automatic check cycle in hours.
- 0 = automatic check cycle is disabled.

Fault indication rejection:

Fault indication rejection

Press the OK key to change…
- If a failure is detected by the system, this results in a programmed response. The system also saves the appropriate (error) message. The message is saved in the memory of the message logbook (in the sensor) and can provide the maintenance technician with information for/when carrying out device maintenance, if applicable.
- Error message suppression designates the time period (in seconds) for the sensor's initial pause. The system response is then only initiated if the fault still persists after the specified time has expired. This means transient failures can be ignored without triggering a system response.

Time to next control cycle [h:mm:ss]:

Time to next control cycle [h:mm:ss]

(read only)
- Indication of remaining time to next control cycle.
- Display -:--:-- = automatic check cycle is disabled.

Reset control cycle timer:

Reset control cycle timer

Carry out (!) with the OK key.

- Sets the timer for the control cycle to the value specified under "Control cycle interval", i.e. the next control cycle will only start again after the entire interval duration has elapsed.
- Request is carried out immediately; no additional confirmation prompt.

10.3.6 [Specific parameter]

Information on the specific parameters can be found in the relevant sensor manual.

10.3.7 [Setup]

10.3.7.1 [Common]

Customer name: [🗀 Customer name]

Press the OK key to change…

- This allows a user-specific name to be entered for the respective sensor.
- This name is then displayed in the measured value / status display behind the sensor name.

10.3.7.2 [S1.1...S1.4 graphic]

Settings can be adjusted here for the graphic displays (bar graph/XY graph) for individual channels of the respective sensor, if these are active (see 8 Display setup menu 2 [▶ 85])

Press the OK key to change…

Automatic scaling: [🗀 Auto scale]

- If enabled (on, 1), the start and end values for the scaling are automatically calculated based on the measured values to be displayed
- If disabled (off, 0), the following three values are used:

Scale start value: [🗀 Scale start value]

- Start value for bar graphs or the Y-axis of XY graphs.

Scale end value: [🗀 Scale end value]

- End value for bar graphs or the Y-axis of XY graphs.

10.3.8 [Information]

List of version numbers for the sensor (this data is read only and *cannot* be changed):

The  symbol means:
the information in this line is read-only here!

- [🗀 Device]
- [🗀 Description]
- [🗀 Device description revision common]
- [🗀 Device description revision specific]

- [Device protocol revision common]
- [Device protocol revision specific]
- [Language revision common]
- [Language revision specific]

10.4 Modules (M) menu: Usable modules

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ ▼ ▼ Channel setup (menu 4) ▼D−ISC 100 (D) (menu 4.1) ▼ ▼ Modules (M) (menu 4.3)
= Software module MENU 4.3.1

This menu item lists all of the modules available in the D-ISC 100 (software and expansion modules).
After selection, the respective module can be configured or information can be requested.
Software modules can also be activated and switched on and off in this menu, and expansion modules can be removed from the system configuration.

The names and numbers of the listed modules may vary depending on the system configuration.

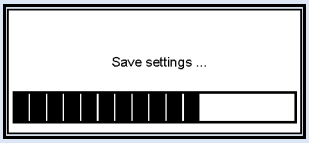
10.4.1 [Software modules]

Software modules must be activated before use. Activation is performed by a software certificate with an activation key, which is only valid for one specific D-ISC 100 Universal control unit.

Further details on the available software modules can be found in Section 3.4 Expansion modules [▶ 25].

Software modules can also be activated and switched on and off in this menu, and expansion modules can be removed from the system configuration.

After leaving the menu using the key, adjusted settings are permanently saved automatically by the universal operation unit. This save action is confirmed in a window:



see also Section 9.4.1 [Backup system settings] [▶ 92]

10.4.1.1 [Active modules]

- List of software modules that are activated on this D-ISC 100 and that can be used.
- A module must be enabled before use (see Section 10.4.1.3 Enable/disable modules [▶ 116]).

10.4.1.2 [Activate modules]

Fig. 10.23: Software certificate

- Enter an activation key to activate a software module that has been purchased as an additional option (menu 3.3.1.2).
- The activation key can be found on the software certificate and is only valid for the D-ISC 100 with the "Mainboard ID" indicated on the certificate.
- If the entered activation key is valid, a message will be displayed indicating the progress of the activation, with subsequent information on which module has been activated.

The detailed procedure for activating a software module can be found in Section 15.13 Example: Activate modules [▶ 190].

10.4.1.3 Enable/disable modules

- A list of all active modules with the option of enabling or disabling.
- If the module is disabled, it does not appear in the module list and it is also not displayed in the measurement and status display.
- If a disabled module (empty status indicator ☐) is to be enabled, it must be selected in the list and enabled using the ▶ arrow key (full status indicator ■).
- A module can be disabled in the same manner using the ◀ arrow key (empty status indicator).
- The changes made are executed when leaving the menu.

10.4.1.4 [Mixed channel] (MX1...2)

Possible sources of a mixed channel[☐ are] sensors (S), external sensors (SX) and media conditions (MC).

The source assignment takes place in the respective channel menu of the software module (MX1/MX2) e.g. 4.3.MX1.1 for MX1. This menu lists the 4 channels of the MX module with the current assignment.

Selecting one of the channels (↵ key) allows its source assignment to be established/changed or even removed (e.g. 4.3.MX1.1.1.1 "Remove assignment").

For source assignment, the desired sensor or module is firstly selected from the list (e.g. 4.3.MX1.1.1.S1 for sensor S1), followed by the selection of the measurement channel (e.g. 4.3.MX1.1.1.S1.1 for sensor S1.1).

Once this selection is made, the screen returns to the higher-level menu (e.g.: 4.3.MX1.1) and the respective assignment is displayed.

See also Section "Measurement display (MXo)" [▶ 74].
A comprehensive description on configuring mixed channels can be found in Section 15.14 Example: Configuring the mixed channel software module [▶ 191].

10.4.1.5 [External sensors] (SX1...2)

First enable the module if necessary (10.4.1.3 Enable/disable modules [▶ 116]).

Additional information on the module menu (see 10.4.3.1.1 Module name (e.g. AOx, MCx ...)* [▶ 127]) for (SX):

Assign source measured value (4.3.SXn.2):

- [🗀 Assign source measuring values]:
  Assignment of the analogue input, to which a measured value transmitter is connected, to a channel SX
- Assignment takes place analogous to the module MX. However, possible sources are only analogue inputs AI

Assign target measured value (4.3.SXn.3):

- [🗀 Assign target measuring values]:
- Assignment of the respective measured value (channel) to an analogue output.
- Assignment takes place analogous to the sensors (see these).

Specific parameters (4.3.SXn.4.1 .. 4, 4 channels):

[🗀 Specific parameter]:

Upper limit value 1[🗀]

Change with: OK key…

- If the measured value exceeds this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

Lower limit value 1 [🗀]

Change with: OK key…

- If the measured value falls below this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

🗀 Upper limit value 2]

Change with: OK key…

- If the measured value exceeds this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

Lower limit value 2 [🗀]

Change with: OK key…

- If the measured value falls below this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

[Offset a0]

Change with: OK key…

- Option to adjust the measurement signal x based on the calculation formula:
  $y=a3 \cdot x^3 + a2 \cdot x^2 + a1 \cdot x + a0$ -> adjusted measurement signal y
- Default value = 0

[Slope a1]

Change with: OK key…

- Option to adjust the measurement signal x based on the calculation formula:
  $y=a3 \cdot x^3 + a2 \cdot x^2 + a1 \cdot x + a0$ -> adjusted measurement signal y
- Default value = 1

[Slope a2]

Change with: OK key…

- Option to adjust the measurement signal x based on the calculation formula:
  $y=a3 \cdot x^3 + a2 \cdot x^2 + a1 \cdot x + a0$ -> adjusted measurement signal y
- Default value = 0

[AI: Live zero]

Change with: OK key…

- Selection of the living zero point of the assigned analogue input / transmitter (start of the AI signal range): 0, 2, 4 mA

[Signal range start]

Change with: OK key…

- Each channel must be assigned a measurement range with a start and end.
- The reference check value is defined based on the signal range setting
  (e.g. 70% of the signal range).
- The dimensions of the signal range setting correspond to the settings in the measurement unit.
- Measured value of the external sensor / transmitter that corresponds to the living zero point selected above (e.g. -50 for a temperature transmitter with the signal range .50..200°C)

[Signal range end]

Change with: OK key…

- Each channel must be assigned a measurement range with a start and end.
- The reference check value is defined based on the signal range setting
  (e.g. 70% of the signal range).
- The dimensions of the signal range setting correspond to the settings in the measurement unit.

- Measured value of the external sensor/transmitter that corresponds to 20 mA (e.g. 200 for a temperature transmitter with the signal range .50..200°C)

AI: [🗀 Over-/underrun action]

(4.3.SXn.4.1.11)
Change with: OK key…

- Action that is performed in the event of an overrun or underrun of the assigned analogue input (see input) -> use current measured value (no restriction) or the overrun/underrun value (measured value is retained in the event of an overrun/underrun, until these limits are overrun/underrun once again).

🗀 Unit selection]

(4.3.SXn.4.1.12)
Change with: OK key…

- Selection of a measurement unit for the respective measurement channel (e.g. °C for a temperature transmitter with the signal range .50..200°C) from the list of the units available in the system. This unit is then displayed in the Measurement display and transmitted with the measured value in the case of digital communication. If no appropriate unit is available in the system, "User defined u.d." can be selected. In this case, the measurement unit is displayed in accordance with the two following points.

[🗀 User defined unit]

(4.3.SXn.4.1.13)
Change with: OK key…

- Enter a character string for the measurement unit of the measured value, e.g. °C

[🗀 User defined type]

(4.3.SXn.4.1.14)
Change with: OK key…

- Enter a character string for the type of measured value, e.g. "temperature"

10.4.1.6 [Media conditions] (MC0)

First enable the module if necessary (10.4.1.3 Enable/disable modules [▶ 116]).

Channel #1 of module MC0 is used for the media temperature.
Channel #2 of module MC0 is used for the media pressure.
Channels #3 and #4 are not currently used.

This channel assignment cannot be changed.

Additional information on the module menu (see 10.4.3.1.1 Module name (e.g. AOx, MCx ...)* [▶ 127]) for MC:

Assign source measured value (4.3.MC0.2):

[🗀 Assign source measuring values]:

- Source assignment takes place in the respective module menu of the software module MC0 (see above).

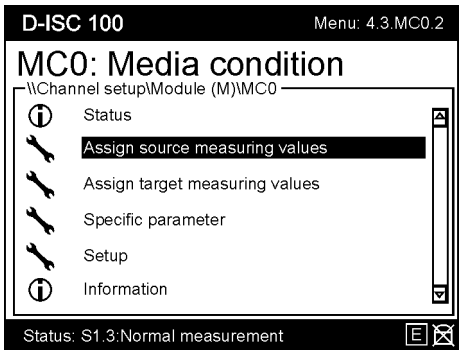


Fig. 10.24: Media conditions

- This menu lists the 2 channels of the MC0 module with the current assignment.
  - MC0.1 = Media temperature
  - MC0.2 = Media pressure

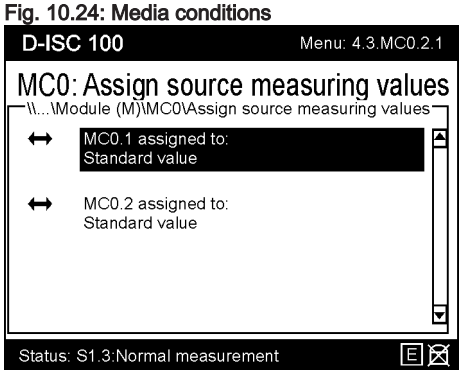


Fig. 10.25: Source assignment

- Selecting one of the channels (↵ key) allows the source assignment to be established or changed.

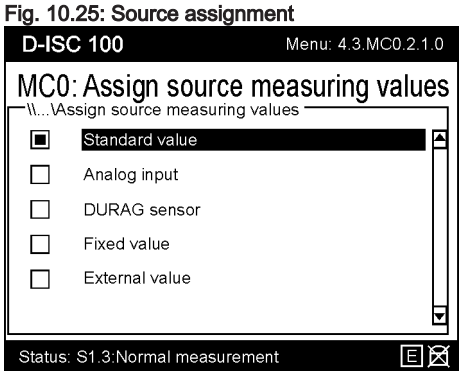


Fig. 10.26: Possible sources

- A selection list of possible sources is displayed:
  - [☐ Standard value]
  - [☐ Analogue input]
  - [☐ DURAG sensor]
  - [☐ Fixed value]
  - [☐ External value]

The ■ symbol shows that the setting is active; the ☐ symbol means "not active".
The setting can be changed with the OK key.

Press the ⮐ key to exit the respective menu:
The change will be loaded into the permanent device memory on return to the measured value/status display.

Press the ESC key to exit the menu:
The settings will **not** be saved.

- After selecting the [☐standard value], [☐fixed value] or [☐external value], the screen returns to the higher-level menu and the selected assignment is displayed. Additional settings may be required in the specific parameters (e.g. setting the fixed value).
- If [☐"analogue input"] is selected, a sub-menu will appear with a list of available analogue inputs. After selecting an appropriate analogue input, the screen returns to the higher-level menu and the selected assignment is displayed. Additional settings may be required in the specific parameters (e.g. setting the signal range of the AI).
- If "DURAG sensor" is selected, a submenu appears with the list of DURAG sensors connected to the system, which deliver an appropriate measuring signal. The adequacy of the

measuring signal can only be assessed by the D-ISC 100 based on the measurement unit. The actual adequacy of this measuring signal must be ensured by the installer. After selecting an appropriate analogue input, the screen returns to the higher-level menu and the selected assignment is displayed.

Assign measured value target (4.3.MC0.3):

[🗀 Assign target measuring values]:

- Assignment of the respective measured value (channel) to an analogue output.
- Assignment takes place analogous to the sensors (see these).

Specific parameters (4.3.MC0.4)

[🗀 Specific parameter]:

MC0.1: Media temperature [°C] (4.3.MC0.4.1)

[🗀 Media temperature]:

Upper limit value 1[🗀]

Change with: OK key…

- If the measured value exceeds this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.

Lower limit value 1 [🗀]

Change with: OK key…

- If the measured value falls below this value, the status signals a corresponding limit value infringement.
- This status signal can be assigned to a digital output if necessary.
- **Offset a0[🗀]***default value a0 = 0*
- **Slope a1** *[🗀]default value a1 = 1*
- **Slope a2** *[🗀]default value a2 = 0*
- **Slope a3** *[🗀]default value a3 = 0*

Change in each case with: OK key…

Option to adjust the measurement signal x based on the calculation formula:
$y=a3 \cdot x^3 + a2 \cdot x^2 + a1 \cdot x + a0$ -> adjusted measurement signal y

[🗀 AI: Live zero]

Change with: OK key…

- Selection of the living zero point of the assigned analogue input / transmitter (start of the AI signal range): 0, 2, 4 mA

[🗀 Signal range start]

- Measured value of the temperature transmitter that corresponds to the living zero point selected above (e.g. -50 for a temperature transmitter with the signal range .50..200°C)

[🗀 Signal range end]

- Measured value of the temperature transmitter that corresponds to 20 mA (e.g. 200 for a temperature transmitter with the signal range .50..200°C)

AI: [Over-/underrun action]

- Action that is performed in the event of an overrun or underrun of the assigned analogue input (see input) -> use current measured value (no restriction) or the overrun/underrun value (measured value is retained in the event of an overrun/underrun, until these limits are overrun/underrun once again).

[Fixed value]

- Temperature that is used if "Fixed value" has been selected for the source assignment.

[Standard temperature]

- Temperature to be used for standardisation (default: 0°C). If the standard temperature in certain application ranges differs from the default value, this can be set here.

MC0.2: Media pressure [hPa]
[(4.3.MC0.4.2)]

Upper limit value [°C]

- see above

Lower limit value [°C]

- see above

Offset a0 [°C]

- see above

Slope a1

- see above

Slope a2

- see above

AI: [Live zero]

- Selection of the living zero point of the assigned analogue input / absolute pressure transmitter (start of the AI signal range): 0, 2, 4 mA.

AI: [Signal range start]

- Measured value of the absolute pressure transmitter that corresponds to the living zero point selected above (e.g. 800 for an absolute pressure transmitter with the signal range 800..1200 hPa)

AI: [Signal range end]

- Measured value of the temperature transmitter that corresponds to 20 mA (e.g. 1200 for a temperature transmitter with the signal range 800..1200 hPa)

AI: [Over-/underrun action]

- Action that is performed in the event of an overrun or underrun of the assigned analogue input (see input) -> use current measured value (no restriction) or the overrun/underrun value (measured value is retained in the event of an overrun/underrun, until these limits are overrun/underrun once again).

Fixed value [hPa] [ ]

- Absolute pressure that is used if "Fixed value" has been selected for the source assignment.

10.4.1.7 Modbus TCP (NE0)

Module must first be activated (10.4.1.2 [Activate modules] [▶ 116]) and enabled (10.4.1.3 Enable/disable modules [▶ 116])

(optional software module)

Status display:

- Online: indicates (if active) that an active Modbus TCP connection (TCP [▶ 204]) currently exists.
  If no Modbus request takes place for the TimeOut time set under "Bus information", this status is set to inactive.
- Rx: Modbus package is received (if active),
  number: Number of Modbus packages already received.
- Tx: Modbus package is sent (if active),
  number: Number of Modbus packages already sent.
- Error: Modbus package was identified as faulty
  (if active),
  number: Number of Modbus
  packages already incorrectly received.
- Information: Displays the set IP address and the TCP port (permanent) used.

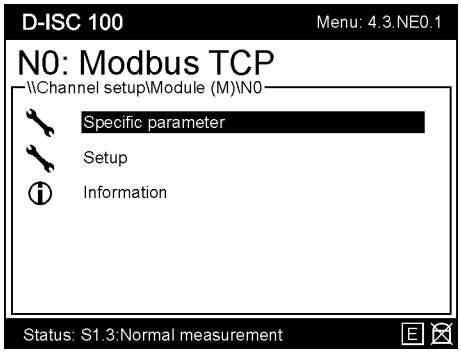


Fig. 10.27: Modbus TCP menu

Additional information on the module menu (see 10.4.3.1.1 Module name (e.g. AOx, MCx ...)* [▶ 127]) for SX:

- [🗀 Specific parameter (4.3.NE0.1)]
-][🗀 NE0 setup (4.3.NE0.1.1]
  - [🗀 IP address]:
    Address via which the D-ISC 100 is available in the IP network. (Default: 192,168,000,001)
  - [🗀 Subnet mask]:
    Together with a device's IP address, the net mask defines which IP addresses this device searches for in the internal network and which IP addresses it could reach in other networks using a router. (Default: 255,255,255,000)
  - [🗀 Gateway]:
    (Default: 000,000,000,000)
- Settings (4.3.NE0.2.1)[🗀 Setup]
  - [🗀 Common]
    Customer name:
    Enter the name to be used to identify the device in the customer system.
- [🗀 Information]:
  - See section 10.3.8 [Information] [▶ 114]

For information on the connection and plug assignment of the Ethernet interface, see Section 4.2.4 Bus connection [▶ 36].

On the Ethernet connection, 2 LEDs display the current status.

Fig. 10.28: D-ISC 100 module, status LEDs on the internal Ethernet connection

No./ colour(s)	LED	Status	Meaning
1 green		On	Link - connection to an Ethernet device established
2 yellow		Flashing	Rx/Tx – flash during Modbus TCP data transfer

Table 10.1: Meaning of the status LEDs

The D-ISC 100 acts as a Modbus TCP server. The "Unit Identifier" in the "MBAP Header" of a Modbus TCP request is not evaluated by the D-ISC 100. As a result, the D-ISC 100 will respond to all correctly received Modbus TCP requests that have been sent to the set IP address. However, we recommend using the "Unit Identifier" 0xFF indicated in the Modbus specification.

Further information on the use of the Modbus TCP can be found in the "DURAG D−ISC 100 Module Modbus RTU, Module Modbus TCP" manual and in the Modbus specification "Modbus Messaging on TCP/IP Implementation Guide". (http://modbus.org/docs/Modbus_Messaging_Implementation_Guide_V1_0b.pdf)

See also 4.2.9 Basic Modbus information [▶ 47].

10.4.1.8 Modbus RTU

Before this software module can be used, it will need to be:

- Activated [☐Activate module]
  The activation key will need to be entered to do so (see Section 10.4.1.2 [Activate modules] [▶ 116]).
- Enabled [☐Enable/disable modules](see Section 10.4.1.3 Enable/disable modules [▶ 116]).

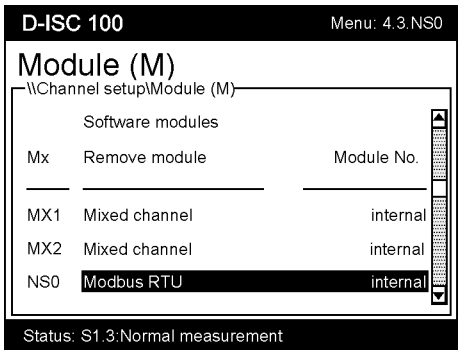


Fig. 10.29: Module list

The "Modbus RTU" module will then be entered into the module list (see figure on the left), from where it can be configured:

Specific parameters (4.3.NS0.1)

[🗀 Specific parameter]

- [🗀 NS0 setup]
  - [🗀 Modbus address]:
    Modbus server address of the D-ISC 100 (default: 20)
  - Baud rate:
    Selection of the speed of communication (default: 19200)
    Pressing the ↵ key in this line opens the Baud rate for adjustment. Use the arrow keys (▼ ▲) to make the selection and the ↵ key to confirm.
    The same selection can also be made in the following line (after the ↳ symbol).
  - [🗀 Settings]:
    Selection of the parity and the number of stop bits (default: none / 1)
  - [🗀 Termination]:
    Enabling/disabling the bus termination of the D-ISC 100. Termination must be enabled if the D-ISC 100 is located at the end of a bus; otherwise it must be disabled.

Setup (4.3.NS0.2)

[🗀 Setup]

- [🗀 Common]
  - [🗀 Customer name]
    Press the OK …
    A user-specific name can be entered here for the respective sensor.
    This name is then displayed in the measured value / status display behind the sensor name.

Information (4.3.NS0.3)

[🗀 Information]

The 👁 symbol means:
the information in this line is read-only here!

- [🗀 Device]
- [🗀 Description]
- [🗀 Device description revision common]
- [🗀 Device description revision specific]
- [🗀 Device protocol revision common]
- [🗀 Device protocol revision specific]

- [Language revision common]
- [Language revision specific]

Additional information on the use of the Modbus RTU can be found in the user information "D−ISC 100 Module Modbus RTU, Module Modbus TCP".

10.4.2 Mx: Remove module

- Expansion modules are automatically identified and registered after installation and switching on the D-ISC 100.
- If an expansion module is subsequently uninstalled, the registration remains in place and an error message is displayed if this module is not available.
- This provides protection against accidentally uninstalled or exchanged expansion modules.
- If an installed expansion module has to be removed from the D-ISC 100, perform the following steps:

1. Select menu 4.3.2.
   All installed modules are listed.
2. Select the module to be removed and confirm with the ↵ key.
3. Respond to the following confirmation prompt with "Yes".
4. Leave the menu.
5. Switch off the D-ISC 100.
6. Remove the module from the D-ISC 100 (see Section4.3.2 Disassembling top hat rail modules [▶ 51]).
7. Switch the D-ISC 100 back on.

10.4.3 Modules (M) (expansion module, hardware)

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼▼▼ Channel setup (menu 4) ↵
D−ISC 100 (D) (menu 4.1) ▼▼ Modules (M) (menu 4.3) ↵

= MENU 4.3.1
▼▼ …

The different versions of the D-ISC 100 (C, M, P, R, A) can have a different number of expansion modules.

