Operating Instructions

DULCOMETER® D1C

Part 2: Adjustment and Operation,
Measured variable H_2O_2 for sensor PER 1

D1C2-H2O2-001-GB

Type D

Type W

D1C A ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Please enter the identity code of your device here.

Please completely read through operating instructions! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!

1 Device Identification / Identity Code

D1C A	**DULCOMETER® Controller Series D1C / Version A**	
	Type of mounting	
D	Control panel installation 96 x 96 mm	
W	Wall mounting	
	Operating voltage	
0	230 V 50/60 Hz	
1	115 V 50/60 Hz	
2	200 V 50/60 Hz (only with control panel installation)	
3	100 V 50/60 Hz (only with control panel installation)	
4	24 V AC/DC	
	Measured variable	
H	Hydrogen peroxide H_2O_2	
	Connection of measured variable	
7	Terminal, standard signal 0/4-20 mA for sensor PER 1	
	Correction variable	
0	None	
2	Temperature via terminal	
3	Temperatura via standard signal	
4	manual temperature input	
	Feed forward control	
0	None	
1	via standard signal 0/4-20 mA	
2	via frequency 0-500 Hz	
3	via frequency 0-10 Hz	
	Control input	
0	None	
1	Pause	
	Signal output	
0	None	
1	standard signal 0/4-20 mA measured value	
2	standard signal 0/4-20 mA control variable	
3	standard signal 0/4-20 mA correction variable	
4	2 standard signal 0/4-20 mA outputs, free programmable	
	Power control	
G	Alarm and 2 limit value/timer relays	
M	Alarm and 2 solenoid valve relays	
R	Alarm relay and servomotor with feedback	
	Pump control	
0	None	
2	Two pumps	
	Control characteristic	
0	None	
1	Proportional control	
2	PID control	
	Log output	
0	None	
	Language	
D	German	
E	English	
F	French	
I	Italian	
N	Dutch	
S	Spanish	
B	Portuguese	
G	Czech	
J	Japanese	

D1C A	___	___	___	___	___	___	___	___	___	___	___	___	___	___

Please enter the identity code of your device here!

2 General User Information

General User Information

These operating instructions describe the technical data and function of the series DULCOMETER® D1C controller, provide detailed safety information and are divided into clear steps.

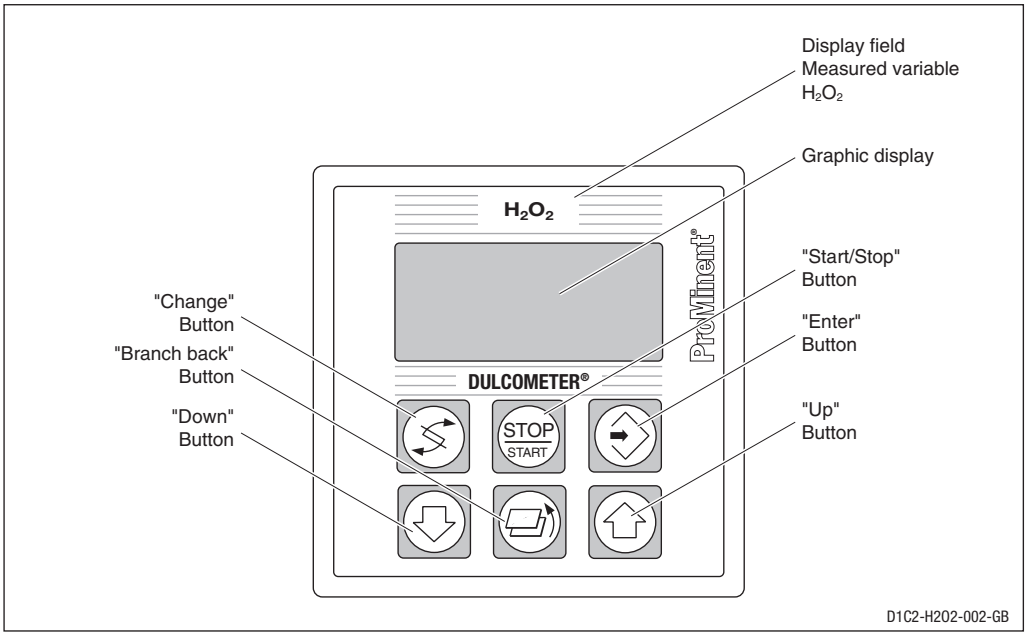
IMPORTANT

- ***Please observe the parts of these operating instructions applicable to your particular version! This is indicated in the Section "Device Identification / Identity Code"!***
- ***Correct measuring and dosing is only possible in the case of impeccable operation of the probe. The probe has to be calibrated / checked regularly!***

NOTE

A form "Documentation of controller settings Type D1C" is available under www.prominent.com/documentation_D1C for the purpose of documenting the controller settings.

3 Device Overview / Controls



	CHANGE Button To change over within a menu level and to change from one variable to another within a menu point.
	START/STOP Button Start/stop of control and metering function.
	ENTER Button To accept, confirm or save a displayed value or status. For alarm acknowledgement.

	UP Button To increase a displayed numerical value and to change variables (flashing display).
	BRANCH BACK Button Back to permanent display or to start of relevant setting menu.
	DOWN Button To decrease a displayed numerical value and to change variables (flashing display).

4 Functional Description

NOTE

Please refer to the description of the complete operating menu in Section 8 for a detailed description of the individual characteristics of the DULCOMETER® D1C controller!

4.1 Operating Menu

The D1C controller permits settings to be made in two different menus. All values are preset and can be changed in the **complete operating menu**.

The controller is delivered with a **restricted operating menu** so that the D1C controller can be used effectively in many applications from the very onset. If adaptations prove to be necessary, all relevant parameters can then be accessed by switching over to the complete operating menu (see “General settings”).

4.2 Access Code

Access to the setting menu can be prevented by setting up an access code. The D1C controller is supplied with the access code 5000 which permits free access to the setting menu. The calibration menu remains freely accessible even when access to the setting menu is blocked by the code.

4.3 Control

The D1C can operate as a proportional controller or as a PID controller - dependent on the device version (see identity code) and the setting.

The controlled variable is recalculated once a second. Control procedures which require rapid correction of setpoint deviations (less than approx. 30 seconds) cannot be processed with this controller. The cycle times must be taken into consideration when activating solenoid valves (pulse length) in the same way as their running times when activating servomotors (3-point).

Via the control input pause, the control function (selection of controlled variable) can be switched off. The calculation of the controlled variable starts again after cessation of "pause".

4.4 Feed Forward Control

The D1C controller can process a signal of a feed forward control. Depending on the device version (see identity code) and the setting, this signal can be obtained in any form of a 0–20 mA or 4–20 mA signal or as a digital contact signal with the maximum frequencies 10 Hz or 500 Hz.

This signal can be used, for example, for flow-proportional metering (multiplicative effect) or feed forward-dependent basic load metering (additive effect). The result of control variable calculation from the proportional or PID control is multiplied by or added to the feed forward signal. A multiplicative feed forward variable at the level of the set rated value carries over the calculated control variable unchanged into the controlled variable:

Controlled variable = Feed forward variable/rated value x calculated control variable

During start-up, the zero point has to be checked. The multiplicative feed forward control is not designed for switching off permanently the actuating variable (signal ≈ 0).

An additive feed forward variable at the level of the rated value results in maximum controlled variable:

Controlled variable (max. 100 %) = Feed forward variable/rated value x max. controlled variable + calculated control variable