The expansion module slots are consecutively numbered from left to right:

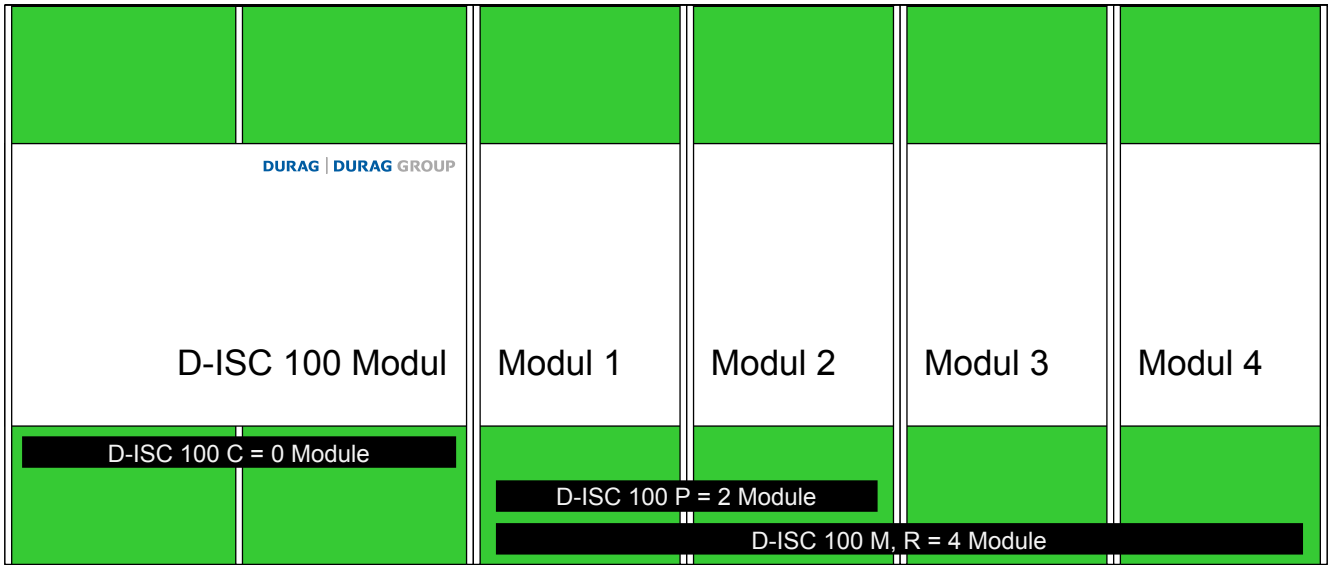


Fig. 10.30: Module assignment; possible names and numbers of module slots for the different device versions

10.4.3.1 Module settings

10.4.3.1.1 Module name (e.g. AOx, MCx …)*

This description is provided by way of example. Its principle applies to all modules.
The menu items may differ depending on the module, i.e. menus may be completely removed, submenus may be added or removed.

The following abbreviations are used to designate the expansion/software modules:

AO	Analogue out	Analogue output
AI	Analogue in	Analogue input
DO	Digital out	Digital output
TU	Digital in	Digital input
MX	Mixed channel	*(for measured value output)*
SX	External sensors	(*not DURAG sensors*)
MC	Media conditions	Specification of the flue gas conditions to standardise the measured values
N		Optional software modules (e.g. Modbus TCP)

Table 10.2: Abbreviations of the module names

The module number and module name in the respective figures are examples and depend on the actual configuration and selection. A possible menu number would be, e.g. 4.3.AO1…;

Selecting this menu item takes you to the channel menu for the selected module (see also 10 Channel setup menu 4 [▶ 96] quick access).

From here, every menu structure is dynamic and depends heavily on the assigned module type. However, the first menu level of the module menus (4.3.mx.n) has been structured as uniformly as possible and variable status / messages / parameters / functions / ... are grouped under this level.

For further information, please refer to the description in the respective module.

---

* x stands for a number (depending on the modules available and configured in the system);
0 refers to internal modules.

10.4.3.1.2 [Assign source measuring values]

The existence and content of this menu item depends on the selected module. After selecting this menu item, all channels in the selected module are displayed with their active assignments. Selecting one of these channels allows the respective assignment to be adjusted:

- "[Remove assignment]" removes the active assignment.
- List of sensors / modules to which the assignment can take place.
- After selecting one of these sensors / modules, the desired sensor/module channel can also be selected
- The screen then returns to the list of channels. The amended assignment is displayed accordingly.

Corresponding assignments can be performed for the following modules:

- **MX:** Selection of the sensor or module and the sensor channel or module channel to be displayed on the respective MX channel.
- **SX:** Selection of the analogue input module and the analogue input channel to be used as an external sensor for processing.
- **AO:** Selection of the sensor and sensor channel to be output on the respective analogue output
- **DO:** Selection of the sensor / module, the status / message group and finally the status information / message to be output on the respective digital output.

For further information, please refer to the description for the respective module.

10.4.3.1.3 [Assign target measuring values]

This menu item is only available for software modules **SX** and **MC**.

Selecting this menu item lists all the channels (measured values) in the selected module. Selecting one of these channels displays a submenu:

Assigning … to analogue output (AO)

[Assign … to analogue output(AO)]

- This menu item can be used to assign the respective sensor channel to an analogue output. The sensor channel's measured value is then output on the selected analogue output in accordance with the set signal range.
- Selecting the menu item opens a list that lists all of the analogue outputs available in the system.
  If an analogue output is already assigned, this is indicated in the list. If no assignment exists, "-" is displayed.
- Selecting the desired analogue output and pressing the key assigns the new sensor channel. This overwrites any existing assignment.
- A sensor channel can also be assigned to multiple analogue outputs. To do so, repeat the previous step.
- After finishing the assignments, the list can be exited by pressing the **ESC** key.

Analogue output (AO) signal range

[Signal range of analogue output(AO)]

- Quick access to the "Signal range" menu where the specific parameters of the respective analogue output are set (see15.10.1 Example: Setting the signal range [▶ 177]).
- Quick access is not possible if the sensor channel has not be assigned to any analogue outputs or has been assigned to multiple outputs. A corresponding message is displayed.

For further information, please refer to the description for the respective module.

10.4.3.1.4 Assign target function

This menu item is only available for **DI** modules.

After selecting this menu item, all channels in the selected module are displayed with their active assignments. Selecting one of these channels allows the respective assignment to be adjusted:

- "Remove assignment" removes the active assignment.
- List of sensors / modules to which the assignment can take place.
- Selecting one of these sensors / modules lists the available functions of the relevant sensor / module.
- Selecting one of these functions results in an assignment.
- The screen then returns to the list of channels. The amended assignment is displayed accordingly.

For further information, please refer to the description for the respective module.

10.4.3.1.5 Functions

The existence and content of this menu item depends on the selected module.

Service functions]

🗀 Simulation functions]

- The functions can be used to start and stop certain module actions. The status of the action is generally displayed under status or messages.
- A function is selected and then activated by ↵ key.
  -> Automatic reporting sequence:
  🗀 "Requested" -> 🗀"accepted"]
- These messages *only* refer to the function's execution status, *not* to the action itself.
- Simulation functions are often available for analogue and digital input and output modules, which facilitate the review of the installation. Regardless of the configuration, output and input values, which are used instead of real value for the duration of the simulation, can be set when the simulation function is activated.

For further information, please refer to the description for the respective module.

10.4.3.1.6 Common parameter

The existence and content of this menu item depends on the selected module. This menu item is generally only available for **expansion modules**.

- This allows information on the respective module to be accessed under the 🗀"Device information" menu item.
  See also Section 10.3.5.1 [Device information] [▶ 110].

For further information, please refer to the description for the respective module.

10.4.3.1.7 Specific parameter

The existence and content of this menu item depends on the selected module.

e.g. 🗀 **Signal invertation**]

- This is where specific settings for the selected module can generally be found.

For further information, please refer to the description for the respective module.

10.4.3.1.8 Setup

10.4.3.1.8.1 Common

Customer name:

[🗀 Customer name]

Press the OK key to change…

- This allows a user-specific name to be entered for the respective sensor.
- This name is then displayed in the measured value / status display behind the sensor name.

10.4.3.1.8.2 Graphic

Channel #1…#4

- Settings can be adjusted here for the graphic displays (bar graph/XY graph) for the respective module, if these are active.

Press the OK key to change…

Automatic scaling:

[☐ Auto scale]

- If enabled (on, 1), the start and end values for the scaling are automatically calculated based on the measured values to be displayed
- If disabled (off, 0), the following three values are used:

Scale start value:

[☐ Scale start value]

- Start value for bar graphs or the Y-axis of XY graphs.

Scale end value:

[☐ Scale end value]

- End value for bar graphs or the Y-axis of XY graphs.

10.4.3.1.8.3 Information

This is where device information on the respective module can be found.

10.4.3.2 Analogue output

For assembly, also refer to 4.3.4 Analogue output [▶ 53], and for the module description see 3.4 Expansion modules [▶ 25]. Also refer to 15.10 Examples: Assignment of the analogue output (current output) [▶ 173] et. seq.

Assign source measured value

[☐ Assign source measuring values]

- Assign source measured value: indicates (list) which source measured values are assigned to the 4 individual channels.
- After accessing the relevant channel AOm.1…4, the assignment can be removed or a selection and assignment can take place from the current list.

Functions

[☐ Functions]

- Service functions: enables the device to be restarted. Settings that have not been saved may be lost and are no longer considered when restarting the device.
- Simulation functions: allow a value (simulation value) to be assigned and the use of the assigned value (simulation request, activate simulation) for each of the 4 channels.

Specific parameter

[☐ Specific parameters]

- Signal range: displays the parameter for the signal range to which the 4 individual channels are assigned; enables the displayed parameter to be edited.
- Error information: displays the assigned error value (in mA) that is issued in the event of an error, for each of the 4 individual channels, and also allows this value to be edited. Whether and when the error signal is to be issued is also defined here.

- Overrun/Underrun: displays the assigned overrun/underrun value (in mA) from which a channel signals an overrun/underrun for each of the 4 individual channels; enables this value to be edited; individually defines whether they should lead to a system response for the individual values (value active) and what this response should be (display error, retain value).

Setup

[🗀 Setup]

- General: displays and edits the customer name(a user-specific name for the respective module).
- Graphic: Activates/deactivates the automatic scaling. Displays and edits the value for the start and end of the scale (Y-axis/bar graph), which is to be used when automatic scaling is deactivated.

Information

[🗀Information]

- Displays information on the D-ISC 100 device with the currently selected module and information on the versions used.

10.4.3.3 Analogue input

For assembly, also refer to 4.3.3 Analogue input [▶ 52], and for the module description see 3.4 Expansion modules [▶ 25].

Functions

[🗀 Functions]

- Service functions: enables a device restart. Settings that have not been saved may be lost and are no longer considered when restarting.
- Simulation functions: allow a value (simulation value) to be assigned and the use of the assigned value (simulation request, activate simulation) for each of the 4 channels.

Common parameter

[🗀 Common parameter]

- Common parameter: displays data such as the manufacturer's name, device name, device type, serial number and firmware version under device information (list).

Specific parameter

[🗀 Specific parameter]

- Overrun/Underrun: displays the assigned overrun/underrun value (in mA) from which a channel signals an overrun/underrun, for each of the 4 individual channels and also enables these values to be edited.

Setup

[🗀 Setup]

- General: displays and edits the customer name(a user-specific name for the respective module).
- Graphic: Activates/deactivates the automatic scaling. Displays and edits the value for the start and end of the scale (Y-axis/bar graph), which is to be used when automatic scaling is deactivated.

Information

[🗀 Information]

- Displays information on the D-ISC 100 device with the currently selected module and information on the versions used.

10.4.3.4 Digital output

For assembly, also refer to 4.3.6 Digital output [▶ 56], and for the module description see 3.4 Expansion modules [▶ 25]. Also refer to 15.11 Example: Assignment of digital outputs [▶ 184] et. seq.

Assign source status

[🗀 Assign source status]

- Assign source status: indicates (list) which source statuses are assigned to the 8 individual channels.
- After accessing the relevant channel DOm.1…8, the assignment can be removed or a selection and assignment can take place from the current list.

Functions

[🗀 Functions]

- Service functions: enables a device restart. Settings that have not been saved may be lost and are no longer considered when restarting.
- Simulation functions: allow a value (simulation value) to be assigned and the use of the assigned value (simulation request, activate simulation) for each of the 8 channels.

Specific parameter

[🗀 Specific parameter]

- Signal inversion: allows for the activation of the signal inversion for each of the 8 channels. See also 15.11.1 Example: Signal inversion setup (digital outputs) [▶ 185].

Setup

[🗀 Setup]

- General: displays and edits the customer name(a user-specific name for the respective module).

Information

[🗀 Information]

- Displays information on the D-ISC 100 device with the currently selected module and information on the versions used.

10.4.3.5 Digital input

For assembly, also refer to 4.3.5 Digital input [▶ 55], and for the module description see 3.4 Expansion modules [▶ 25]. Also refer to 15.12 Example: Assignment of digital inputs [▶ 187] et. seq.

Assign target function

[🗀 Assign target function]

- Assign the target function: indicates (list) which target functions are assigned to the 8 individual channels.
- After accessing the relevant channel DOm.1…8, the assignment can be removed or selected from an up-to-date list divided into the connected units
(D−ISC 100, sensors) and then assigned.

Functions

[🗀 Functions]

- Service functions: enables a device restart. Settings that have not been saved may be lost and are no longer considered when restarting.
- Simulation functions: allow a value (simulation value) to be assigned and the use of the assigned value (simulation request, activate simulation) for each of the 8 channels.

Common parameter

[🗀 Common parameter]

- Common parameter: displays data such as the manufacturer's name, device name, device type, serial number and firmware version under device information (list).

Specific parameter

[🗔 Specific parameter]

- Signal inversion: allows for the activation of the signal inversion for each of the 8 channels. See also 15.11.1 Example: Signal inversion setup (digital outputs) [▶ 185].

Setup

[🗔 Setup]

- General: displays and edits the customer name(a user-specific name for the respective module).

Information

[🗔 Information]

- Displays information on the D-ISC 100 device with the currently selected module and information on the versions used.

11 Maintenance

11.1 Safety

Filter maintenance on the D-ISC 100 P must only be carried out by specialist personnel (qualified electricians)!

DANGER

Danger of death due to electric current!

An immediate danger of death exists in case of contact with live parts. Damage to the insulation or individual components can present a danger of death.

- In the event of damage to the insulation, turn off the power supply immediately and initiate repairs.
- Only have work on electric systems performed by specialised electricians.
- Before opening the housing or removing the touch guard, disconnect the device, check that no voltage is present and secure against reactivation.
- Keep moisture away from live parts. This may lead to a short-circuit.

11.2 Maintenance work

Visible deposits (if present) are removed with a (damp) cloth or oil-free compressed air. If necessary, use water or isopropanol as well (not on hot surfaces).

We recommend checking the cable bushings for damaged seals at regular intervals. Leak-tight cable bushings prevent the ingress of moisture, thereby preventing corrosion inside the housing. Unused openings in the cable bushings must be sealed.

Be aware of any corrosion, deformation and damage to the housing, and make sure that it is securely positioned on the mounting wall. The housing cover and doors must be securely closed.

The operator defines the maintenance intervals for the D-ISC 100 depending on the usage conditions.

Maintaining the filter (D-ISC 100)

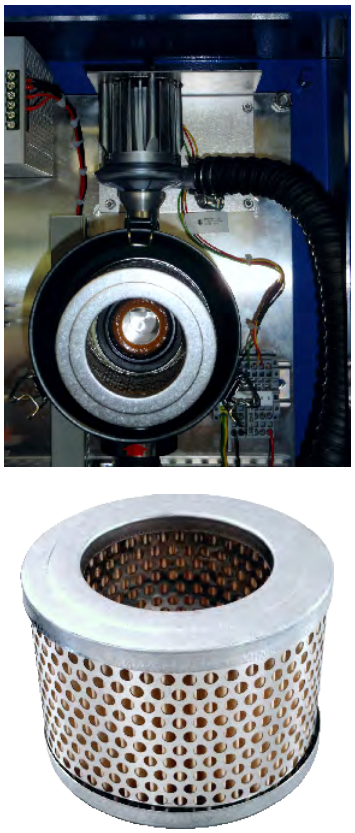


Fig. 11.1: Opening the filter housing; filter cartridge

The filter cartridge can be cleaned several times before it has to be replaced. The maintenance intervals for the filters depend on the quality of the intake air.

- Before interrupting the purge air, the device(s) being supplied with purge air must firstly be removed from the channel/stack.
- Switch off the operating voltage before opening the housing door.

For the maintenance of the filter, proceed as follows:

1. Open the filter housing lock ([▶ 136] at the top).
2. Remove loose dirt. Clean filter housing and filter (vacuum cleaner).
3. Insert new or cleaned filter cartridge. ([▶ 136] at the bottom)
4. Close the filter housing. Make sure that the interlocks engage.
5. Check the door seals. Replace defective seals.
6. Close the housing door. Switch on the supply voltage.

Purge air cable maintenance (D-ISC 100 P)

Check the purge air cables:

1. Check hoses for damage, kinking and ageing.
2. Check hose connections for leak-tightness and secure fitting.
3. Remove deposits from the purge air hoses, taking care not to damage the hose walls.
4. Switch on the purge air supply.
5. If required, refit the sensor(s) back onto the channel/stack.

12 Messages/error elimination

12.1 System message categories

Messages output by the system are divided into 4 categories:

Information:

[🗀 Information]

The messages in this group have a purely informative character (e.g. "Startup").
No LED signal is displayed when messages in this category are present.

Warnings:

[🗀 Warnings]

Messages of this category necessitate the attention of the operator (for instance maintenance requirements, time not set, change of battery necessary). But a system fault is not (yet) expected.
An LED signal accompanies messages in this category.

Simple error:

[🗀 Simple error]

Messages due to a simple system fault (e.g. incorrect configuration / assembly) belong to this category.
"Simple errors" can generally be rectified on-site by a qualified technician.
A red LED signal accompanies messages in this category.

Critical error:

[🗀 Critical error]

This category contains messages issued due to a serious system fault (e.g. hardware error).
"Critical errors" generally need to be rectified by qualified specialised personnel using special tools. On-site repair is often impossible.
A red LED signal accompanies messages in this category.

See also Section 12 Messages/error elimination [▶ 137].

12.2 Information

Note:

The English language version of the software display is indicated in square brackets in each case.

Code	Message	Measures
[001]	[Startup (power on)]	-
[002]	[Startup (external reset)]	-
[003]	[Startup (watchdog reset)]	1. If a soft reset is desired, no further measures are necessary. 2. In the event of multiple, unwanted resets, contact DURAG Service.
[004]	[Startup (bod reset)]	In the event of multiple occurrences contact DURAG Service.

Code	Message	Measures
[005]	[No backup of system settings found on SD card]	1. Copy a valid backup of the system settings to the SD card and manually restore the backup. 2. Check system settings and correct if necessary. Add sensors if necessary. 3. Create a backup of the system settings.
[006]	[Changes on system settings saved successfully]	-
[007]	[Backup of system settings not successful]	Perform new backup. Check the function of the SD card in the system if necessary.
[008]	[Backup of system settings successful]	-
[009]	[Restore of system settings successful]	-
[010]	[Backup of system settings inoperative]	1. Copy new backup file to the SD card. 2. Insert new SD card with the required files. 3. Check system settings 4. Create new backup and store in a safe place.
[011]	[One or more device descriptions copied]	Check the version of the device description and settings and correct if necessary.
[012]	[Device description not found on SD card]	Copy the required device description to the SD card. Perform a manual update of the device description.
[013]	[Device description on SD card inoperative]	1. Copy new device description to the SD card. 2. Insert new SD card with the required files.
[014]	System description copied	Check the version of the system description and settings and correct if necessary.
[015]	[System description not found on SD card]	Copy the required system description to the SD card and restart the system.
[016]	[System description on SD card inoperative]	1. Copy new system description to the SD card. 2. Insert new SD card with the required files.
[018]	[Internal file system formatted]	-
[019]	SD card: [SD card: file system faulty]	1. Format SD card and restore content. 2. Use new D-ISC 100 SD card.
[020]	[One or more device languages copied]	-
[021]	[Device language not found in system]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Run 'Update device description'.
[022]	[Device language not found on SD card]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Run 'Update device description'.
[023]	[Device language on SD card is inoperative]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Run 'Update device description'.

Code	Message	Measures
[024]	[Device language revision too low]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Run 'Update device description'.
[025]	[Setup of system language invalid]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Set desired language.
[026]	[System language set to default language]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Set desired language.
[027]	Die Gerätebschreibung auf der SD-Karte ist zu neu. [The device description on the SD card is too new. Please update the firmware]	1. Carry out a firmware update
[028]	Die Sprachdatei auf der SD-Karte ist zu neu. [The language file on the SD card is too new. [Please update the firmware]]	1. Carry out a firmware update

Table 12.1: Information

12.3 Warnings

Note: The English language version of the software display is indicated in square brackets in each case.

Code	Message	Measures
[064]	[System settings restored automatically]	Check system settings and correct if necessary.
[065]	[New (factory) system settings generated automatically]	1. Copy a valid backup of the system settings to the SD card and manually restore the backup. 2. Check system settings and correct if necessary. Add sensors if necessary. Create a backup of the system settings.
[066]	[Device description not found in system]	Copy the required device description to the SD card. Perform a manual update of the device description.
[067]	[Device description in system inoperative]	Copy the required device description to the SD card. Perform a manual update of the device description.
[068]	[Default device description not found in system]	Copy the standard device description to the SD card. Perform a manual update of the device description.
[069]	[Default device description used as device description]	Copy the required device description to the SD card. Perform a manual update of the device description.

Code	Message	Measures
[070]	[System description not found in system]	1. Check the version of the system description and settings and correct if necessary. 2. Check system for further related messages and execute measures if necessary. 3. Copy the required system description to the SD card and restart the system. Perform a manual update of the device description.
[071]	[System description in system inoperative]	1. Check the version of the system description and settings and correct if necessary. 2. Check system for further related messages and execute measures if necessary. 3. Copy the required system description to the SD card and restart the system. Perform a manual update of the device description.
[072]	[System description generated automatically]	1. Check the version of the system description and settings and correct if necessary. 2. Check system for further related messages and execute measures if necessary. 3. Copy the required system description to the SD card and restart the system. Perform a manual update of the device description.
[073]	[Clock not set]	Set the time via the system menu.
[074]	[Battery low]	Replace or insert a battery.
[075]	[Communication error (HSN)]	1. Restart the system. 2. Replace the main board.
[076]	[Communication error (RTC)]	1. Restart the system. 2. Replace the main board.
[077]	[Communication error (ADC)]	1. Restart the system. 2. Replace the main board.
[078]	[SD card missing]	Insert SD card and repeat operation.
[079]	[System temperature too high]	1. Cool system. 2. Shut-down system.
[080]	[System temperature too low]	1. Use system with extended temperature range or heat. 2. Shut-down system.
[081]	DURAG bus: [DURAG-Bus: supply voltage too high]	1. Determine and remove the cause. 2. Replace the power supply unit. 3. Replace the main board.
[082]	DURAG bus: [DURAG-Bus: supply voltage too low]	1. Determine and remove the cause. 2. Check fuse and replace if necessary. 3. Replace the power supply unit. 4. Replace the main board.

Code	Message	Measures
[083]	DURAG bus: [DURAG-Bus: load current too high]	1. Determine and remove the cause (e.g. defective sensors). 2. Reduce the load current (e.g. reduce the number of connected sensors). 3. Replace the power supply unit. 4. Replace the main board.
[084]	[Device description (Sensor) not found on SD card]	Copy the required device description to the SD card. Manually update the device description or remove and reinstall the sensor.
[085]	[Device description (Module) not found on SD card]	Copy the required device description to the SD card and perform a restart in order to integrate the expansion module into the system.
[086]	[More then one Modbus RTU module detected]	Remove excess modules from the system.
[087]	[Device language in system inoperative]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Run 'Update device description'.
[088]	[System language in system inoperative]	1. Copy the device language to the SD card or use current SD card. 2. Insert SD card. 3. Set desired language.
[089]	Die installierte Gerätebschreibungs-Datei ist zu neu. [The installed device description file is too new. Please update the firmware]	1. Carry out a firmware update
[090]	Die installierte Sprachdatei ist zu neu. [The installed device description file is too new. Please update the firmware]	1. Carry out a firmware update
[091]	[Unknown display module connected]	1. Carry out a firmware update on the D-ISC 100 2. Connect a supported display module.

Table 12.2: Warnings

12.4 Simple error

Note: The English language version of the software display is indicated in square brackets in each case.

Code	Message	Measures
[128]	[No system settings found]	1. Copy a valid backup of the system settings to the SD card and manually restore the backup. 2. Check system settings and correct if necessary. Add sensors if necessary. Create a backup of the system settings.
[129]	[System setting could not be saved]	1. Repeat changes. Save system settings if necessary. 2. Save system settings. Restart the system and run "Delete flash disc". The saved system settings are automatically restored. Check system settings and correct if necessary.

Code	Message	Measures
[130]	[System settings inoperative]	1. Copy a valid backup of the system settings to the SD card and manually restore the backup. 2. Check system settings and correct if necessary. Add sensors if necessary. Create a backup of the system settings.
[131]	[No valid system description available]	1. Copy the required system description to the SD card and restart the system. Perform a manual update of the device description. 2. Contact DURAG Service.
[132]	[System parameter inoperative]	1. Restart the system. 2. Allow DURAG Service to check and correct the system parameter. 3. Replace the main board.
[133]	[Firmware inoperative (Bootloader)]	1. Perform firmware update (bootloader). 2. Replace the main board.
[134]	[Firmware inoperative (Application)]	1. Perform firmware update (application). 2. Replace the main board.
[135]	[Communication error (EEPROM)]	1. Restart the system. 2. Replace the main board.
[136]	[SD card write protected]	Remove write protection.
[137]	[Internal file system faulty (access)]	1. Delete the file system and restore from the SD card. Firmware update if necessary. 2. Replace the main board.
[138]	[Firmware fault (Init)]	1. Perform firmware update with bootloader. 2. Replace the main board.

Table 12.3: Simple error

12.5 Critical error

Code	Message	Measures
[192]	[Internal file system faulty (Format)]	1. Delete the file system and restore from the SD card. Firmware update if necessary. 2. Replace the main board.
[193]	[Hardware fault]	1. Delete flash with bootloader and completely restore the content of the SD card. 2. Replace the main board.
[194]	[Hardware fault]	Replace the main board.
[195]	[No firmware (Application)]	1. Perform firmware update with bootloader. 2. Replace the main board.
[196]	[Hardware fault]	1. Restart the system. 2. Replace the main board.
[197]	[Hardware fault]	1. Restart the system. 2. Replace the main board.

Code	Message	Measures
[198]	[Display heater faulty]	1. Check the plug connector for the display heating in the display module. 2. Replace the display module.
[199]	[Hardware fault display module]	1. Check the wiring connection between the display module and the CPU module. 2. Replace the display module.

Table 12.4: Critical error

12.6 Messages by expansion modules (common)

For messages (code) not listed here, please use the information from the previous Sections.

Code	Message	Measures
[001]	[Startup (power on)]	-
[002]	[Startup (external reset)]	-
[003]	[Startup (watchdog reset)]	1. If a soft reset is desired, no further measures are necessary. 2. In the event of multiple, unwanted resets, contact DURAG Service.
[004]	[Startup (bod reset)]	1. In the event of multiple occurrences contact DURAG Service.
[005]	[Parameter modification stored]	-
[006]	[Simulation/function test]	-

Table 12.5: Messages by expansion modules (common)

12.7 Messages by the expansion module (analogue/ digital input/output)

For messages (code) not listed here, please use the information from the previous Sections.

Code	Message	Measures
	Simple fault (specific)	
[160]	[Current limiting (15V supply voltage)]	1. Check external wiring. 2. Check the power consumption of the connected sensors.
	Critical fault (specific)	

Code	Message	Measures
[224]	[Hardware fault]	1. Restart the device 2. Replace the main board

Table 12.6: Messages by the analogue input expansion module

Code	Message	Measures
	Critical fault (specific)	
[224]	[Hardware fault]	1. Restart the device 2. Replace the main board

Table 12.7: Messages by the analogue output expansion module

Code	Message	Measures
	Critical fault (specific)	
[224]	[Hardware fault]	1. Restart the device 2. Replace the main board

Table 12.8: Messages by the digital output expansion module

12.8 Reports via the LEDs

There are five LEDs in the area above the display. These indicate the current operating status.

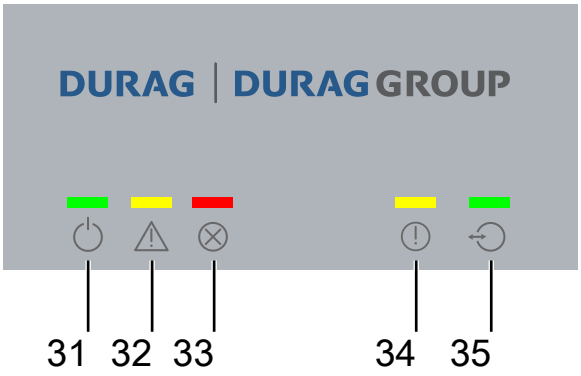


Fig. 12.1: LED assignment in the D-ISC 100 C, M, P, R

No./ colour(s)	LED	Symbol	Status	Meaning
31 green			On	• Ready for operation / in operation

No./ colour(s)	LED	Symbol	Status	Meaning
32 yellow			On	• Maintenance status for the D-ISC 100 or a connected sensor (no valid measured value is output during this period)
			Flashing	• in 1-second cycles (cycle ratio 50/50) • D-ISC 100 or a connected sensor/module has saved a message (warning/information). (A valid measured value is output during this time, but the device function may be restricted due to an internal error)
33 red			Flashing	• in 1-second cycles (cycle ratio 50/50) • Error/fault in the D-ISC 100 or a connected sensor/ module
34 yellow			Flashing	• Bus (data) error • Flashes in synchronism (at the end of the receipt frame) with the green LED (5) when a defective DURAG Modbus frame is being received.
35 green			Flashing	• Bus active • Flashes when a DURAG Modbus frame is being transmitted or received. • Flashes in synchronism with the yellow LED (4) when a defective DURAG Modbus frame is being received.

Table 12.9: Flash code meaning

13 Technical data

13.1 Technical data D-ISC 100

Inputs/outputs, D-ISC 100	Type C	Type M	Type P	Type R
Analogue outputs 4 … 20 mA, 400 Ohm, potential-free, assignment parametrisable	1	1	1	1
with expansion modules (option)	-	up to 17	up to 9	up to 17
Analogue inputs with expansion modules (option)	-	up to 16	up to 8	up to 16
Digital outputs Contact NC/NO, max. load 60 VDC/30 VAC/0.5 A potential-free, function parametrisable; typically: Maintenance, failure	2	2	2	2
with expansion modules (option)	-	up to 34	up to 18	up to 34
Digital inputs with expansion modules (option)	-	up to 32	up to 16	up to 32

Table 13.1: Inputs/outputs

Digital interfaces on the D-ISC 100	Type C	Type M	Type P	Type R
USB (service)	1 (inside the housing)	1	1 (inside the housing)	1
DURAG Modbus	1	1	1	1
Modbus RTU / RS485 (option)	1	1	1	1
Profibus DP (option)	-	1	1	1
Modbus TCP (option)	1	1	1	1

Table 13.2: Digital interfaces

Technical data for the D-ISC 100	Type C	Type M	Type P	Type R
Operating voltage	90 - 264 V~, 48 - 62 Hz			
Power consumption	200 VA	200 VA	450 VA	200 VA
IP protection class (EN 60529)	IP65		IP65 (apart from purge air inlet)	IP20
Permissible ambient temperature (operation)	-20 … +50 °C, -40 … +60 °C (option)			-20...+50 °C
(storage)	-40...60 °C			
Relative humidity	0 … 95 % RF, non-condensing			
Altitude	<2000 m			
Overvoltage category	CAT II			
Electrical connections Device connection via:				
DURAG standard plug M23	1	1	1	-
Panel jack M23 (option)	1	1	-	-

Technical data for the D-ISC 100	Type C	Type M	Type P	Type R
Possible number of top hat rail expansion modules	0	4	2	4
Dimensions (H x W x D) in mm (without cable glands and wall clips)	230x200x111	278x415x174	410x400x240	267x483x255 19“, 6 HE [U]
Diameter of attachment holes (wall clip) in mm	8	10	10	-
Weight (approx.)	5 kg	10 kg	20 kg	10 kg
Material	Aluminium, RAL 5017	Stainless steel 1.4301, RAL 5017		Aluminium, anodised
Display, status LEDs	Graphic LCD Display 120 x 92 mm, 5 LEDs for status display			
Operation	Keypad, service software D-ESI 100, incl. remote access via web interface (option), remote access via USB/Modbus RTU (option)/Modbus TCP (option)			
Conformities	• CE			

Table 13.3: Technical data

Purge air for the D-ISC 100 type P	D-ISC 100 P AB2-S6ME1-Wx	D-ISC 100 P AB2-S6ME3-Wx
Purge air quantity	Output-regulated max. 27 m³/h	Stage 1: max. 15.5 m³/h, stage 2: max. 31 m³/h
Inner duct pressure	−50 … +50 hPa	Stage 1: -20 … +50 hPa, stage 2: −50 … +50 hPa
Fan service life	40,000 hrs.	Stage 1: 20,000 hrs Stage 2: 40,000 hrs.
Purge air hose connection inner diameter	40 mm	25 mm

Table 13.4: Special technical data for the purge air blower

13.2 Connection overview

Design	Sensors	Type	M16	M20	M23	M25
D−ISC 100 P	Single sensor	Cable gland	4	5		2
D−ISC 100 M	Single sensor	Cable gland	6	8		2
	Dual sensor	Cable gland	6	7		2
		Panel jack			1	
D−ISC 100 C	Single sensor	Cable gland		6		
	Dual sensor	Cable gland		5		
		Panel jack			1	
D−ISC 100 R		Cable gland	-			

Table 13.5: Connection overview

13.3 D-ISC 100 cable type, cross-section, max. cable lengths

DURAG Modbus	
Cable type	screened
Core structure	twisted pair
Surge impedance	100 Ohm
Operational capacitance	approx. 80 nF/km
Max. segment length	up to 1000 m, depending on the chosen Baud rate
Recommended cable	e.g LiHCH (TP) 8 x 0.25mm² (halogen-free,temperature range -40..80°C, UV-resistant)

Table 13.6: Cable specification for DURAG Modbus cable

The DURAG Modbus must be connected with the surge impedance at each end (see also 15.3 Example: Setting / checking DURAG the Modbus [▶ 158])

13.4 D-ISC 100 communication settings

DURAG Modbus	
Interface	serial (RS485)
Baud rate	9600 Baud **19200 Baud (factory default)** 38400 Baud 57600 Baud
Data bits	**8 (factory default)**
Stop bits	**1 (factory default)** 2
Parity	**none (factory default)** even odd

Table 13.7: List of the DURAG Modbus communication settings

13.5 Technical data D-ISC 100 expansion modules

13.5.1 D-ISC 100 module – analogue output (analogue out)

D-ISC 100 module - analogue output (analogue out)	
Analogue outputs	4x output 4...20 mA, 400 Ohm, isolated, assignment parametrisable

13.5.2 D-ISC 100 module – analogue input (analogue in)

D-ISC 100 module - analogue input (analogue in)	
Analogue inputs	4x input 0…20 mA, 50 Ohm, zero point configurable

13.5.3 D-ISC 100 module – digital output (digital out)

D-ISC 100 module – digital output (digital out)	
Digital outputs	8x relay output, contact NC/NO, max. load 60 V⎓/30V~/0.5 A potential-free, assignment parametrisable

13.5.4 D-ISC 100 module – digital input (digital in)

D-ISC 100 module – digital input (digital in)	
Digital inputs	8x digital input, function via potential-free contact, assignment parametrisable

13.5.5 D-ISC 100 software module - Modbus RTU Slave

D-ISC 100 software module - Modbus RTU	
Address range	1…247
Preset address	**20** (factory default)
max. number of devices (bus loads) per bus segment	32

Table 13.8: Modbus RTU address setup

13.5.6 D-ISC 100 module - Profibus DP

D-ISC 100 module - Profibus DP	
Application layer	DP V0
Number of cyclical input data	64 words
Number of cyclical output data	32 words
Number of modules	4 input modules 2 output modules

D-ISC 100 module - Profibus DP	
Baud rate	9.6 kBits/s, 19.2 kBits/s, 31.25 kBits/s, 45.45 kBits/s 93.75 kBits/s, 187.5 kBits/s, 500 kBits/s, 1.5 MBits/s, 3 MBits/s, 6 MBits/s, 12 MBit/s Automatic Baud rate detection is supported
Data transport layer	PROFIBUS FDL
Restrictions	The DPV1 and DPV2 application layers are not supported

Table 13.9: Technical data D-ISC 100 module - Profibus DP

13.5.6.1 D-ISC 100 module - Profibus DP communication settings

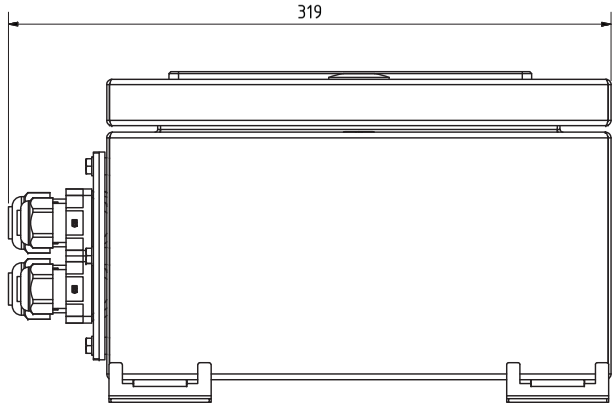
The D−ISC 100 Profibus DP (A) module uses the Modbus RTU protocol for internal communication. For flawless operation, use the factory setting for the D-ISC 100 Modbus RTU slave module communication parameters:

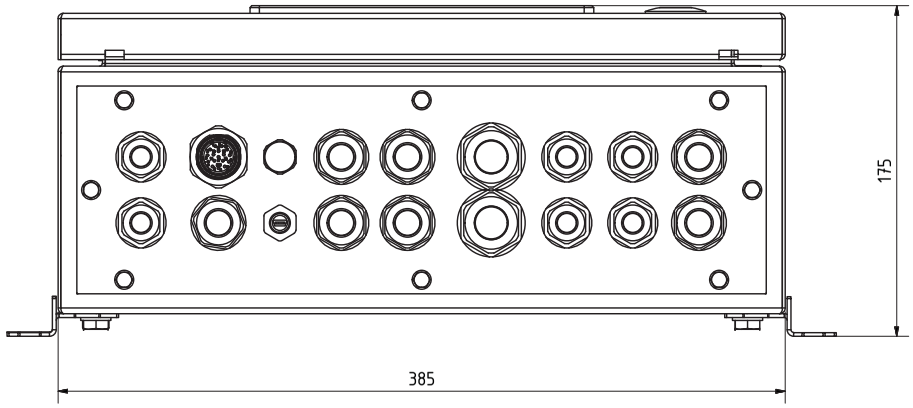
Modbus RTU communication setting (factory setting)				
Modbus address	20		Stop bits	1
Baud rate	19200		Termination	On
Parity	None			

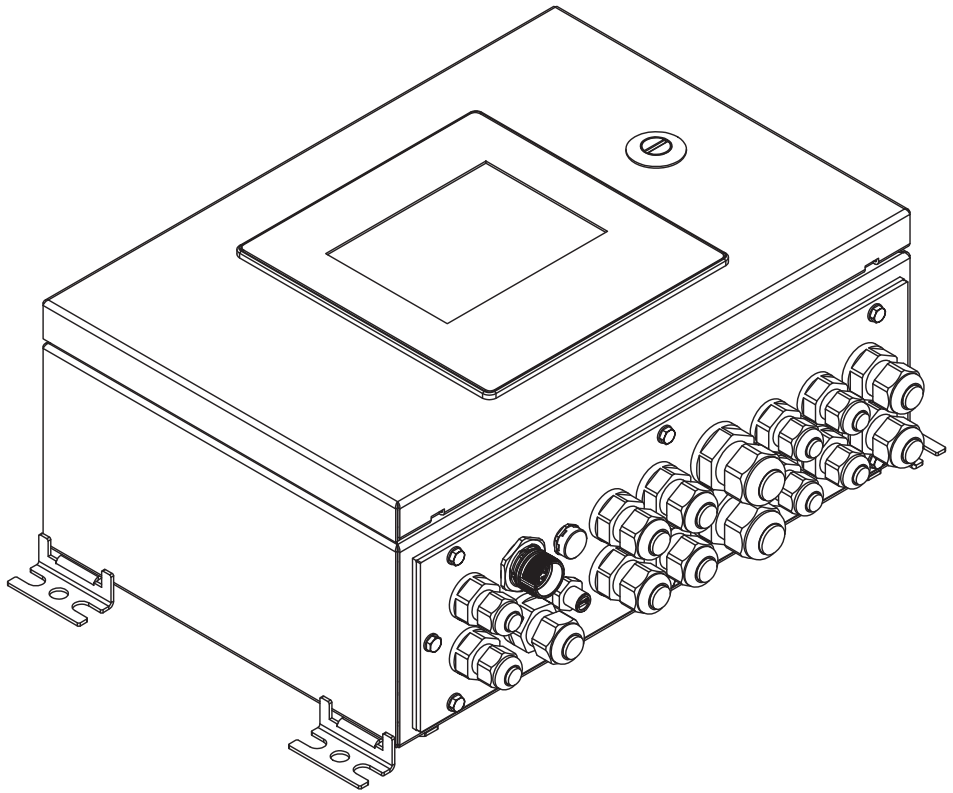
Table 13.10: Modbus RTU module factory setting communication parameters

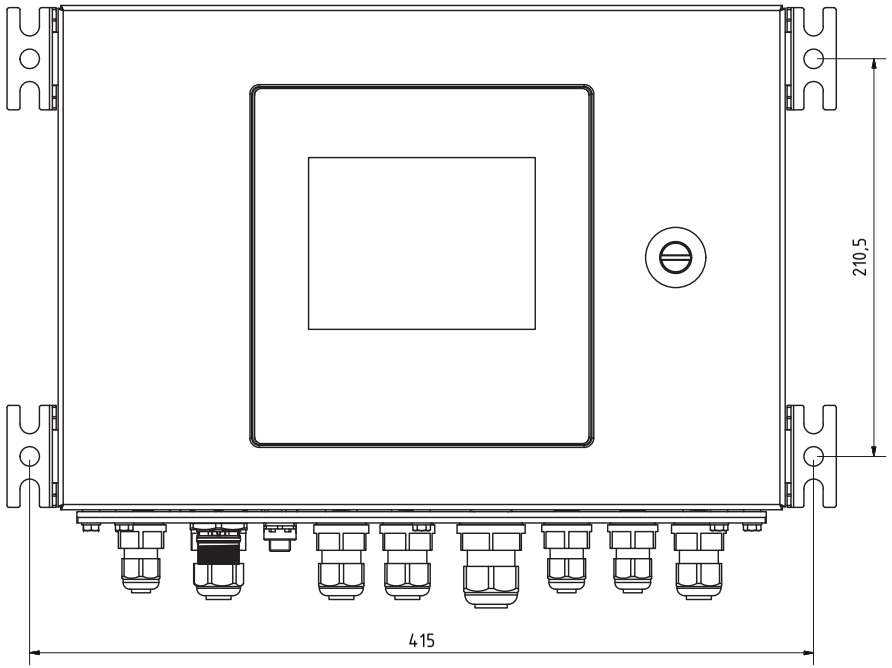
14 Dimensioned drawings

Also see about this









DURAG

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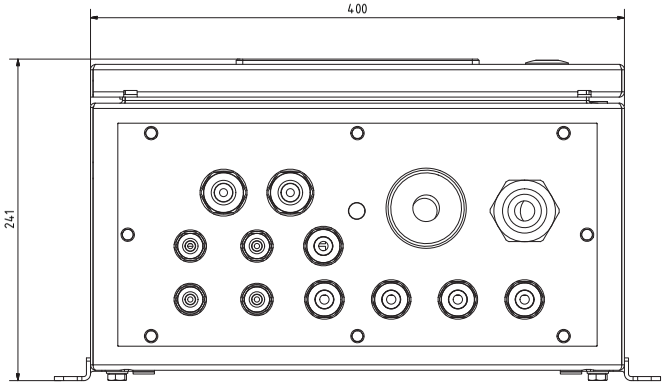
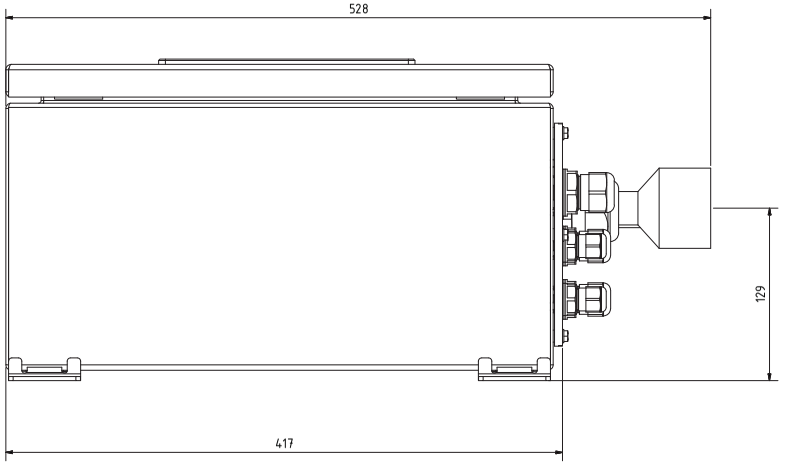
	Datum	Name
Bearb.:	11.04.2017	D. Vorrath
Gepr.:		
Freig.:		

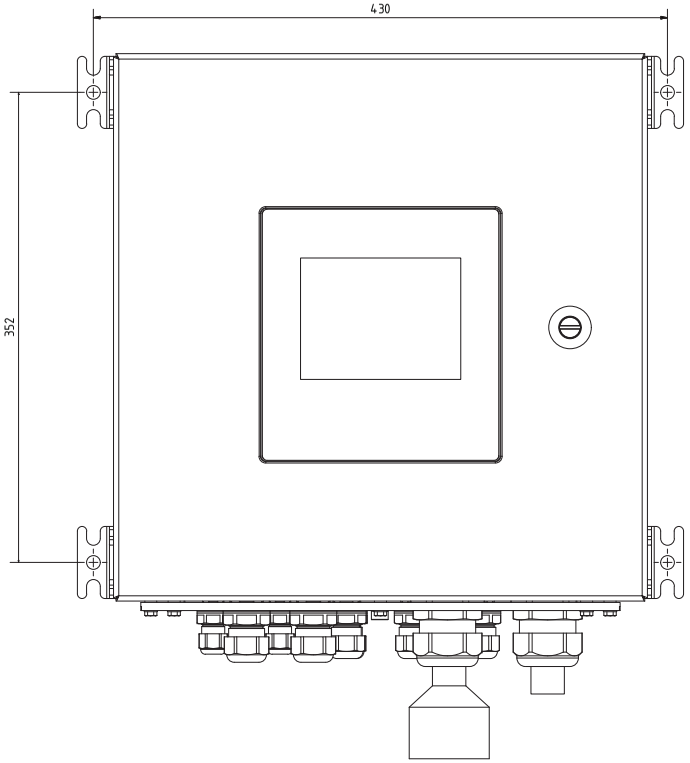
D-ISC 100M AB2-S8SFX-WA

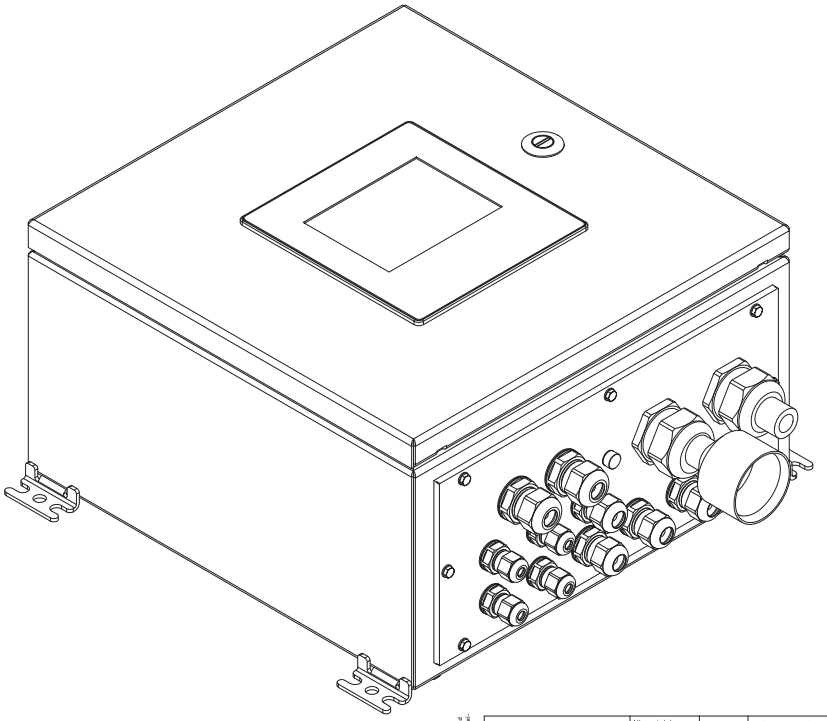
Auftr.-Nr.:	90018838_2	Revision 0	Blatt 1 A2

Ursprung: 90018838.iam









DURAG

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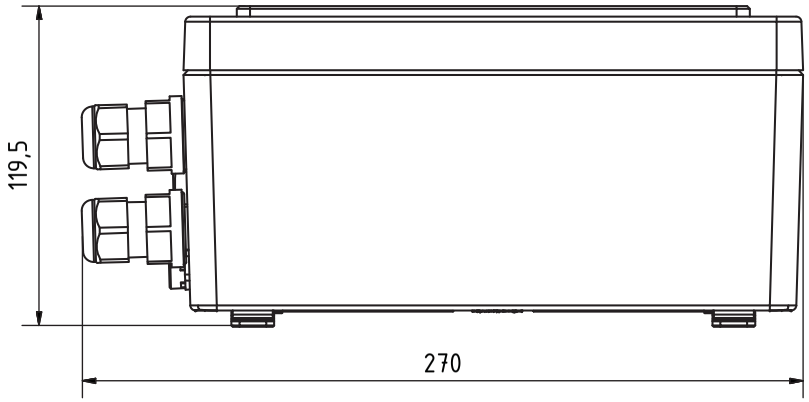
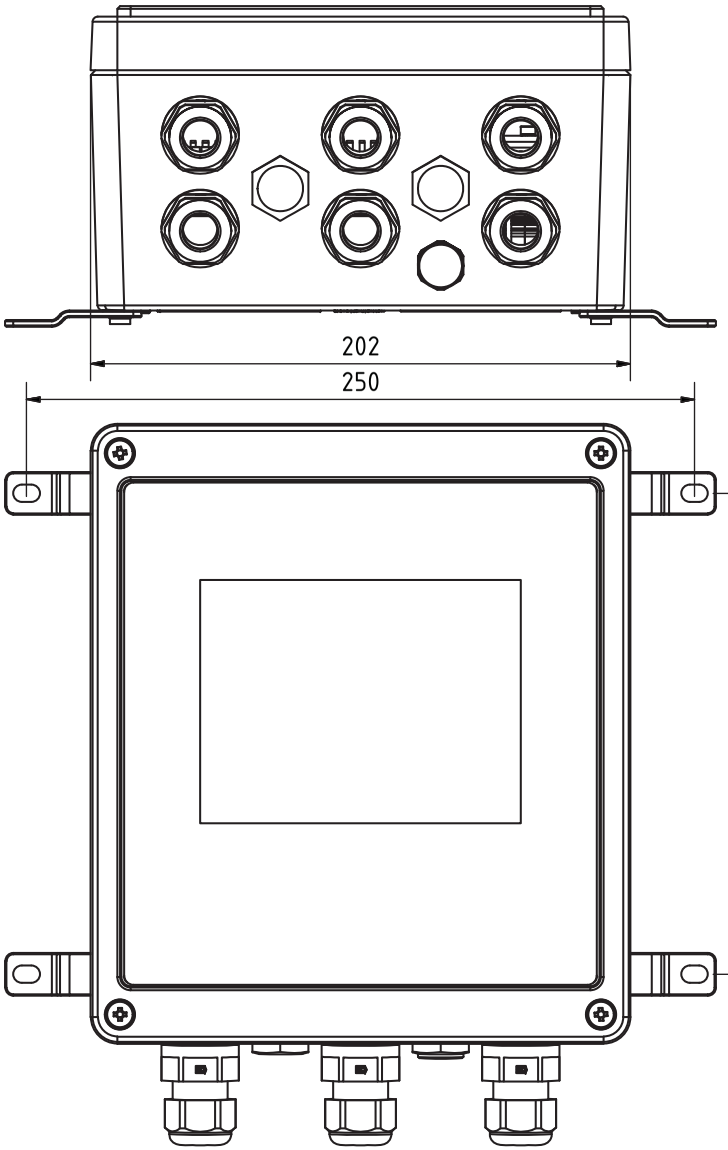
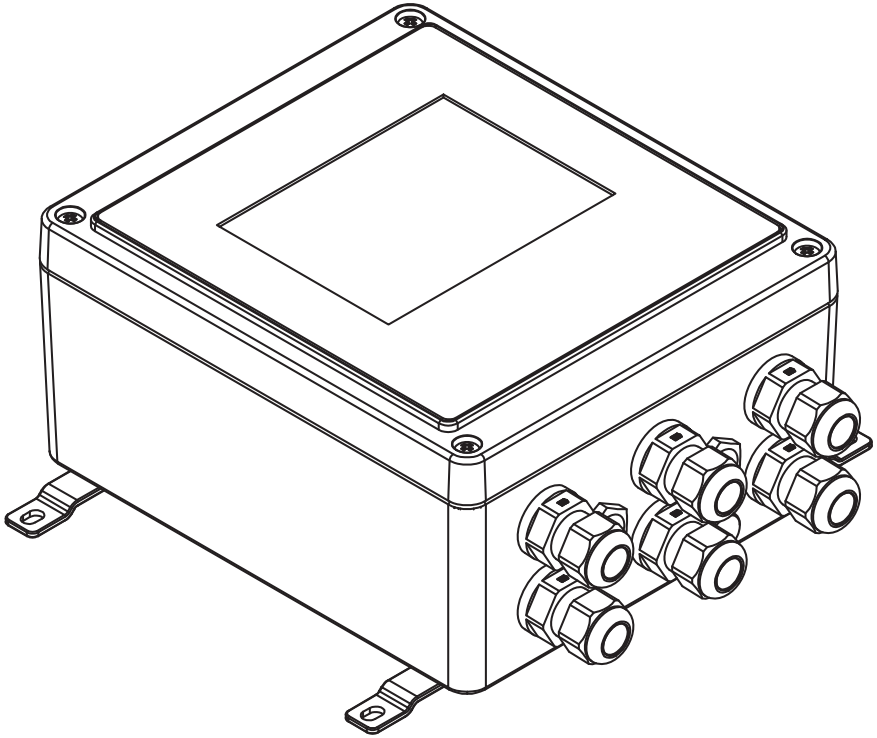
Freig.			
Auftr.-Nr.:		90017316_2	Revision 0 / Blatt 1 / A1
Ursprung: 90017316.iam			







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DURAG

Allgemeintoleranzen ISO 2768 -m	Werkstückkanten DIN ISO 13715	Maßstab: 1 : 2
		Gewicht: 8.67 kg

	Datum	Name
Bearb.:	11.04.2017	D. Vorrath
Gepr.:		
Freig.:		

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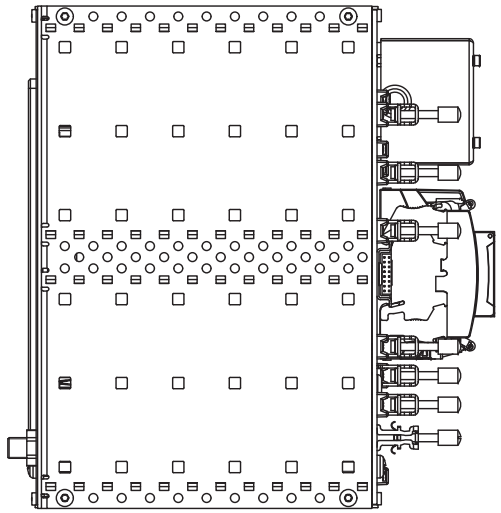
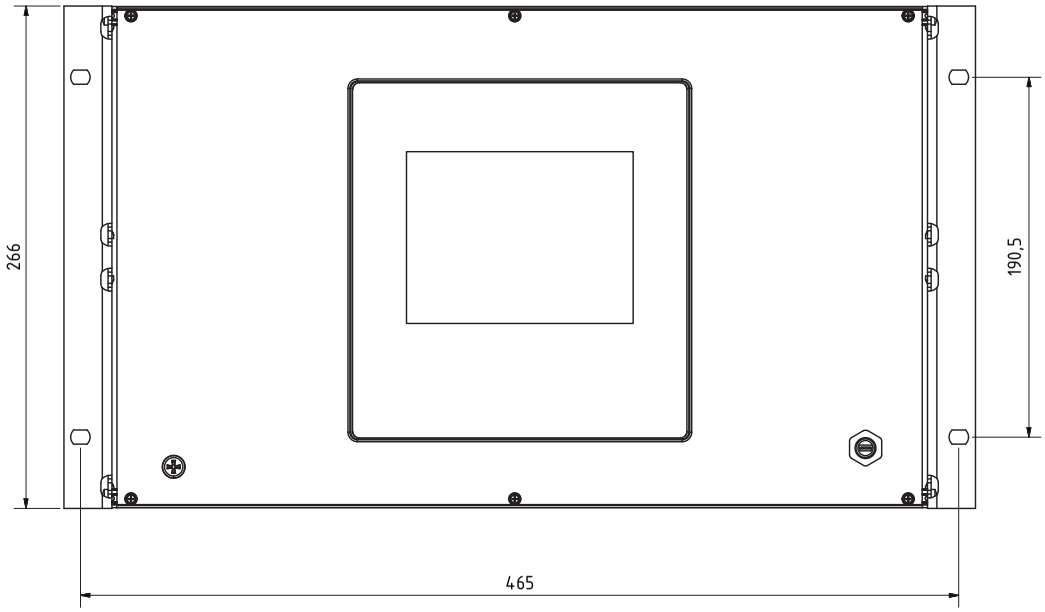
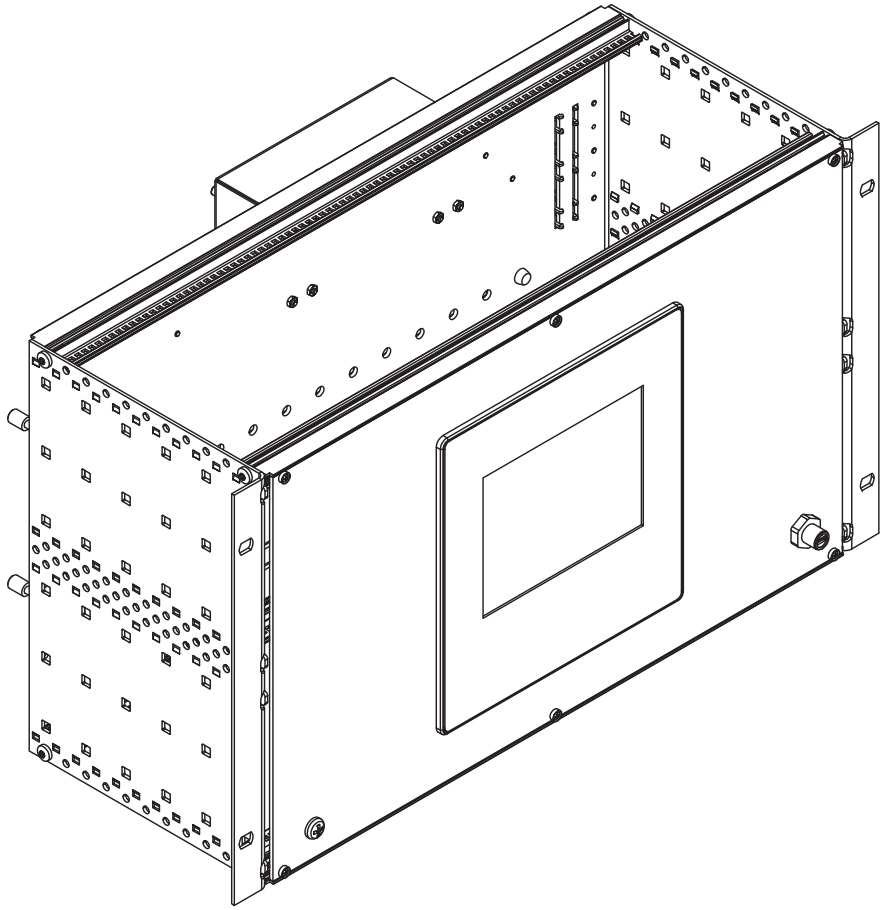
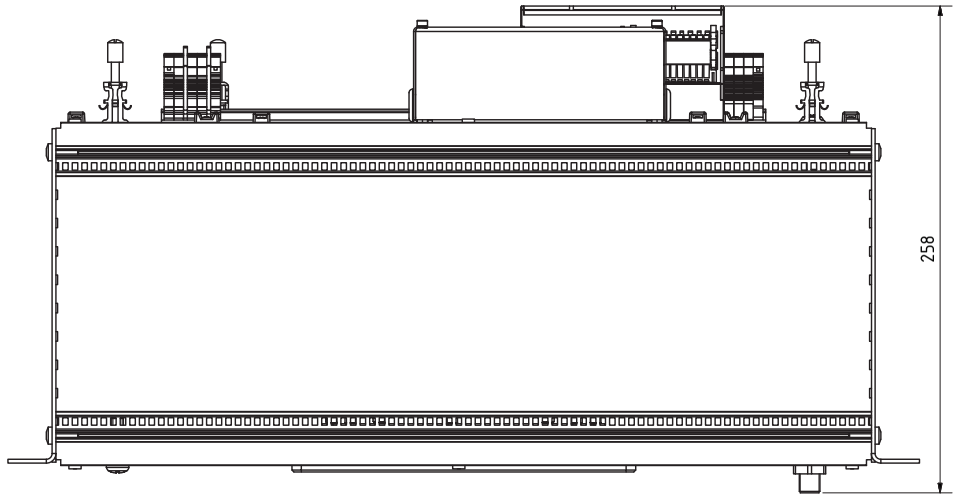
AB2-MADEX-WA

Auftr.-Nr.:	90018208_2	Revision 0	Blatt 1
Ursprung: 90018208.iam			A3









DURAG

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Gepr.:			
Freig.:			
Auftr.-Nr.:			90018762_2
Ursprung: 90018762.iam			Revision 0
			Blatt 1 A2

Gewicht: -

15 Examples of settings

In this chapter we explain by means of examples how you can make settings on the Universal control unit D-ISC 100. The examples are structured so that you can follow then step by step.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

Please note that the data presented in the examples (for instance the menu numbers: 1.1.1.3.1 or device names: D-R 220) depend on the connected devices and their individual settings. If you follow through our *examples*, because of the individual selection on your system you may see quite different data displayed.

15.1 Example: Display setup

The following *example* shows how the display can be set up. The setup relates to the composition of the ["Current Measurement display"] and the ["Measurement display after system start"□]. The contrast and backlight setting is also indicated.

Press on the pictured keys to move from one display to the next.

A		**Display: Measurement display**
M1		**Menu: Display setup**
		**[□ Current Measurement display]** Settings for the current measured value/status display
M1.1 1.1.1		**[□ Device channel]** Selection of the currently displayed measured value/status display
M1.1 1.1.2		**[□ Type and option]** Section of the measured value display format Option: Select display bar graph

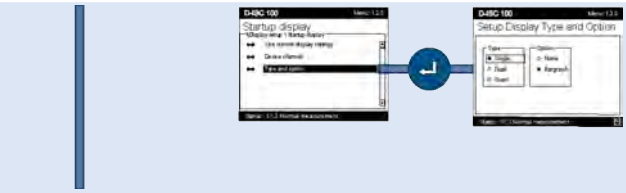
		[Measurement display after system start] Settings for the measured value/status displays to be displayed after system start.
M1.2 1.2.1		**[Use current Measurement display settings]** Current display setting is loaded and displayed after a restart
M1.2 1.2.2		**[Device channel]** Selection of the measured value/status display to be displayed
M1.2 1.2.3		**[Type and option]** Section of the measured value display format Option: Select display bar graph
M1.3		**[Contrast]** Setting of the display contrast to correspond to the operator's needs (0..100%)
M1.4		**[Back light]** Time in minutes after which the back lighting display will switch off automatically if no keys are pressed

Table 15.1: Display setup

15.2 Example: Setting/checking the time

The Universal control unit has an internal clock. The correct setting of the clock is essential amongst other things for time-based functions such as the recording of messages in the report log.

A specific desired date/time input can be saved in the device (e.g. if it is part of a system which works across more than one time zone). Once this input has been made, the D-ISC 100 regularly synchronises the time across all the connected sensors.

Parameters	Description	Language
Current date/time	Standard format: *22.08.2014 13:29*	en

Table 15.2: Setting the time

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display System setup (menu 3) Date/time (menu 3.1) = Date/time MENU 3.1

Use the arrow keys (▼▲▶◀) to set the displayed values, and save them by pressing the Enter key ():

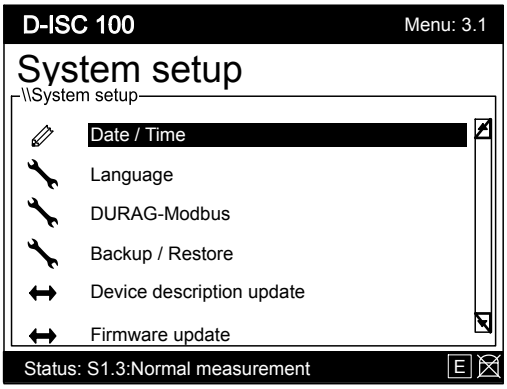


Fig. 15.1: Setting the display time

15.3 Example: Setting / checking DURAG the Modbus

In order to enable communication between the Universal control unit and the connected sensors, all components connected to the DURAG Modbus (sensors *and* the D-ISC 100) should use the same connection settings (for the serial interface).
In the first example, these settings therefore need to be checked and corrected if necessary.
In addition, (only) the two devices connected at the ends of the Modbus must be provided with a terminating resistor. One of those devices is generally the Universal control unit - D-ISC 100. Here the terminating resistor is already fitted but can be switched on or off. This setting should also be checked here and corrected if necessary

Generally the devices are pre-set with the following data:

NOTICE

Default setting (also called with factory setting or presetting) of the serial interface of current DURAG devices:

19200 Baud, no parity, 1 stop bit, bus termination active

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display System setup (menu 3) ▼ ▼ DURAG Modbus (menu 3.3)) Communication parameters (menu 3.3.1) =Communication parameters MENU 3.3.1

Use the arrow keys (▼ ▲ ▶ ◀) to set the displayed values, and save them by pressing the Enter key ():

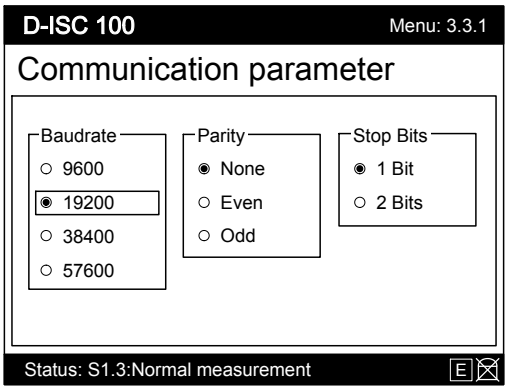


Fig. 15.2: Communication parameters menu 3.3.1

D-ISC 100 menu path:

Standard display System setup (menu 3) ▼ ▼ DURAG Modbus (menu 3.3)) Communication parameters (menu 3.3.1) ▼ Bus termination (menü 3.3.2)
= Bus termination MENU 3.3.2

Use the arrow keys (▼ ▲ ▶ ◀) to set the displayed value, and save it by pressing the Enter key ():

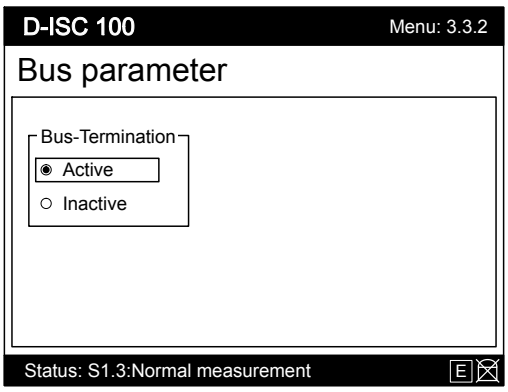


Fig. 15.3: Bus parameters menu 3.3.2

Make sure that the connected devices also have the necessary settings.

15.4 Example: Clearing the PIN protection (logging in)

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ ▼ ▼ ▼ Login/ Logout (menu 5) Login (menu 5.1)
= Login MENU 5.1.1 Name

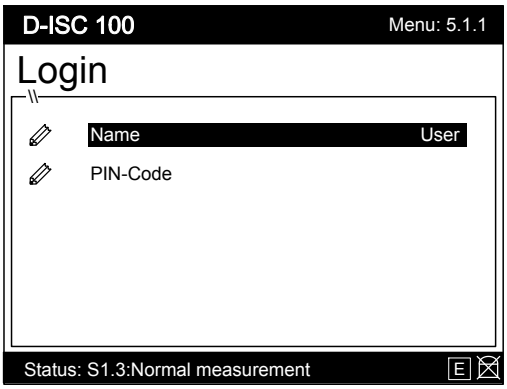


Fig. 15.4: Login menu 5.1.1

Check the name in this display. For PIN code input, it must be set to "**User**".

D-ISC 100 menu path (continued):

Name (menu 5.1.1) ▼ PIN code (menu 5.1.2)
= Login MENU 5.1.2 PIN code

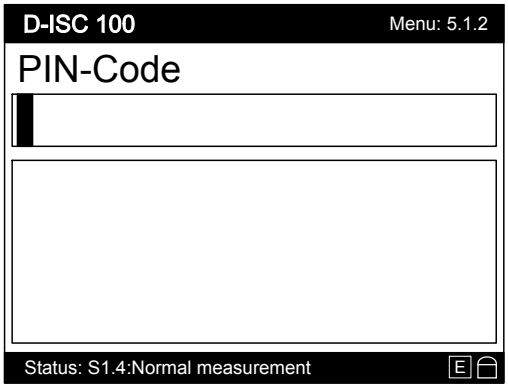


Fig. 15.5: PIN code menu 5.1.2

Enter the value PIN code here. If must consist of 4 digits in the value range 0-9.

PIN input:

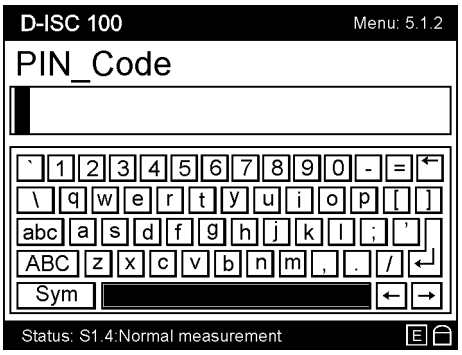


Fig. 15.6: Menu 5.1.2 with the virtual on-screen keyboard I

The arrow keys (▲ ◀ ▶ ▼) on the keypad [▶ 203] (on the device housing) can be used to select the characters on the on-screen keyboard [▶ 204] (display). The current character is shown against a black background (*in this example the space bar*).

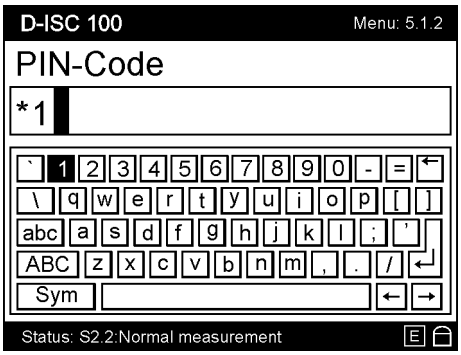


Fig. 15.7: PIN code: Menu 5.1.2 with the virtual on-screen keyboard II

Use the arrow keys to select for instance the "2". After the Enter key ↵ (keypad on the housing!) has been pressed, the "2" is loaded to the input field.

Using this method, input all four figures of the PIN code.

You can go back a step (delete the last character) by pressing the Back key (⌫) at the top right-hand side of the **on-screen keyboard.**

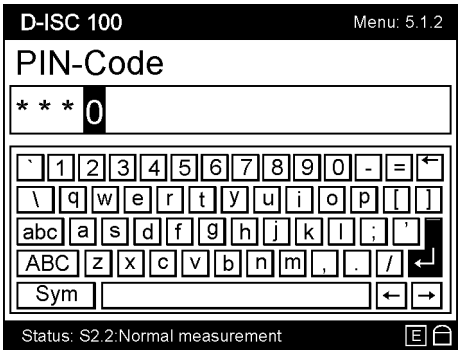


Fig. 15.8: Menu 5.1.2 On-screen keyboard with Enter key selected

If all characters have been entered correctly, send the characters (or the code when entering the PIN) to the program by pressing the Enter key on the **on-screen keyboard**. To do so, select the Enter key on the on-screen keyboard (See figure above) using the arrow keys on the **keypad**, and confirm by pressing OK.

If a valid code was input, you will receive the following message by way of confirmation, which you can close by pressing the ↵ key on the keypad.

Fig. 15.9: Display message PIN OK

The lock symbol 🔓 at the bottom right in the status display is now shown open.

Now return to the setting that you wished to change. You can now edit the data.

15.5 Example: Change PIN code

Changing the PIN code will impact on the D-ISC 100 and all of the connected sensors that use the same code. Sensors with different PIN codes (different to the one used for logging in) cannot be accessed by the system; a new code can therefore not be stored there. The previous PIN code for these sensors remains valid.

To change the PIN code, log in as described in Section 15.4 Example: Clearing the PIN protection (logging in) [▶ 159].

Confirm the message that appears

with the ↵ key.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼▼▼▼ Login/ logout (menu 5) ↵ Login (menu 5.1) ↵ Name (menu 5.1.1) ▼ PIN-Code (menu5.1.2) ↵
(*Enter your PIN-Code:* ↵ *If Login successful:* ↵)
= Login MENU 5.1.2 **ESC** Logout (menu 5..1) ▼ PIN-Code change (menu 5.2) ↵
PIN-Code change menu 5.2.1
= PIN-Code change MENU 5.2.1

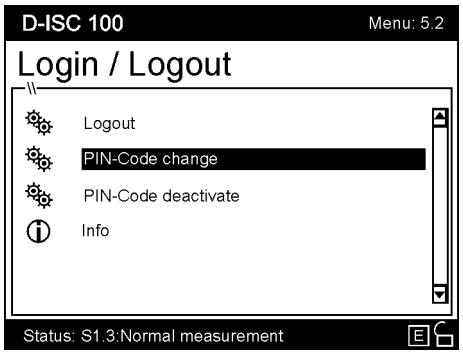


Fig. 15.10: Login/logout menu 5.2

Pressing the ↵ will take you to the input screen for the new PIN code.

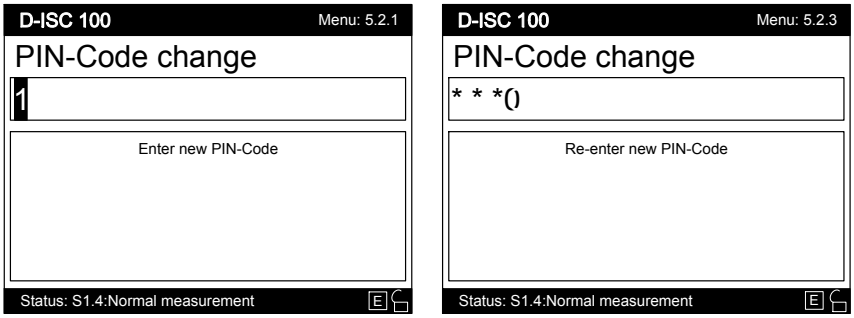


Fig. 15.11: PIN code menu 5.2.1/5.2.3

Enter the new PIN code here. If must consist of 4 digits in the value range 0-9.

Information on how to enter the PIN is provided in Section 15.4 Example: Clearing the PIN protection (logging in) [▶ 159] under **PIN input**.

After entering the 4th digit, confirm by pressing the ◉ key. As usual, you will be requested to enter the new code again for safety reasons.

Don't forget to memorise or note down the new code.

- Without a valid PIN code, you will no longer be able to change sensitive parameters.
  This applies to both the Universal control unit and the connected sensors with the same PIN.
- If you do forget your PIN code, the DURAG Service department will be happy to help. You can find the addresses and telephone numbers on page [▶ 211].

Once you have changed your PIN code, a list will be displayed of all of the devices logged into the D-ISC 100. There will be a tick (✓) next to all of the devices that can now be enabled using the new PIN code (see figure below). There will be a cross (✕) next to devices that have not had their PIN codes changed.

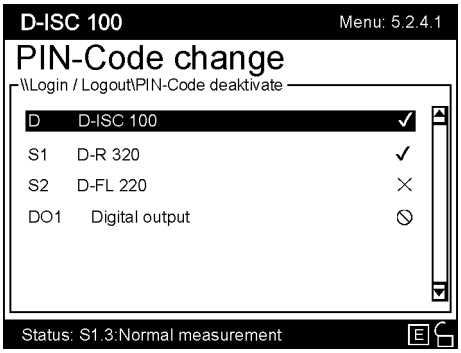


Fig. 15.12: List of devices for which the PIN code has been changed

If the PIN code has not been changed successfully, the device will continue to be protected against any unintentional changes. The old, previous PIN code remains valid for the device!

15.6 Example: Deactivate PIN lock

To deactivate the PIN code, log in as described in Section 15.4 Example: Clearing the PIN protection (logging in) [▶ 159].

Confirm the message that appears

with the ↵ key.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼▼▼▼ Login/ logout (menu 5) ↵ Login (menu 5.1) ↵ Name (menu 5.1.1) ▼ PIN-Code (menu5.1.2) ↵
(*Enter your PIN-Code:* ↵ *If Login successful:* ↵)
= Login MENU 5.1.2 **ESC** Logout (menu5..1) ▼▼ PIN code deactivate (menu 5.3) ↵
= PIN code change MENU 5.3.1

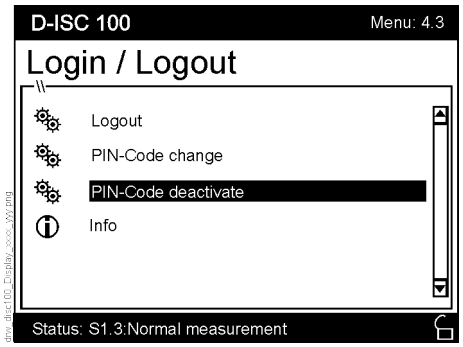


Fig. 15.13: Deactivating the PIN lock I

Pressing the ↵ key deactivates the PIN code (without any additional queries or inputs).

Once you have deactivated your PIN code, a list will be displayed of all of the devices logged into the D-ISC 100. There will be a tick (√) next to all of the devices for which the PIN code has been deactivated (see figure below).

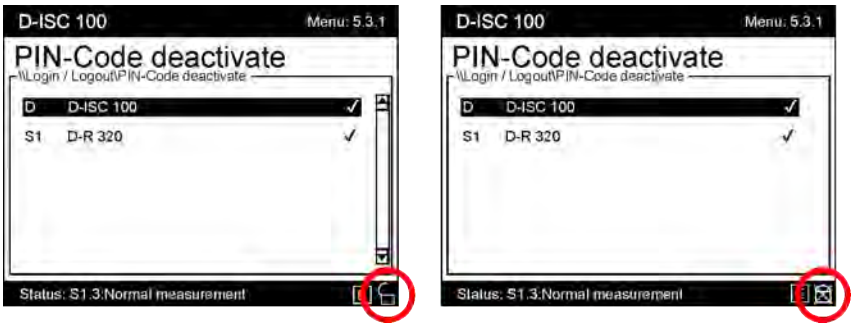


Fig. 15.14: Deactivating the PIN lock II

The display of the PIN protection status (see figure above; circled section in the status line) will change after the D-ISC 100 has reported deactivation of the PIN protection.

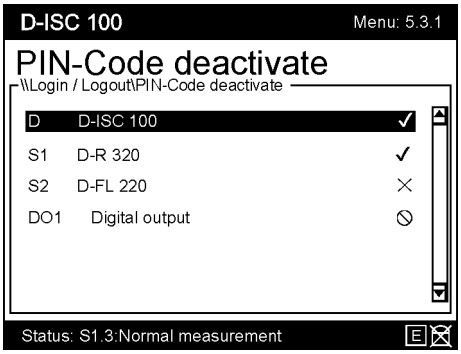


Fig. 15.15: Deactivating the PIN lock III

There will be a cross (⊗) next to all of the devices for which the PIN code has not been deactivated (see figure above for D-FL 220).

If the ⊘ symbol is shown, then the device does not have any internal PIN protection (e.g. modules).

If the PIN code has not been changed (deactivated) successfully, the device will nevertheless continue to be protected against any unintentional changes. The old, previous PIN code will remain valid!

15.7 Example: Adding a sensor

When a sensor is connected to the D-ISC 100 for the first time, it must be "registered" to the system. This is done using the keypad and the display.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display Channel Setup (menu 3) ▼ Sensor (S) (menu 3.2)
(Sx) Add/remove Sensor Addr. (MENU 3.2.1) = Add/remove sensor MENU 3.2.1

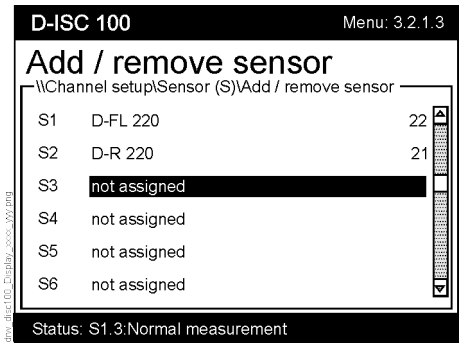


Fig. 15.16: Add/remove sensor menu 3.2.1.3 I

Select a free (not assigned) sensor channel (*here S3 ≙ menu 3.2.1.3*) and confirm with ⏎.

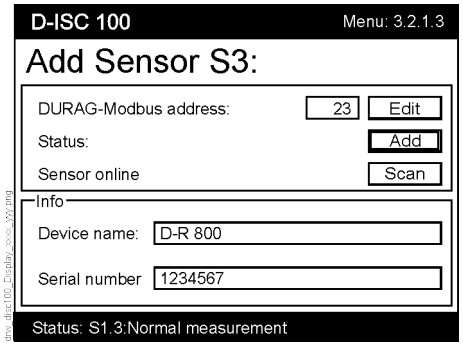


Fig. 15.17: Add sensor menu 3.2.1.3 II

Edit

Use the arrow keys on the keypad (▶◀▼▲) to navigate to the "Edit" button and activate the manual address input by pressing the ⏎ key. Now if you know the device address, input it into the address field. Otherwise: see "Scan" below.

The input is made using the arrow keys (▶◀▼▲) and the ⏎ key (keypad on the housing). For ease of input, you can also use the key to open a "virtual keyboard".

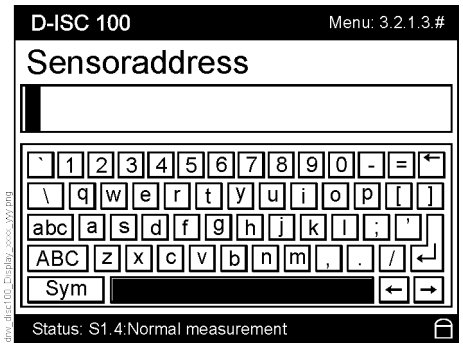


Fig. 15.18: Sensor address menu 3.2.1.3.# with virtual on-screen keyboard

Use the arrow keys (▶◀▼▲) (keypad on the housing) to navigate between the keys of the virtual keyboard. The current character is shown against a black background (*in this example the space bar*).
You can go back a step (delete the last character) by pressing the Back key (⏎) at the top right-hand side of the virtual keyboard.

Once all characters have been entered correctly, confirm the code by pressing the Enter key on the **virtual keyboard** (see figure below). To do so, select the Enter key on the virtual keyboard and press the ↵ key on the **keypad** on the housing.

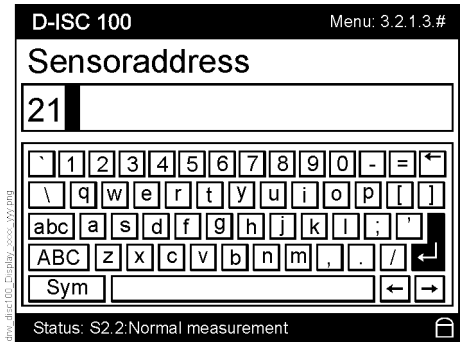


Fig. 15.19: Sensor address menu 4.2.1.S3.# On-screen keyboard Enter key

If a sensor is found at the specified address, the D-ISC 100 will show the information read out there (device name and serial number) in the info area of the display. The new sensor is then selected by using the arrow keys on the keypad ▼▲ to press the "Add" button. Confirming the selection with the ↵ key adds the sensor to the list.

Scan

If the device address is not recognised, the D-ISC 100 can also search for it. When doing this, the address range (1-247) is scanned. If the address has already been specified as 100, the range 100 to 247 will be scanned. The scanning operation may take a few minutes.

Use the arrow keys on the keypad (▼▲) to move to the "Scan" button, and activate the automatic search by pressing the ↵ key. A found sensor is displayed. The D-ISC 100 waits for the user's response during the scan. The new sensor can be added to the list by pressing "Add" once it has been selected. The detected sensor may already be available. By way of assessment, compare the DURAG Modbus addresses and the displayed serial numbers. Selecting the "Scan" button and then pressing the ↵ key again continues the search (without loading the sensor).

In the "Info" area in the lower part of the display, the data read from the respective sensor is displayed against the sensor name and serial number.

Press the **ESC** key to return to the standard display (it may be necessary to press it several times).

15.8 Examples: Parameterising sensors

The D-ISC 100 allows sensors to be parameterised in a similar way to parameterising with the software D-ESI 100. In order to parameterise a connected sensor via the D-ISC 100, the sensor in question will need to have been recognised by the D-ISC 100 (see 15.7 Example: Adding a sensor [▶ 165]). Similarly to the procedure for parameterising using the software D-ESI 100 [▶ 203], a distinction is made between specific and common parameters.

15.8.1 Sensor: Common parameter

NOTICE

The parameters (also called "Common parameters") whose settings are to be edited are (in certain cases) device-dependent and the scope and content can vary between devices!

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (select the desired sensor if necessary ▶ ◀) ⏎ (e.g. menu 4.2. S1.1) ▼ ▼ ▼ ▼ Common parameter (e.g. menu 4.2. S1.5) ⏎ = MENU 4.2.S1.5.1

The ["Device information"] menu item allows the information about the device (such as manufacturer, serial number etc.) to be read.

Selecting the ["Bus information"] menu item allows the Modbus settings (such as address, date/time, communication settings) to be changed.

The ["Variable setup"] menu item allows the variables for the individual measurement channels of the sensor to be set up.

For parameterisation of the measurement channel, select the "Variable setup" menu item:

D-ISC 100 menu path:

Current display: MENU 4.2.S1.5.1 ▼ ▼ Variable setup (menu 4.2. S1.5.3) ⏎
= MENU 4.2.S1.5.3.1

Select the measurement channel to be parameterised ▼ ▲:

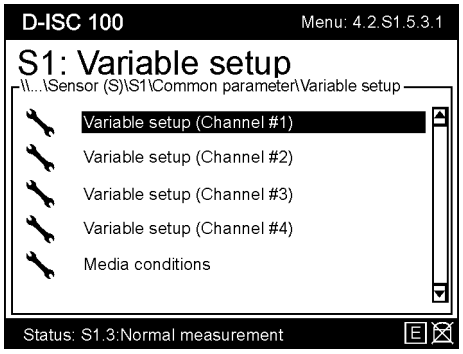


Fig. 15.20: Menu 4.2.S1.5.3.1 (example)

Setting the parameters displayed in the menu ▼ ▲:
As required; underneath the displayed and selected (▼ ▲) parameter.

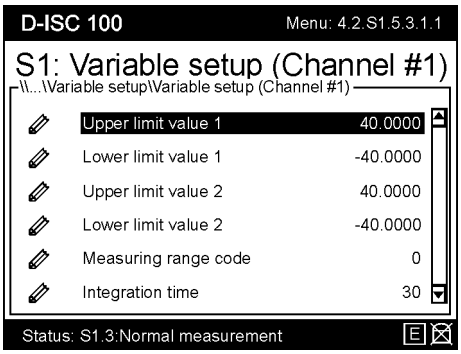


Fig. 15.21: Menu 4.2.S1.5.3.1.1 (example)

While editing parameters:

- The entry is temporarily loaded into the device by pressing the OK key.
- The entry is discarded by pressing the ESC key.

The change will be loaded from the temporary to the permanent device memory on return to the measured value/status display.

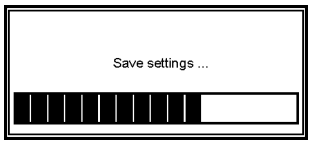


Fig. 15.22: Message when saving

15.8.2 Sensor: Specific parameter

NOTICE

The parameters ("Specific parameters") whose settings are to be edited are device-dependent and the scope and content may vary depending on the device!

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (select the desired sensor if necessary ▶ ◀) ↵ (e.g. menu 4.2. S1.1) ▼ ▼ ▼ ▼ ▼ Specific parameter (e.g. menu 4.2. S1.6) ↵
= MENU 4.2.S1.6.1

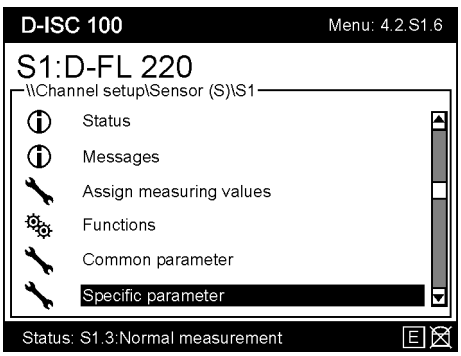


Fig. 15.23: Menu 3.2.S1.6

The contents of the ["Specific Parameter"] menu item is heavily dependent upon the connected devices, their functions and the set parameters.

Parametrisation is performed similarly to parametrisation using the software D-ESI 100 [▶ 203]. The specific settings for each sensor are adjusted individually in the [Specific Parameter] menu.

Details can be found in the respective device manuals.

While editing parameters:

- The entry is temporarily loaded into the device by pressing the OK key.
- The entry is discarded by pressing the ESC key.

The change will be loaded from the temporary to the permanent device memory on return to the measured value/status display.

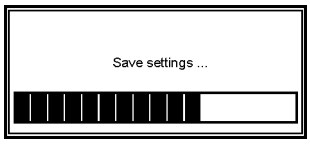


Fig. 15.24: Message when saving

15.9 Examples: Selection of the displayed data

As previously mentioned in the Chapter 5.2.2 Display of measured values and status [▶ 67], the display of the Universal control unit is configurable. The two following chapters give the necessary information using an example.

15.9.1 Example: Selection of the displayed measurement channel

The measurement channel whose measured values are to appear in the current display (standard display) for the Universal control unit can be selected using the keypad and the menu.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ Display setup
Current measurement display (menu 2.1) Device (menu 2.1.1)
= Device MENU 2.1.1.xx ▼/▲

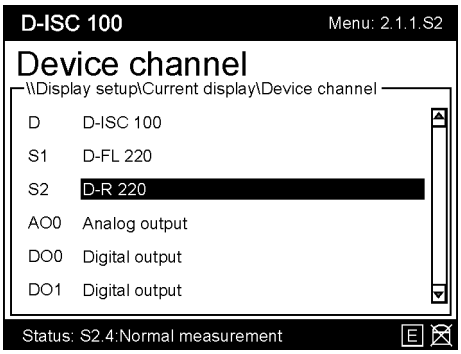


Fig. 15.25: Device channel menu 2.1.1.S2

In the displayed list, the currently highlighted device is the one from whose measured value display you have accessed the menu 2. Select one of the displayed devices from the list (example Fig. 15.25) using the arrow keys (▼▲▶◀) and confirm the selection with the Enter key (↵).

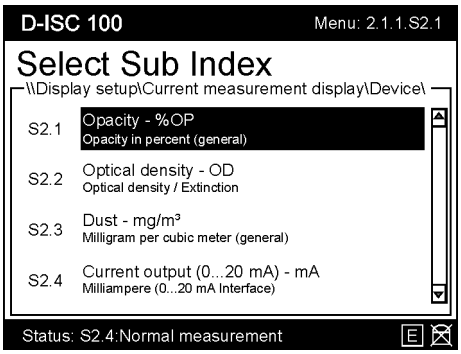


Fig. 15.26: Select Sub Index menu 2.1.1.S2.1

From the displayed list (example Fig. 15.26 , select the desired measurement channel (arrow keys ▼▲▶◀) and confirm the selection by pressing the ↵ key.

The D-ISC 100 loads the selection and skips back to the "Current measurement display" menu (2.1.1).

15.9.2 Example: Selection Number of the displayed measurement channels

The D-ISC 100 allows for the display of one, two or four measurement channels per device output. The setting can be performed either using the menu or by pressing the key while *simultaneously* pressing the up ▲/down ▼ arrow key. The setting by means of the menu is described below.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (e.g. S1.1) User mode (menu 1) ▼ Display setup ↵
Current measurement display (menu 2.1) ↵ Type and option (menu 2.1.2) ↵
= Setup Display Type and option MENU 2.1.2

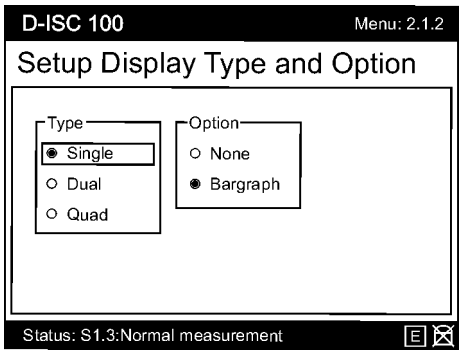


Fig. 15.27: Example display 2.1.2

Select the desired display type (arrow keys ▼ ▲ ▶ ◀) and confirm the selection by pressing the ↵ key.

For the "Single" display type: Displays 1 measurement channel/ device output in each case.
Additional channels can be displayed in the measured value display using the up/down arrow keys (▼ ▲).

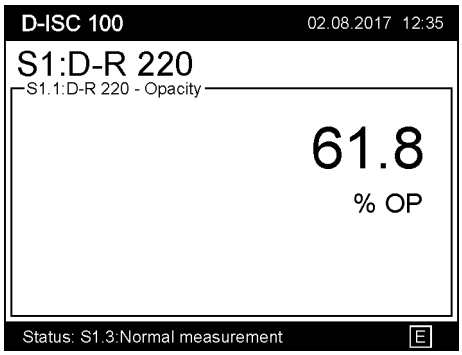


Fig. 15.28: Displaying a single measurement channel

For the "Dual" display type: Displays 2 measurement channels/ device output in each case.
Additional channels can be displayed in the measured value display using the up/down arrow keys (▼ ▲).

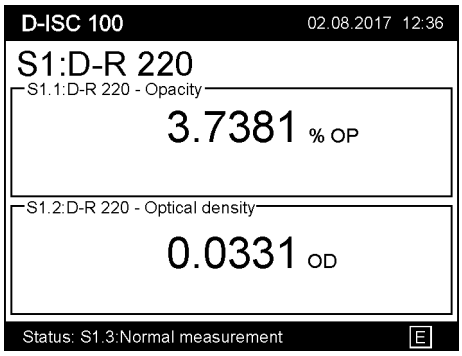


Fig. 15.29: Displaying a dual measurement channel

For the "Quad" display type: Displays 4 measurement channels for one output.

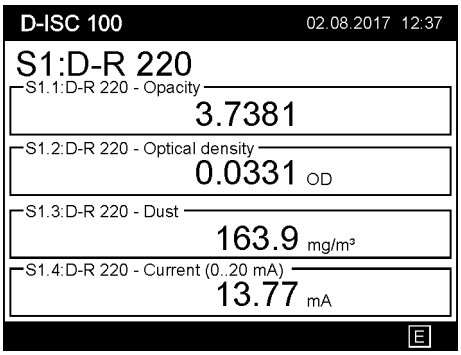


Fig. 15.30: Displaying a quad measurement channel

The measured values for the display types "Single" and "Dual" can display a bar graph *in addition to* the displayed numeric values. To do this, the option "bar graph" must be selected in the display menu.

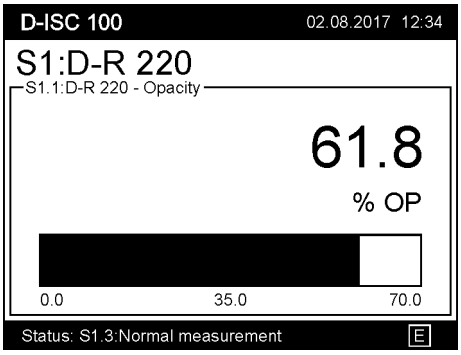
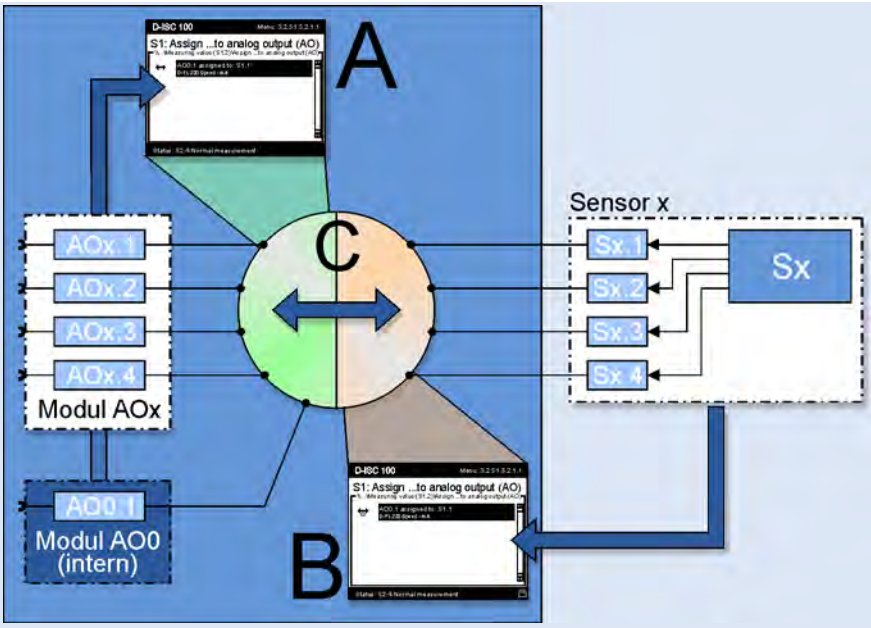


Fig. 15.31: Displaying a single measurement channel with bar graph

15.10 Examples: Assignment of the analogue output (current output)

The D-ISC 100 has *one* (internal) 4…20 mA analogue output. Up to 4 additional expansion modules can be incorporated, each with 4 analogue outputs. Each current output can be assigned to one of the four measurement channels for a sensor (module configuration, method A). The output value of the measurement channel is output at the assigned current output.



Method A		Method B	
A	Configuration of the analogue output via the module configuration (M)	B	Configuration of the analogue output via the sensor configuration (S)
C	Any link from the analogue outputs of the modules AOx1 … AOx4 to the channels of sensors Sx.1 … Sx4; multiple assignment of an analogue output to various sensor channels is not permissible and not possible.	C	Any link from the channels of measuring device Sx.1 … Sx4 to the analogue outputs of modules AOx1 … AOx4; multiple assignment of a sensor channel to various analogue outputs is possible.

Table 15.3: Setting methods

Another option for the assignment is via the measuring device configuration (method B). In this case a sensor, or more precisely a measurement channel for the sensor, is assigned to one (or also several) current output(s).

The options for the settings are shown in [▶ 173]. Method A is the configuration of the analogue output via the configuration of the module. Method B shows the configuration of the analogue output via the configuration of the sensor (measurement channel). C shows the linking options between the sensor channel (Sx) and the analogue output (AOx). Each point on the left hand side of the circle can be linked to any point on the right hand side, and vice versa.

Method A

Assignment of the measurement channel (sensor) to the analogue output

The keypad and menu can be used to select the sensor (S) and one of its four measurement channels (S1.1 … S1.4), whose output value is to be assigned to the D-ISC 100 current output.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ (menu 4) [Channel setup] ↵
[Channel setup] (menu 4.1) ▼▼ ↵ (menu 4.3.1)
e.g. ▼▼ [Analogue output] (menu 4.3.AO0 internal) ↵
(menu 4.3.AO0.1)
▼ [Assign source measuring values] (menu 4.3.AO0.2) ↵
= AO0.1 assigned to …MENU 4.3.AO0.2.1

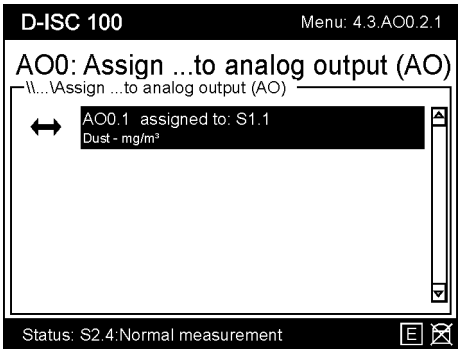


Fig. 15.32: AOx assignment I

Press the ↵ key.

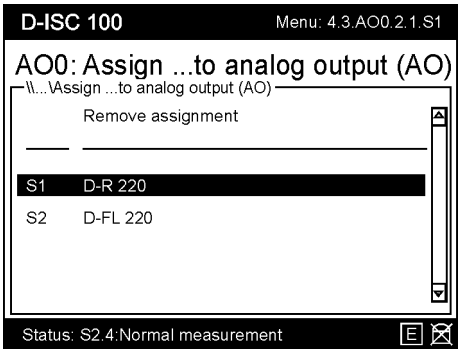


Fig. 15.33: AOx assignment II

In this menu, a selection list is displayed, from which an entry can be selected using the arrow keys (▼▲).

The selected entry can be opened by pressing the ↵ key:

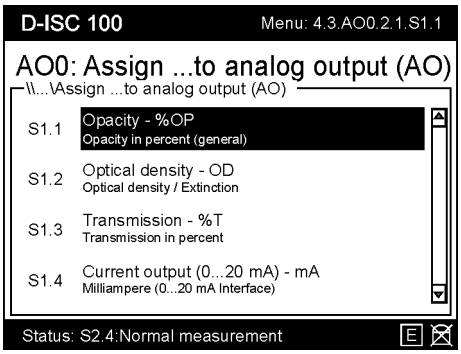


Fig. 15.34: AOx assignment III

Use the arrow keys (▼▲) to select an entry from the list shown above. The assignment of an entry is performed by pressing the ↵ key. This

- Saves the setting,
- Updates the display and

- Outputs the selected sensor channel at the analogue output.

Method B

Assignment of analogue output to sensor channel

The sensor channel whose output value is to be output at the D-ISC 100 current output is firstly selected. The analogue output (AOx) providing this output value must then be assigned.

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ (menü 4) [Channel setup] ↵
(Channel setup menü 4.1) ▼ (menu 4.2) Sensor (S) ↵
(menu 4.2.1) e.g. ▼ (S1 D-R 220) ↵ (menu 4.2.S1.1) ▼▼
[Assign measuring values] ↵
= S1:Assign measuring values MENU 4.2.S1.3.1

In this menu, a selection list is displayed, from which an entry (sensor channel) can be selected using the arrow keys (▼▲). The menu address firstly displayed here is, for example: Menu 4.2.S1.3.1.
A sensor channel can be selected (▼▲) and confirmed by pressing the ↵ key. In the following menu, the previously selected sensor channel (menu 4.2.S1.3.1…4) is now linked to the desired analogue output (▼▲ and ↵) under the entry [Assign … to analogue output (AO)] (e.g. 4.2.S1.3.1.1).
The analogue OUT interfaces that are present and configured within the system are listed there (in the example below, the list consists of only a single entry).

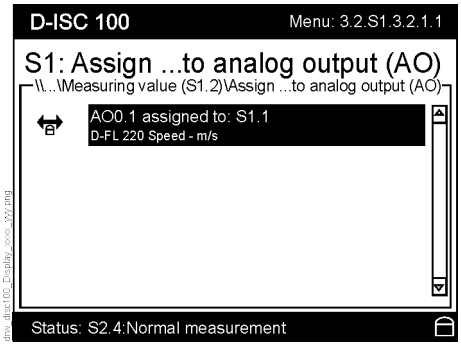


Fig. 15.35: Menu 4.2.S1.3.1.1.1

The assignment of the selected entry is performed by pressing the ↵ key. This

- Saves the setting,
- Updates the display and
- Outputs the selected sensor channel at the analogue output.

There is also a short method for setting the analogue output:

- Use the arrow keys in the measured value display to call up the analogue output.
- Press the ↵ key to access the configuration (*in the menu for the menu address first displayed, e.g.:* menu 4.3.AOx.1).
- ▼ [Assign source measuring values] ↵

After the analogue output has been set, the signal range (15.10.1 Example: Setting the signal range [▶ 177]) for the analogue output must then be defined.

15.10.1 Example: Setting the signal range

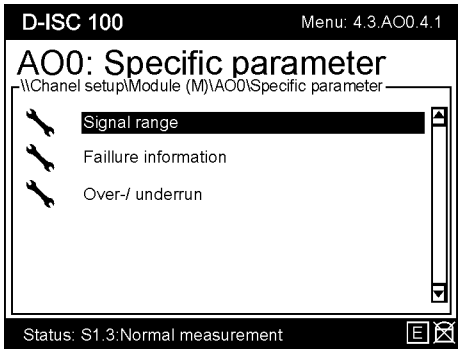


Fig. 15.36: Analogue output, specific parameter

General points regarding the signal range

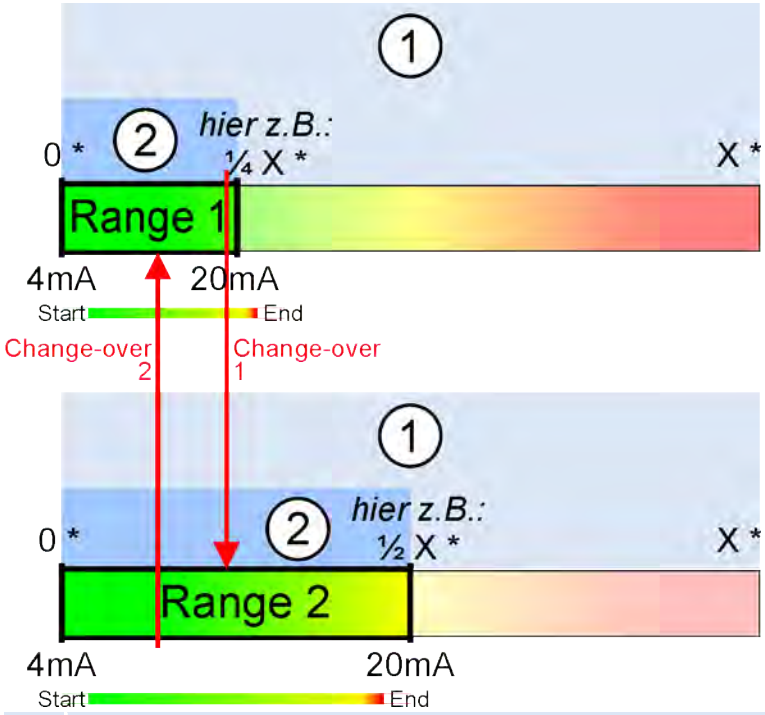
The D-ISC 100 provides two output ranges for each analogue output. As a rule, it is sufficient to specify *one* output range within the signal range for the measured value of the assigned sensor.

In order to ensure that the measured value outputs from the control cycles of the sensor also lie securely within the output range, for example, the signal ranges of the sensor and of the Universal control unit (analogue output) must be set to identical values.

	Exclusive use of signal range 1
1	Maximum signal range * (signal range [▶ 204])
2	Adjusted output range (here 75 *, possible setting 0 … x *) dependent upon the sensor
*	(e.g. %OP, scattered light, extinction, %transmission, gas velocity) dependent upon the sensor

Fig. 15.37: Ranges

In special cases a second output range may also be specified for a measured value. If a specified value is exceeded in the first output range, the D-ISC 100 changes over to the second output range. If the current measured value then falls below another previously specified value, the D-ISC 100 will switch back to the first output range.



	Use of signal ranges 1 and 2 (automatic change-over)
1	Maximum signal range * (signal range [▶ 204])
2	Adjusted output range (here ¼ or ½ x*, possible setting 0 … x *) dependent upon the sensor
*	(e.g. %OP, scattered light, extinction, %transmission, gas velocity) dependent upon the sensor

Fig. 15.38: Automatic range change-over

Example 1

(X = maximum signal range = 100% OP)

In our example from Fig. 15.38 , the end value in the first output range is set to 25% opacity (¼X). If for instance 22% opacity is exceeded when range 1 is active and the change-over 1 is set to 22, the system changes over to output range 2. Here the output range end value is set to 50% opacity (½X). If the measured value now falls below 15% opacity when range 2 is active and the change-over 2 is set to 15, the system changes back to output range 1.

Example 2

(X = maximum signal range = 40 m/s)

In our example from Fig. 15.38 , the end value in the first output range could be set to 10 m/s gas velocity (when linked to an appropriate sensor). If for instance 8 m/s gas velocity is exceeded when range 1 is active and the change-over 1 is set to 8, the system changes over to output range 2. Here for instance the range end value is set to 20 m/s gas velocity. If the measured value now falls below 5 m/s gas velocity when range 2 is active and the change-over 2 is set to 5, the system changes back to output range 1.

The adjustable values for the start and end values of the output range (signal range) are *not* % values! Rather the values relate to the physical unit of the measured value.

Setting the signal range

Here also there are two methods of performing the setting. This example describes only the setting of the signal range by accessing the analogue output (≙ method A in Section 15.10 Examples: Assignment of the analogue output (current output) [▶ 173]).

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ Channel setup (menu 4) ◉ Channel setup (menu 4.1) ▼▼◉ Modules (M)(menu 4.3.1) e.g. ▼▼ Analogue output (menu 4.3.AO0; internal) ◉ Status (menu 4.3.AO0.1) ▼▼▼ [Specific parameter] (menu 4.3.AO0.4) ◉
= Signal range MENU 4.3.AO0.4 ◉

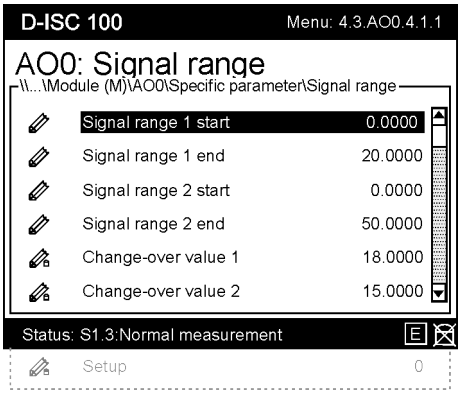


Fig. 15.39: Setting the signal range

First use the arrow keys (▼▲) on the keypad [▶ 203] to select [▭ Signal range 1 start] and confirm the selection by pressing the ◉ key.

1. Use the arrow keys to set the desired value (as a physical unit of the measured value) and press the ◉ key to confirm.

   The ▭ key can also be used to switch on the on-screen keyboard (see also Bildschirmtastatur [▶ 204] nutzen [▶ 70]).
2. Now use the arrow keys on the keypad to select [▭Signal range 1 end] and confirm the selection by pressing the ◉ key.
3. Use the arrow keys to set the desired value (as a physical unit of the measured value) and press the ◉ key to confirm.

Repeat the procedure if you wish to set the second signal range [▭signal range 2].

The following settings *must only be performed if you wish to set a second signal range*:

[Setting the change-over value]

1. First, use the arrow keys on the keypad to select [Change-over value 1], and confirm the selection by pressing the ↵ key.
2. Use the arrow keys to set the desired value (as a physical unit of the measured value) and press the ↵ key to confirm.

   [Change-over value 1] indicates the value at which the system switches to the 2nd output range (see Fig. 15.38).
3. Then use the arrow keys on the keypad to select [Change-over value 2], and confirm the selection by pressing the ↵ key.
4. Use the arrow keys to set the desired value (as a physical unit of the measured value) and press the ↵ key to confirm.

   [Change-over value 2] indicates the value at which the system switches back to the 1st output range (see Fig. 15.38).

[Activating the change-over value]

In order to ensure that the D-ISC 100 will now use the ranges that have been set, Automatic mode must be activated. If the ranges are not changed over automatically, there exists the option of specifying which of the two ranges should be used.

1. To do this, use the arrow keys to navigate to the **Setup** entry (right at the bottom outside the visible menu area; see Fig. 15.39).
2. Use the arrow keys (▼ ▲) to select one of the following values:

- **0** Activate the automatic change-over between output ranges
  (the two ranges are used, depending on the current measured value).
- **1** Output range 1 is used
- **2** Output range 2 is used

Press the ↵ key to load the selected value.

If the range change-over is activated, the output range currently used by the analogue output is not automatically displayed or loaded. The Information about the range currently used is contained within the status of the respective analogue output.

If the measured data is being transferred to a central PLC [▶ 204], the status of the output range currently being used may therefore need to be called up and transferred to the external evaluation unit (PLC) via the digital output.

View display of the analogue outputs

If you wish to check the display of the analogue outputs, press the **ESC** key multiple times to return to the standard display. Once there, press the arrow key (▶) (several times if necessary) to select the display for the analogue output (AO0). The relevant display then looks like this:

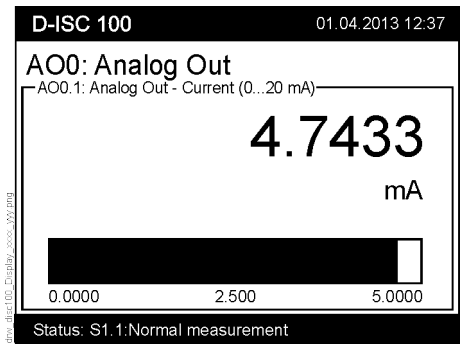


Fig. 15.40: Display analogue OUT (example)

15.10.2 Example: Setting the error information

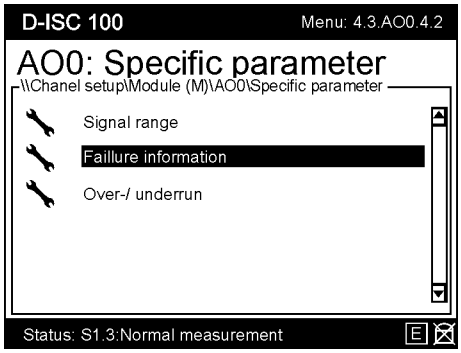


Fig. 15.41: Analogue output specific parameter

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ Channel setup (menu 4) ◉ Channel setup (menu 4.1) ▼▼ Module (M) (menu 4.3) ◉ (menu 4.3.1) e.g. ▼▼ Analogue output internal (menu 4.3.AO0) ◉ (menu 4.3.AO0.1) ▼▼▼ Specific parameter (menu 4.3.AO0.4) ◉ Signal range (menu 4.3.AO0.4.1 ▼ Failure information (menu 4.3.AO0.4.2) ◉ = Failure value [mA] MENU 4.3.AO0.4.2.1

The signal range of the analogue output is from 0 … 23mA. The range from 4 … 20mA is reserved for measured values. The range from 0 … 4mA and the range from 20 … 23mA can also be activated by the analogue output. These ranges can be used to forward information about faults.

The "Failure information" menu item (menu 4.3.AOx.x.x) can be used to make the first selection as to whether this fault reporting function is to be used, and which events should trigger the sending of a fault report.

- [Failure value [mA] ◉
  Use the arrow keys (▼▲) to specify the value that should be output in such an event (see setup) (default: 2 mA)
- [Setup] ◉
  Mark the event(s) for which the value set as the [Failure value] is to be output.
  An empty square ☐ means "not active (not selected)";
  a solid square ■ means "active (selected)". Use the arrow keys (▼▲) to select the option(s). The right arrow key (▶) activates the option, the left arrow key (◀) deactivates it.
  - [Indicate fault status on analogue output, if:]
    If this setting is deactivated, all the following error messages are suppressed (deactivated).
  - [Analogue output module faulty (common fault)]
  - [Source module faulty (e.g. sensor)]

- [▭ Source module off-line (e.g. sensor)]
  Signal source (e.g. sensor) not connected
- [▭ Source module not assigned (e.g. sensor)]
  Signal source (e.g. sensor) not assigned
- [▭ Source module not available (e.g. sensor)]
  Signal source (e.g. sensor) not available
- [▭ Device (D-ISC 100) faulty]
  Fault in the Universal control unit

15.10.3 Example: Setting the overruns / underruns

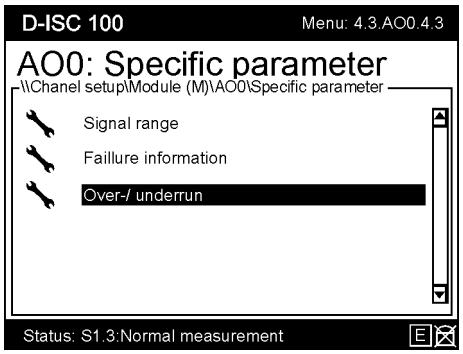
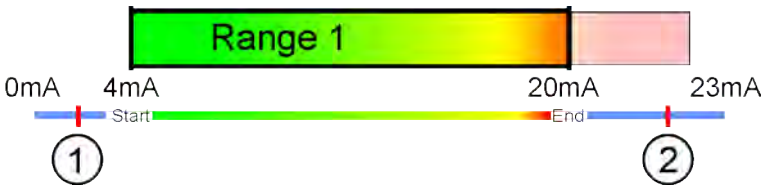


Fig. 15.42: Analogue output specific parameter

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ Channel setup (menu 4) ↵ Channel setup (menu 4.1) ▼▼ Modules (M) ↵ (menu 4.3.1) e.g. ▼▼ Analogue output internal (menu 4.3.AO0) ↵ (menu 4.3.AO0.1) ▼▼▼ Specific parameter (menu4.3.AO0.4) ↵ Signal range (menu 4.3.AO0.4.1) ▼▼ Over-/underrun (menu4.3.AO0.4.3) ↵
= MENU 4.3.AO0.4.3.1

The settings for the [▭over-/underrun] can be used to specify what actions should be taken in the event that limit values are overrun/underrun.



1	Underrun 0 … 4 mA (typically 2 mA)	2	Overrun 20 … 23 mA (typically 22 mA)

Fig. 15.43: Signal overrun / underrun

The signal range of the analogue output is from 0 … 23 mA. The range from 4 … 20 mA is reserved for measured values. The range from 0 … 4 mA and the range from 20 … 23 mA can also be activated by the analogue output. These ranges are also normally used for signal outputs. Even if the signal range was previously set to 4 … 20 mA, the signal can take values outside this range and be used. In some cases, it may even be desirable that the measured value signal is *not* directly capped at the specified limits.
The underrun value is typically 2 mA, while the overrun value is 22 mA. Only when these limits are undershot or overshot will (optionally) the corresponding overrun / underrun values be output.

Comply with the settings for the overruns / underruns in the local instructions!

Not all official measurement locations in all regions of the EU permit the use of "Underrun".

After [over-/underrun] has been called up, the following options are available for selection:

- [Overrun value [mA]]
  The overrun output value is adjustable; the overrun default value is 22 [mA].
  The value can be adjusted using the arrow keys (▼ ▲) or the on-screen keyboard [▶ 204] (see also [▶ 70]).
- [Underrun value [mA]]
  The underrun output value is adjustable; the underrun default value is 2 [mA].
  The value can be adjusted using the arrow keys (▼ ▲) or the on-screen keyboard (see also [▶ 70]).
- [Setup]
  Additional settings for over-/underrun can be adjusted under this menu item.
  An empty square ☐ means "not active (not selected)"; a solid square ■ means "active (selected)". Use the arrow keys (▼ ▲) to select the option. The right arrow key (▶) activates the option, the left arrow key (◀) deactivates it.
  - [Overrun value active]
    If this option is active, the previously set [overrun value [mA]] will be evaluated as follows.
  - [Overrun set fault (F)
    If this option is active, the fault status is applied when the set [Overrun value [mA]] is exceeded and the red LEDs on the module and on the D-ISC 100 (see illustration below (F)) are activated.

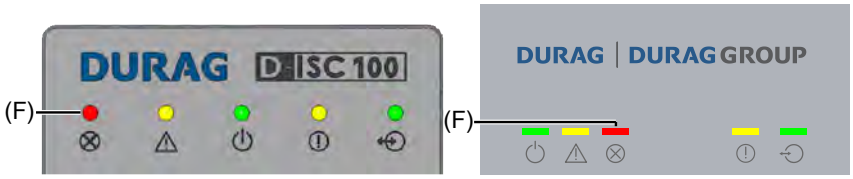


Fig. 15.44: Fault status (F) display via red LEDs

  - [Overrun hold value]
    If this option is active, when the [Overrun value [mA]] is reached, this value will be held until the measured signal falls back below this value again.
  - [Underrun value active]
    If this option is active, the previously set [Underrun value [mA]] will be evaluated as follows.
  - [Underrun set fault (F)
    If this option is active, the fault status is applied when the set Underrun value [mA] is undershot and the red LEDs on the module and on the D-ISC 100 (see illustration below (F)) are activated.
  - [Underrun hold value]
    If this option is active, when the [Underrun value [mA]] is reached, this value will be held until the measured signal rises back above this value again.

15.11 Example: Assignment of digital outputs

The D-ISC 100 - Universal control unit has three digital outputs, to each of which a status report can be assigned.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display (select required sensor if necessary ▶ ◀ (e.g. S2)) ⏎ Status (menu 4.2.S2.1) ⏎ S2: Status
= MENU 4.2.S2.1. xx

This menu shows the *active* status, e.g.

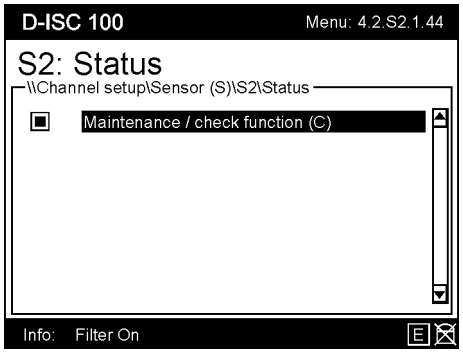


Fig. 15.45: Menu 4.2.S2.1.2.13

Pressing the key (= filter off) displays *all* statuses.

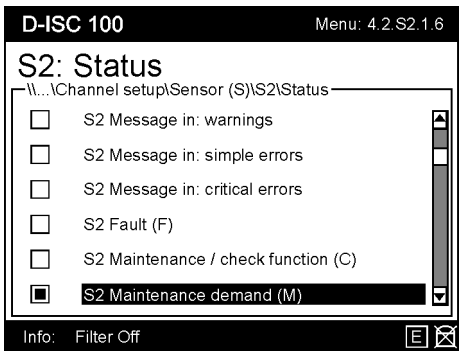


Fig. 15.46: Menu 4.2.S2.1.6

Select the desired message (*here*: *6x ▼ = S2 Maintenance demand (M)*) by pressing the ⏎ key

Select the digital channel (▼ ▲) to which the selected status is to be assigned.

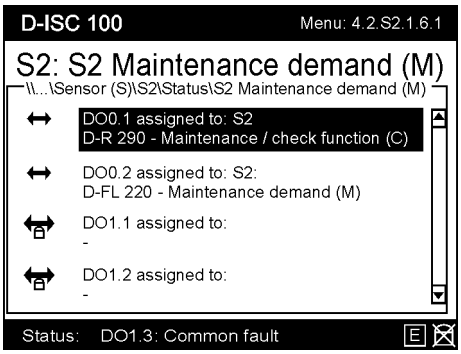


Fig. 15.47: Menu 4.2.S2.1.6.1

While editing parameters:

- The entry is temporarily loaded into the device by pressing the OK key.
- The entry is discarded by pressing the ESC key.

The change will be loaded from the temporary to the permanent device memory on return to the measured value/status display.

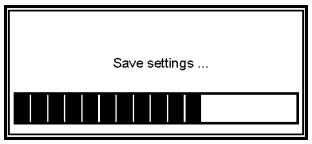


Fig. 15.48: Message when saving

15.11.1 Example: Signal inversion setup (digital outputs)

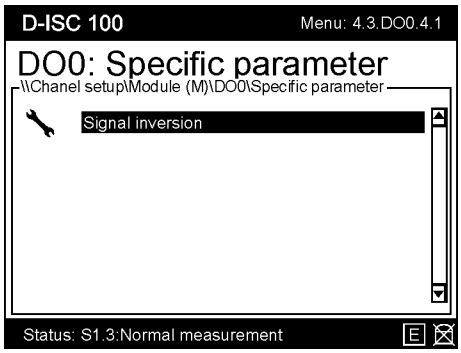


Fig. 15.49: Digital output specific parameter

The status reports assigned to the digital outputs can also be output as inverted *signals*.

Let us assume that a digital output has been assigned as a status report for a fault situation. For instance, a red lamp should light up in the control room in the event of a fault. The lamp is not illuminated if no fault is present.
A power failure on the D-ISC 100 should also be considered a fault. In this case however one supposes that this fault would pass unnoticed.

Let us therefore invert the signal for the fault situation. In this case a green lamp is actuated. Now if there is a fault in the system the green lamp goes out. But the green lamp also goes out in the event of a power failure. This error indication can thus lead to a response in either fault situation.

Proceed as follows if you wish to invert the signal:

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ Channel setup (menu 4) Channel setup (menu 4.1) ▼▼ Channel setup (menu4.3) (menu 4.3.1) e.g. ▼▼▼ Digital output internal (menu 4.3.DO0) Status (menu 4.3.DO0.1) ▼▼▼ Specific parameter (menu 4.3.DO0.4) Signal inversion (menu 4.3.DO0.4.1)

= (MENU 4.3.DO0.4.1.1)

Use the arrow keys (▼ ▲) to select the channel/channels to be inverted.

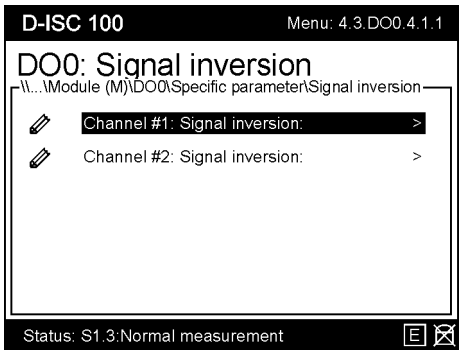


Fig. 15.50: Inverting the signal

Confirm the selection by pressing the ↵ key.

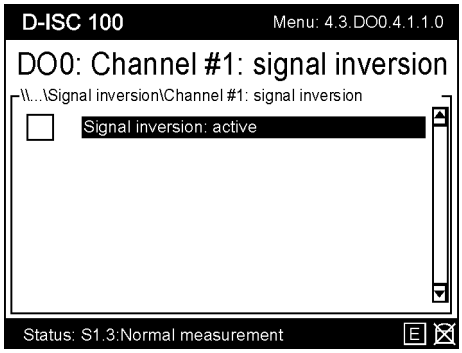


Fig. 15.51: Activating signal inversion

Use the right arrow key (▶) to activate the inversion; use the left arrow key (◀) to deactivate it.

An empty square ☐ means "not active (not selected)";
a solid square ■ means "active (selected)".

If you exit the menu item by pressing the ↵ key, the setting will be loaded and saved in the system. If you exit the menu item by pressing the **ESC** key, the setting will not be loaded.

If necessary, check the setting by pressing the **ESC** key multiple times to return to the display of the digital output:

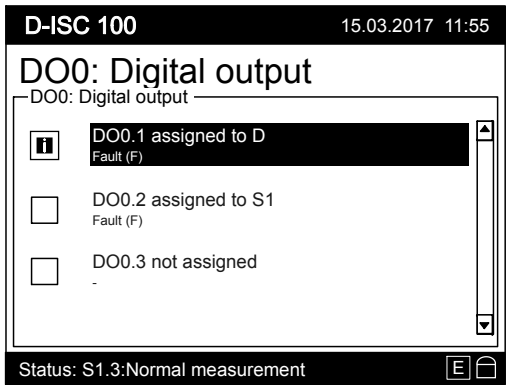


Fig. 15.52: Display digital output

In the illustration above, the first channel is linked to the inverted output of an error message, indicated by ☐ or ■. The second channel is linked to a non-inverted error message, indicated by ☐ or ■.

In both cases, the filled square means that there is current flowing through the relay *coil*. In conjunction with the switches for the NO/NC relay switching (see (45) e.g. in Section 3.3.7 Expansion modules [▶ 24]), this may result in a closed or opened relay.

15.12 Example: Assignment of digital inputs

The D-ISC 100 can be fitted with additional digital IN modules. Each module extends the system by 8 digital inputs.

The digital inputs are needed in order for external signals, such as from a central PLC [▶ 204], to prompt the system to perform various specifiable actions. Such actions (depending on the sensor to be activated) might for instance be to switch the sensor to maintenance mode, to start a control cycle or to perform a zero point check.

For the individual steps, proceed in accordance with the D-ISC 100 menu path (for an explanation of this, see Section 7.1 Navigation guide within this manual [▶ 79]). Comments on the settings are included in the appropriate text where necessary.

D-ISC 100 menu path:

Standard display User mode (menu 1) ▼▼▼ Channel setup (menu 4) D−ISC 100 (D) (menu 4.1) ▼▼ Modules (M) (menu 4.3) (e.g. ▼▼▼▼ on:) DI**x** Digital input (menu 4.3.DIx.1) DIx: Digital input (menu 4.3.DIx.1) ▼▼ Assign target function (menu4.3.DIx.3) = MENU 4.3.DIx.3.1
(x stands for the number of a module)

Use the arrow keys (▼▲) to firstly select one of the 8 digital inputs to which you want to assign an action (in this example DI1.4). Confirm the selection by pressing the key.

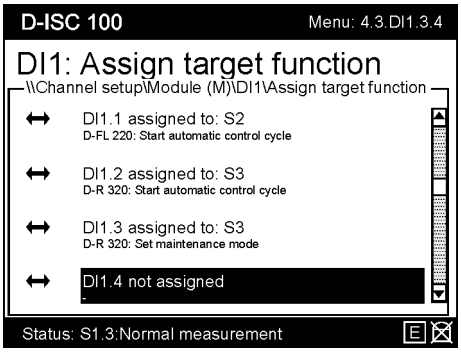


Fig. 15.53: Action list of the digital inputs

Then assign the required sensor: in this case (▼▼▼) "S2 D-FL 220". Confirm the selection by pressing the key.

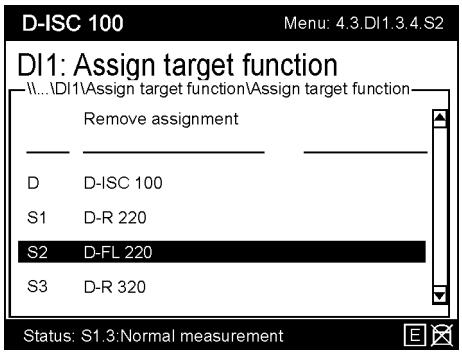


Fig. 15.54: Selecting a sensor

The list of available actions depends of the capabilities of the sensor. Precisely one single action can be assigned to each digital input. Use the arrow keys (▼ ▲) to select the desired action and make the assignment by pressing the ◴ key. In this example, we are putting sensor 2 into maintenance mode.

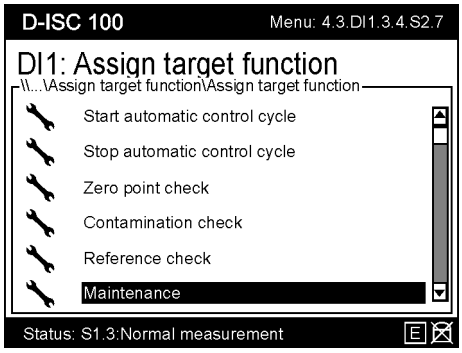


Fig. 15.55: Assigning the target function

The D-ISC 100 confirms the selection by changing the display, and now shows the assigned action for this digital input and for every other digital input to the module.

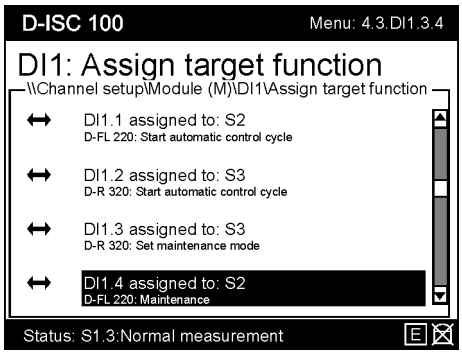


Fig. 15.56: Assignment in progress

15.12.1 Example: Signal inversion setup (digital inputs)

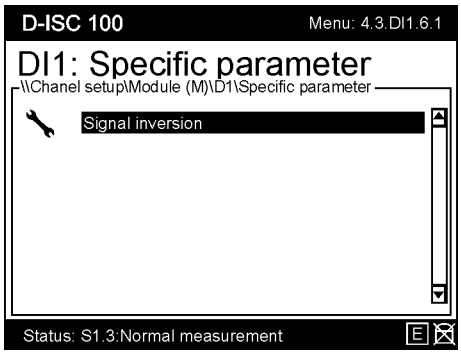


Fig. 15.57: Digital input specific parameter

If required, the signal can also be inverted for digital inputs.

Proceed as follows:

D-ISC 100 menu path:

Standard display (menu 1) ▼▼▼ Channel setup (menu 4) ↵ Channel setup (menu 4.1) ▼▼ ↵ Modules (M) (menu 4.3.1) e.g. ▼ (4x) Digital input (menu 4.3.DI1) ↵ Status (menu 4.3.DI1.1) ▼ (5x) Specific parameter (menu 4.3.DI1.6) ↵ Signal inversion (menu 4.3.DI1.6.1) ↵ = MENU 4.3.DI1.6.1.1

After the specific parameters of the digital input has been called up, the desired channel can be selected from a list.

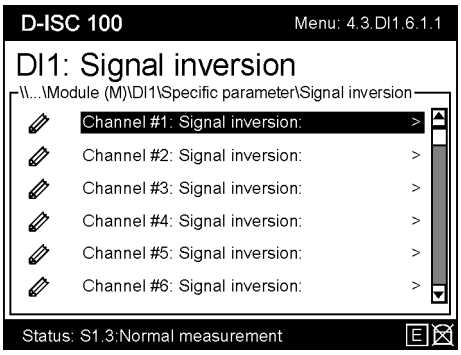


Fig. 15.58: Inverting the signal

There are 8 channels to choose from. Use the arrow keys (▼▲) to select a channel and load the selection in the system by pressing the ↵ key.

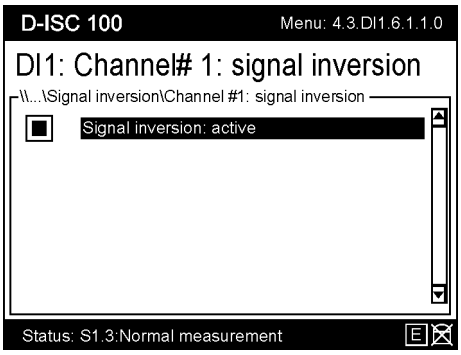


Fig. 15.59: Activating signal inversion

Use the right arrow key (▶) to activate the inversion; use the left arrow key (◀) to deactivate it.

An empty square ☐ means "not active (not selected)";
a solid square ■ means "active (selected)".

If you exit the menu item by pressing the ↵ key, the setting will be loaded and saved in the system. If you exit the menu item by pressing the **ESC** key, the setting will not be loaded.

To check the setting, return to the digital input display by pressing the **ESC** key multiple times as well as the arrow key (▶◀):

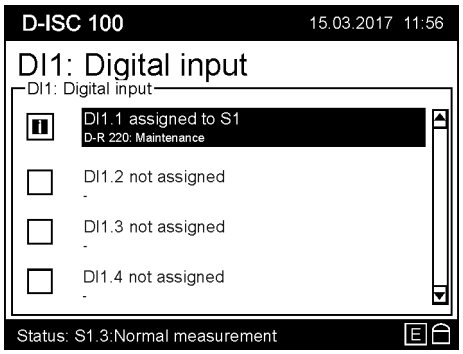


Fig. 15.60: Display digital input

The illustration above shows that the internal digital input DI1 is being used in the inverted state.

15.13 Example: Activate modules

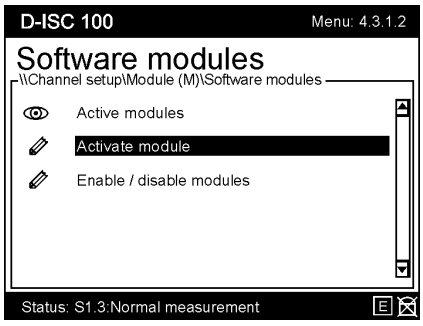
In order to use an optional software module, an activation key will need to be entered.

Proceed as follows:

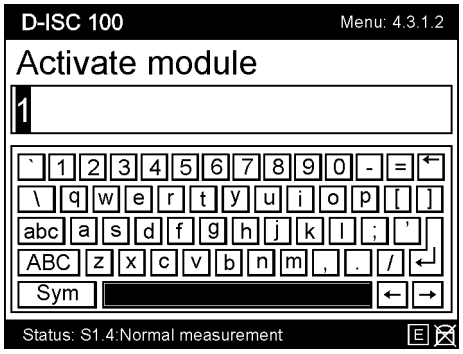
D-ISC 100 menu path:

Standard display User mode (menu 1) ▼ ▼ ▼ Channel setup (menu 4) D−ISC 100 (D) (menu 4.1) ▼ ▼ Modules (M) (menu 4.3) Software modules (menu 4.3.1) Software modules (menu 4.3.1.1) ▼ = Activate module MENU 4.3.1.2

Access the relevant menu to enter the activation key as described in the menu path above:



Activate the on-screen keyboard [▶ 204] (see figure below) by pressing the key on the keypad.



Instructions on operating the on-screen keyboard can be found in Section 15.4 Example: Clearing the PIN protection (logging in) [▶ 159].

Fig. 15.61: Software certificate

The activation key can be found on the software certificate. This key is only valid for the D-ISC 100 with the "Mainboard ID" indicated on the certificate.

Aktivierungsschlüssel Activation key	F2BA-F796-99F8-44DC-7572

The entire key (including hyphens) must be entered. No distinction is made between capitals and lower case. The entry is loaded and completed by pressing the ↵ key (keypad).

The "Mainboard ID" can be retrieved from menu 6 "About D−ISC 100".

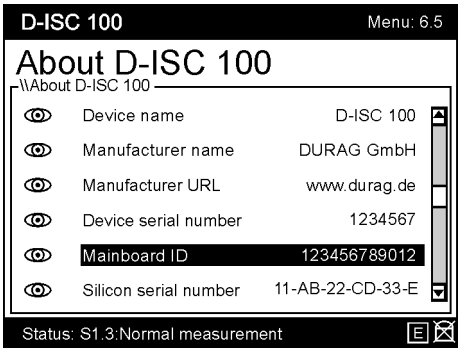


Fig. 15.62: Retrieve the mainboard ID

If the activation key entered is **invalid**, a corresponding message will be displayed and the entry can be corrected (cancel using the **ESC** key).

If the entered activation key is **valid**, a message will be displayed indicating the progress of the activation, with subsequent information on which module has been activated.

15.14 Example: Configuring the mixed channel software module

Given values:

The following sensors must be used to determine the dust quantity from a stack:

- Dust measuring device (e.g. D−R 320)
- Volume flow meter (e.g. D−FL 220)
- Temperature sensor
- Absolute pressure sensor

In a D-ISC 100 measurement display, the measured values of *one* source (e.g. dust measuring device) may be displayed simultaneously by several measured variables in this source if necessary.

If the measured variables of different sensors/modules are simultaneously required in a measurement display, this can be achieved using the ["Mixed channel"] software module.

See also Section 10.4.1.4 [Mixed channel] (MX1...2) [▶ 116].

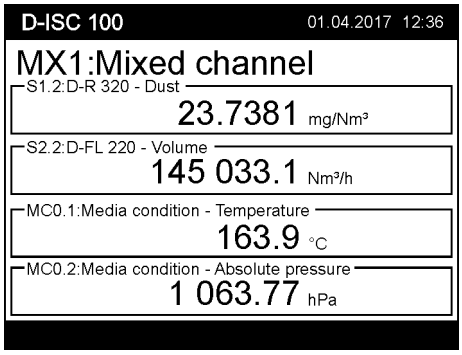


Fig. 15.63: Measurement display in the mixed channel

Requirement:

- The sources used (sensors/modules) are already configured for a measured display in the Universal operation unit. See also 15.8 Examples: Parameterising sensors [▶ 167] et. seq.
- The mixed channel module must be enabled (see Section 10.4.1.3 Enable/disable modules [▶ 116]).
- For step 6, the software module [media condition] may need to be configured and enabled (see Section 15.16 Example: Configuring the Media condition software module [▶ 200]).

Configuring the mixed channel module

Step 1

Access the menu for the mixed channel:

D-ISC 100 menu path:

Standard display ▣ User mode (menu 1) ▼ ▼ ▼ Channel setup (menu 4) ↵ D−ISC 100 (D) (menu 4.1) ▼ ▼ Modules (M) (menu4.3) ↵ Software modules (Menü 4.3.1) (z. B. ▼ …) Mixed channel internal (menu 4.3.MX1) ↵
= MENU 4.3.MX1.1

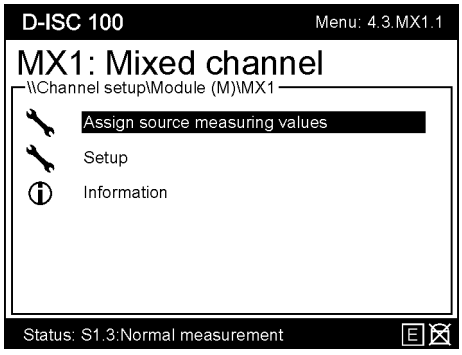


Fig. 15.64: Assign source measuring value I

Step 2

Select the ["Assign source measuring values"] menu item for the first channel MX1.1.

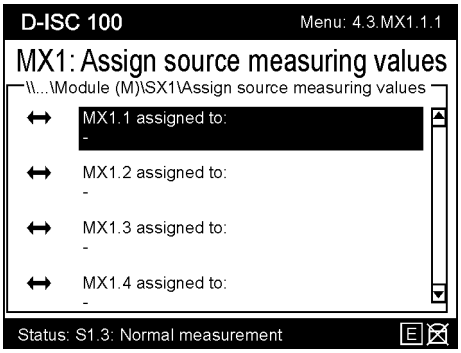


Fig. 15.65: Assign source measured value II

The output menu entry is empty before a source is assigned (see Fig. 15.65).

Select a channel using the arrow keys (▼ ▲) on the keypad (here MX1.1) and confirm the entry by pressing the ↵ key.

Step 3

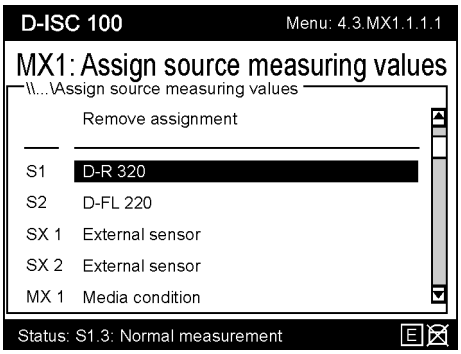


Fig. 15.66: Select source measured value

In this case, we first want to assign a dust measuring device (D-R 320). Use the arrow keys (▼ ▲) to select the corresponding sensor from the displayed list, and press the ↵ key to confirm. (Note: *The units available for selection depend on the composition of the existing system*)

Step 4

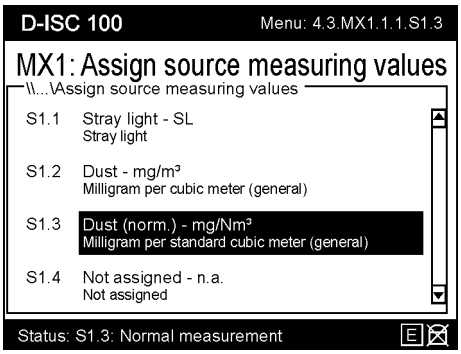


Fig. 15.67: Assign a measurement channel with the required unit I

Depending on the assigned sensor, the measured value – channel (with unit) must now be selected from the associated list (▼▲). We require [□"Dust (norm.) – mg/Nm³; in our example, this is entry S1.3. The selection is confirmed by pressing the ↵ key.

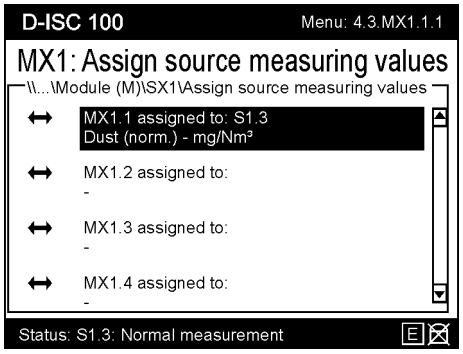


Fig. 15.68: Assign source measuring value II

Once a source has been assigned, the associated menu entry is also visible in the display with the relevant addition. The program is in the [□"Assign source measuring values"] menu again.

Step 5

To assign the second sensor, firstly select the entry MX1.2 by pressing the ▼ key. Repeat steps 2 – 4 and assign the volume flow meter D−FL 220.

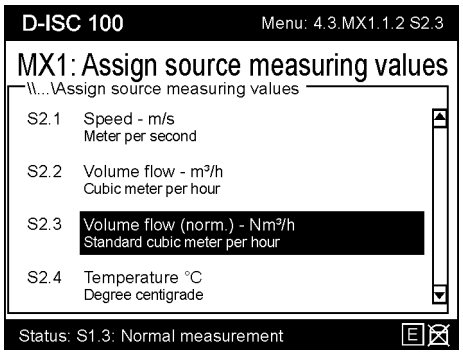


Fig. 15.69: Assign a measurement channel with the required unit II

We require "Volume flow (norm.) – Nm/m³“ [□ Volume flow (norm.) - Nm³/h"] as the measured value; in our example, this is entry S2.3. The selection is confirmed with the ↵ key.

We have now assigned both sensors. In this example, we want to perform the standardisation using an absolute pressure sensor and a temperature sensor.

Both sensors are integrated into the system by the [□media condition] software module. For information on the procedure, first read Section 15.16 Example: Configuring the Media condition software module [▶ 200]).

Step 6

Once the source for the second sensor has been assigned, the associated menu entry is also visible in the display with the relevant addition. The program is in the ["Assign source measuring values"] menu again.

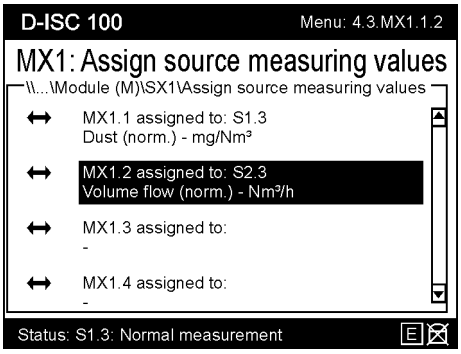


Fig. 15.70: Assign source measuring value IV

To assign the third source measuring value, firstly select the entry MX1.3 by pressing the ▼ key. Repeat steps 2 – 4 and assign the [MC0 Media condition] entry.

The following entry is only available once the [Media condition] software module has been configured.

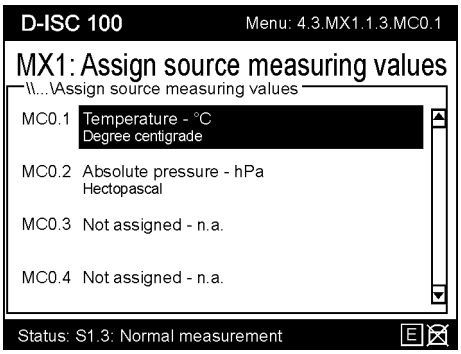


Fig. 15.71: Assign a measurement channel with the required unit III

Once again, only the measured value – channel (with unit) has to be selected. The channels are permanently pre-assigned for the [Media condition] software module. Channel 1 for the temperature and channel 2 for the absolute pressure. To assign the temperature media, select entry MC0.1 (temperature) and confirm by pressing the ↵ key.

The temperature is assigned and the program returns to menu 4.3.MX1.1.3.

Step 7

To assign the fourth source measuring value, first select ▼ entry MX1.4 [Absolute pressure – hPa] by pressing the ▼ key.

Once again, the measured value – channel (with unit) has to be selected. To assign the absolute pressure, use the ▼ key to select entry MC0.2 [Absolute pressure – hPa] and confirm by pressing the ↵ key.

The absolute pressure is assigned and the program returns to menu 3.3MX1.1.4.

Once all sources have been assigned in this manner, return to the measurement display by pressing the key.

The display *may* then look similar to that displayed in Fig. 15.63 , depending on the selection of the composition.

Note:
In order to view all four measured values simultaneously, the display may also need to be set to output four measured values.
See also: 15.9.2 Example: Selection Number of the displayed measurement channels [▶ 171]).

15.15 Example: Configuring external sensor software module

Besides the DURAG sensors, additional sensors need to be connected to a measuring system, which only have an analogue interface (4 … 20 mA). However, the Measurement display for these sensors will not output the current value, but rather the (converted) measurement variable with the desired unit (°C, hPa, m/s, Nm³/h, etc.).

The External sensor software module can assign *analogue* signals of a measured variable. The D-ISC 100 converts the current value to the desired unit. The relevant values can then be displayed and evaluated.

Requirement:

- At least one analogue input expansion module (available as an option) is installed.
  Four analogue input channels are available per module; i.e. four sensors can be connected per channel, or fewer sensors with multiple channels can be connected to the analogue input module.
- At least one free analogue input channel must be available and *configured* for every connected external sensor.
- The External sensor module must be enabled (see Section 10.4.1.3 Enable/disable modules [▶ 116]).

Configuring external sensor software module:

Step 1

Access the menu for the external sensor:

D-ISC 100 menu path:

Standard display User mode (menu 1) ▼▼▼ Channel setup (menu 4) ↵ (D−ISC 100 (D) (menu 4.1) ▼▼ Modules (M) (menu4.3) ↵ Software modules (menu 4.3.1) e.g. ▼ … External sensor (menu 4.3.SX1) ↵ Status (menu 4.3.SX1.1) e.g. ▼ Assign source measuring values
= MENU 4.3.SX1.2

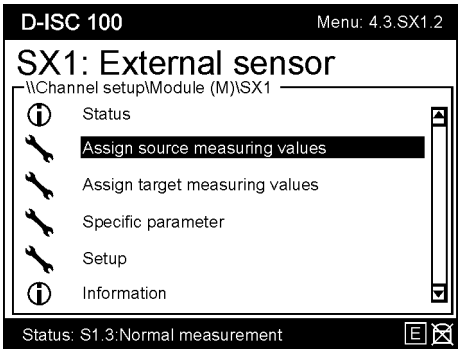


Fig. 15.72: "External sensors" menu

Step 2

Select the ["Assign source measuring values"] menu item.

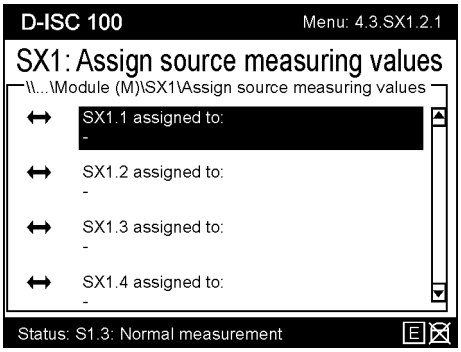


Fig. 15.73: Assign source 1

The output menu entry is empty before a source is assigned (see figure above).

To assign the External sensor module to a source, confirm SX1.1 by pressing the ↵ key.

(*Note*: *The units available for selection depend on the composition of the existing system*).

Step 3

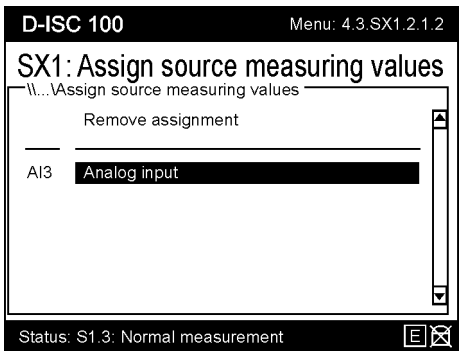


Fig. 15.74: Assign source 2

Select the analogue input from the list of possible sources. Confirm the selection by pressing the ↵ key. In our example, the analogue input module is in the third position in the list (see Section 10.4.3 Modules (M) (expansion module, hardware) [▶ 126]); and is therefore designated as AI3 (AnalogIn3).

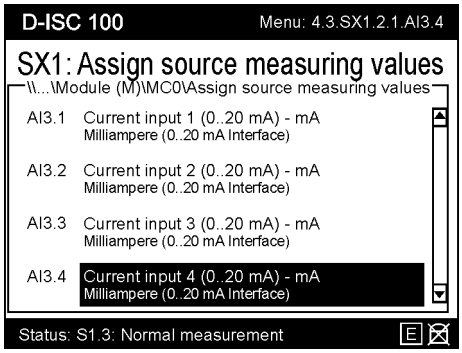


Fig. 15.75: Assign source 3

The analogue input module has 4 channels, to which different sensors can be assigned depending on the system and the current signal. First, familiarise yourself with which of your sensors have been connected to which analogue input.

Step 4

One of these connected sensors (let us assume this to be a functionally installed temperature sensor) now has to be assigned to a channel of the [External sensor] software module. In our example, we select AI3.4 and confirm with the ↵ key.

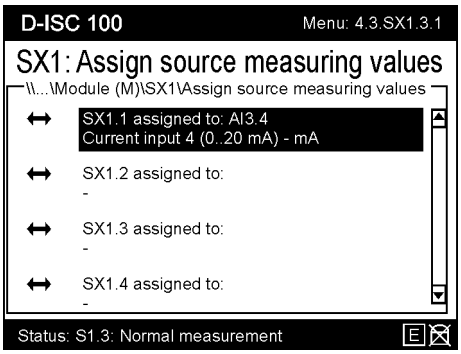


Fig. 15.76: Display the assigned source

The display now shows the assigned analogue input for the External sensor software module.

Step 5

Go back to the [Assign source measuring values ☐] display by pressing the **ESC** key on the keypad.

(In special application cases, a target measuring value ☐ can now also be assigned [Assign target measuring value]. This would make it possible to display the value on an ☐analogue output.)

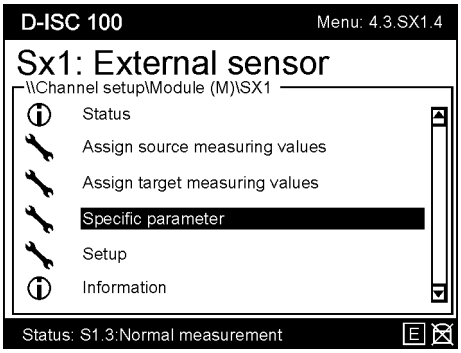


Fig. 15.77: Assigning specific parameters

Step 6

The [☐ specific parameters] *must now* be defined for each of the *used* external sensor channels e.g. SX1.1 ... SX1.4. These include limit values, signal range and the unit display (amperes, hectopascals, metre, etc.) in which the measured value is presented. The specific parameters are described in more detail in Section 10.4.1.5 [External sensors] (SX1...2) [▶ 117].

Assign the desired parameters. It may be useful to take the relevant values from the *data sheet* of the *connected sensor*. This avoids misinterpretations in the measured value output.

After these have been assigned, the measured value from the External sensor module will be available in the D−ISC 100 measured value display (see also Section 15.9 Examples: Selection of the displayed data [▶ 170]).

15.16 Example: Configuring the Media condition software module

In our 15.14 Example: Configuring the mixed channel software module [▶ 191], we wanted to determine the volume of dust flowing out of a stack.

The [🗀 Media condition] software module makes it possible to record and display the media conditions for the measured medium (temperature and absolute pressure) for the entire measurement system, and to provide these for all connected DURAG sensors in order to standardise the measured values.

Channel #1 of module MC0 is normally used for the media temperature
(MC0.1).
Channel #2 of module MC0 is normally used for the media pressure
(MC0.2).

Requirement:

- The [🗀 Media condition] software module must be enabled. see 10.4.1.3 Enable/disable modules [▶ 116].

Either:

- A fixed value for temperature and/or pressure is configured [🗀 Specific parameter > … > Fixed value].

Or:

- At least one analogue input expansion module (available as an option) is installed.

And:

- An analogue sensor is connected to the analogue input expansion module, which determines the temperature and/or pressure of the flue gas at the measurement location.

Or:

- A DURAG sensor is available, which determines the temperature/pressure of the flue gas.

Or:

- Temperature/Pressure is provided externally (e.g. EMI computer) via digital bus communication

Configuring the [🗀 Media condition] software module:

Step 1

Access the menu for the [🗀media condition]:

D-ISC 100 menu path:

Standard display 🖳 User mode (menu 1) ▼▼▼ Channel setup (menu 4) ↵ D−ISC 100 (D) (menu 4.1) ▼▼ Modules (M) (Menü 4.3) ↵ e.g ▼… Media condition (menu 4.3.MC0) ↵ Media condition (menu 4.3.MC0.1) ▼ Assign source measuring values ↵
= MENU 4.3.MC0.2

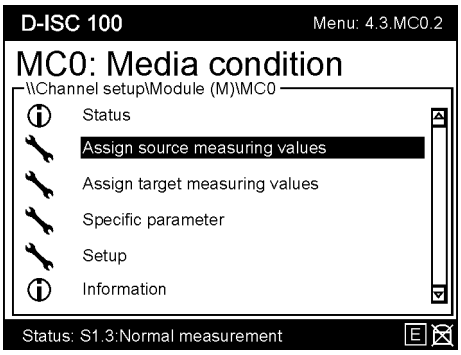


Fig. 15.78: Assign data source

Step 2

Select the [🗀 "Assign source measuring values"] menu item and confirm the selection by pressing the ↵ key.

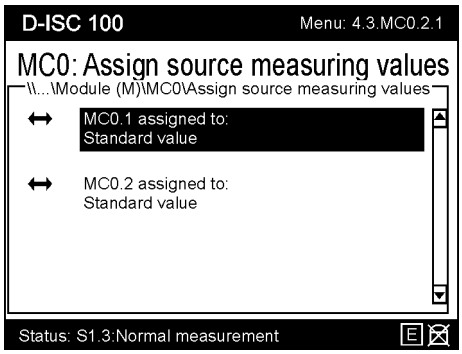


Fig. 15.79: Assign source

Step 3

Select one of the two possible media condition channels and confirm the selection by pressing the ↵ key.

Step 4

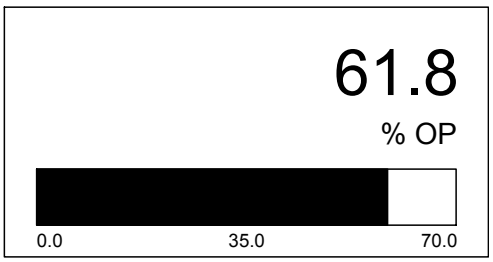
Assign the desired parameters. Detailed information on the individual settings can be found in Section 10.4.1.6 [Media conditions] (MC0) [▶ 119].

After assignment, the standardised measured values are available.

Repeat the process for the second channel with absolute pressure if necessary.

16 Glossary

Bar graph (display)



A bar graph provides a graphic depiction of a signal value. The length of the bar changes with the signal size. A bar graph display means that signal changes or maximums can be detected more quickly, and changes are clearer to see.

D-ESI 100

The D−ESI 100 software is a graphical interface for operating and managing sensor devices. The software simplifies the checking and where necessary the parameterisation of bus-based DURAG devices. D−ESI 100 allows individual devices or multiple devices connected via a DURAG - Modbus or USB cable to be identified. Setting parameters (depending on the capabilities of the device concerned) can be read and edited, and measurement results displayed or recorded for maintenance purposes. D-ESI 100 is used on site by maintenance teams and by DURAG service engineers.

Enter key

OK / OK

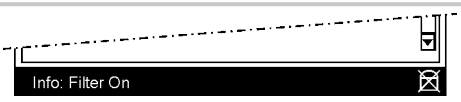
D-ISC 100 membrane keyboard; loads the changes that were made, uses them and saves them; skips to the selected menu entry (and the selected level).

ESC key

ESC / ESC

D-ISC 100 keypad; cancel during menu input (without saving) or back to the higher-level menu (or level).

Filter (Status D-ISC 100)



The status of the D-ISC 100 differentiates between active and inactive status. Where status information is to be viewed or checked, this generally relates to the active status. For a better overview, inactive statuses can be filtered out. The status line of the display for the respective menu shows when the filter active is (see illustration). The screen key allows toggling back and forth between filter on and filter off. By default the filter is switched on for status displays. For on/off settings (list view) by default the filter is switched off.

Firmware

Firmware is software that is embedded in electronic devices. It is mostly saved in flash memories, EPROMs, EEPROMs or ROMs and cannot be changed by the user except by use of special tools or functions. Firmware is functionally tied to the hardware, i.e. neither can be used without the other. Firmware acts as an intermediary between hardware (i.e. the physical parts of a device) and the software (the exchangeable programs on a device).

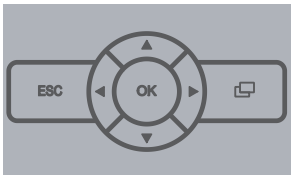
GSD file

(GSD = device master data file) GSD files are used in connection with the PROFIBUS. A GSD file is required in order to configure a PROFIBUS master, which will operate with the slave (sensor). A GSD file contains all of a device's properties, such as protocols, characteristics, etc. It also contains German text for display in the configuration software.

I/O

Term from the field of IT or computer science (Input/Output). Abbreviation of input and output. The communication/interaction between an information system and other information systems, actions for reading and writing data etc. Inputs are signals or data received by the system. Outputs are items that are issued by the system, via the screen, printer, memory, A/D converter etc.

Keypad



Navigate through the menus and displays using the keypad in the front panel of the Universal operation unit. Inputs such as val-

ues and parameters are also performed using the keypad. The keypad can also perform the inputs from the on-screen keyboard.

Measurement display after system start

[Measurement display after system start] refers to the selection of the measured value/status display to be shown after the D-ISC 100 is started up. This selection can be taken from the current Measurement display.

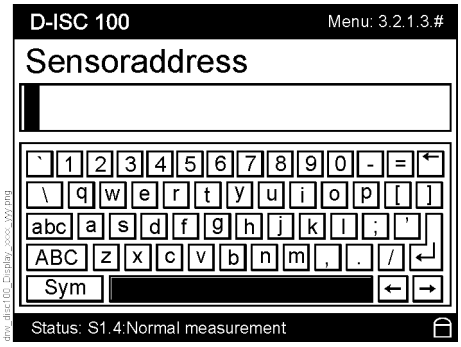
Modbus RTU

(RTU: Remote Terminal Unit) The Modbus protocol is a communications protocol that is based on a master/slave or client/server architecture. Modbus has become a de facto standard in industry, as it is an open-source protocol. A master (e.g. a PC) and several slaves (e.g. measurement and control systems) can be connected using Modbus.

Modbus TCP

Modbus TCP is very similar to the Modbus RTU, but TCP/IP packages are used to submit the data.

On-screen keyboard



The term "On-screen keyboard" denotes the display of a virtual keyboard on the display screen of the Universal control unit D-ISC 100. The individual keys of this keyboard are selected and activated using the arrow- and Enter keys on the membrane keyboard for this unit.

PLC (SPS)

Programmable Logic Controller. A Programmable Logic Controller is a device that is used for controlling or regulating and which is programmed on a digital basis. For some years now, in many areas the PLC has superseded the "hard-wired" programming of control systems. When programmed with suitable software this task can also be undertaken by a (mobile) PC.

PLS

Process control system

PROFIBUS DP V0

(DP = decentralised periphery) is used to request and operate sensors (for example) by a central control unit. The connection of "distributed intelligence", i.e. the linking of several control units to each other, can also be implemented using PROFIBUS DP. V0 stands for the protocol defined in 1993. This describes the cyclical exchange of data and diagnostics. Primarily devices in general automation technology and machine control support this range of functions.

RS485 serial interface

has been - similarly to the RS 422 interface - developed for serial high-speed data transfer over long distances and is becoming increasingly widespread in the industrial sector. The data cables must be laid as twisted pairs.

Screen key

D-ISC 100 membrane keyboard; changing over between the various displays

Signal range

The signal range specifies the limits within which a measured value from a specific device may occur. If the signal is outside these limits, the measured value cannot be defined. If the measured value lies outside the signal range, the variations can no longer be precisely measured.

TCP

The Transmission Control Protocol is a network protocol. IT defines the manner in which data is to be exchanged over a network. Most current operating systems are TCP-capable and use it to exchange data with other computers. The protocol is part of the internet protocol family, which are fundamentally used in the internet. This connection allows data to be transmitted in both directions. In most cases, TCP uses the

"IP" (Internet Protocol), which is why this is often also, not quite correctly, referred to as the "TCP/IP Protocol".

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