4.5 Error Messages

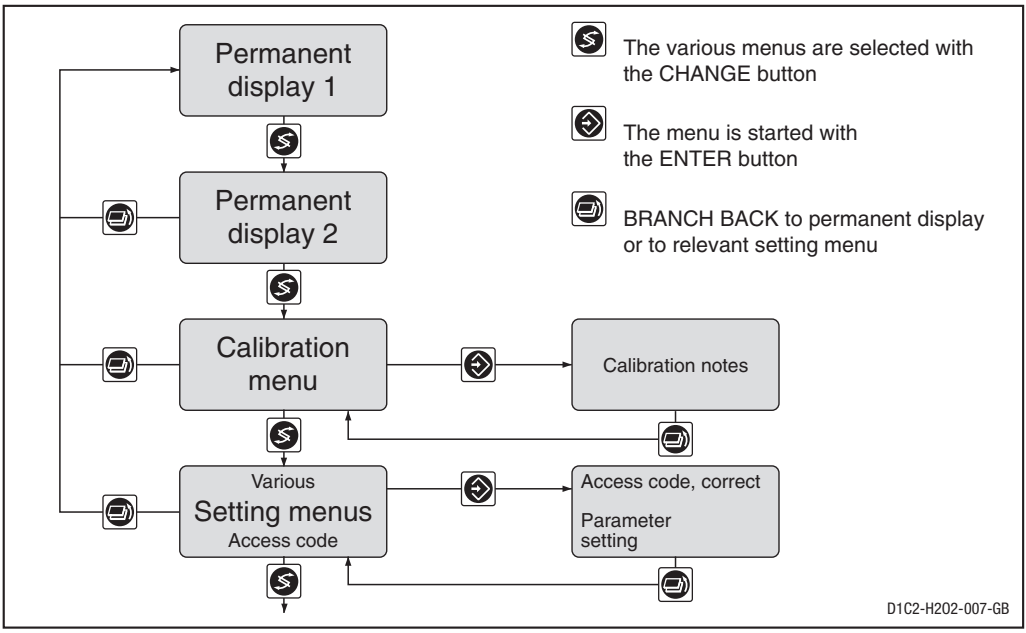
Error messages and information are indicated on the bottom line in the permanent display 1. Errors to be acknowledged (acknowledgement switches off the alarm relay) are indicated by the "Ɛ". Errors/notes which still apply after acknowledgement are indicated alternately. During correction variable processing (temperature for correction of pH-value), the value is indicated in the same line as the error/note. Faults which are rectified of their own accord due to changed operating situations are removed from the permanent display without the need for acknowledgement.

5 Display Symbols

The display of the DULCOMETER® D1C controller uses the following symbols:

Description	Comment	Symbol
Limit value transgression Relay 1, upper	Symbol left	
Relay 1, lower	Symbol left	
Relay 2, upper	Symbol right	
Relay 2, lower	Symbol right	
Metering pump 1 (H_2O_2) Control off	Symbol left	
Control on	Symbol left	
Metering pump 2 (De-H_2O_2) Control off	Symbol right	
Control on	Symbol right	
Solenoid valve 1 (H_2O_2) Control off	Symbol left	
Control on	Symbol left	
Solenoid valve 2 (De-H_2O_2) Control off	Symbol right	
Control on	Symbol right	
Servomotor Control, open relay		
Control, close relay		
Without control		
Position feedback	Thickness of bar increases from left to right during opening.	
Stop button pressed		
Manual metering		
Fault		

6 Operation



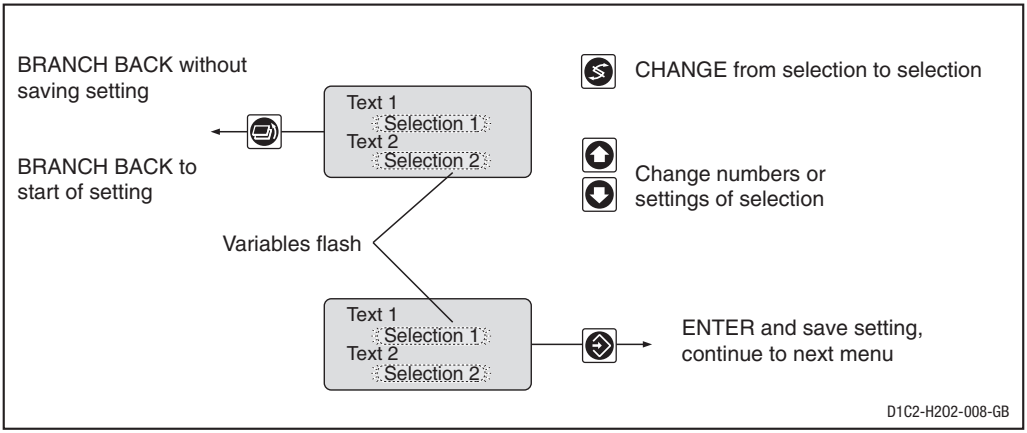
NOTE

Access to the setting menus can be barred with the access code!

The number and scope of setting menus is dependent on the device version!

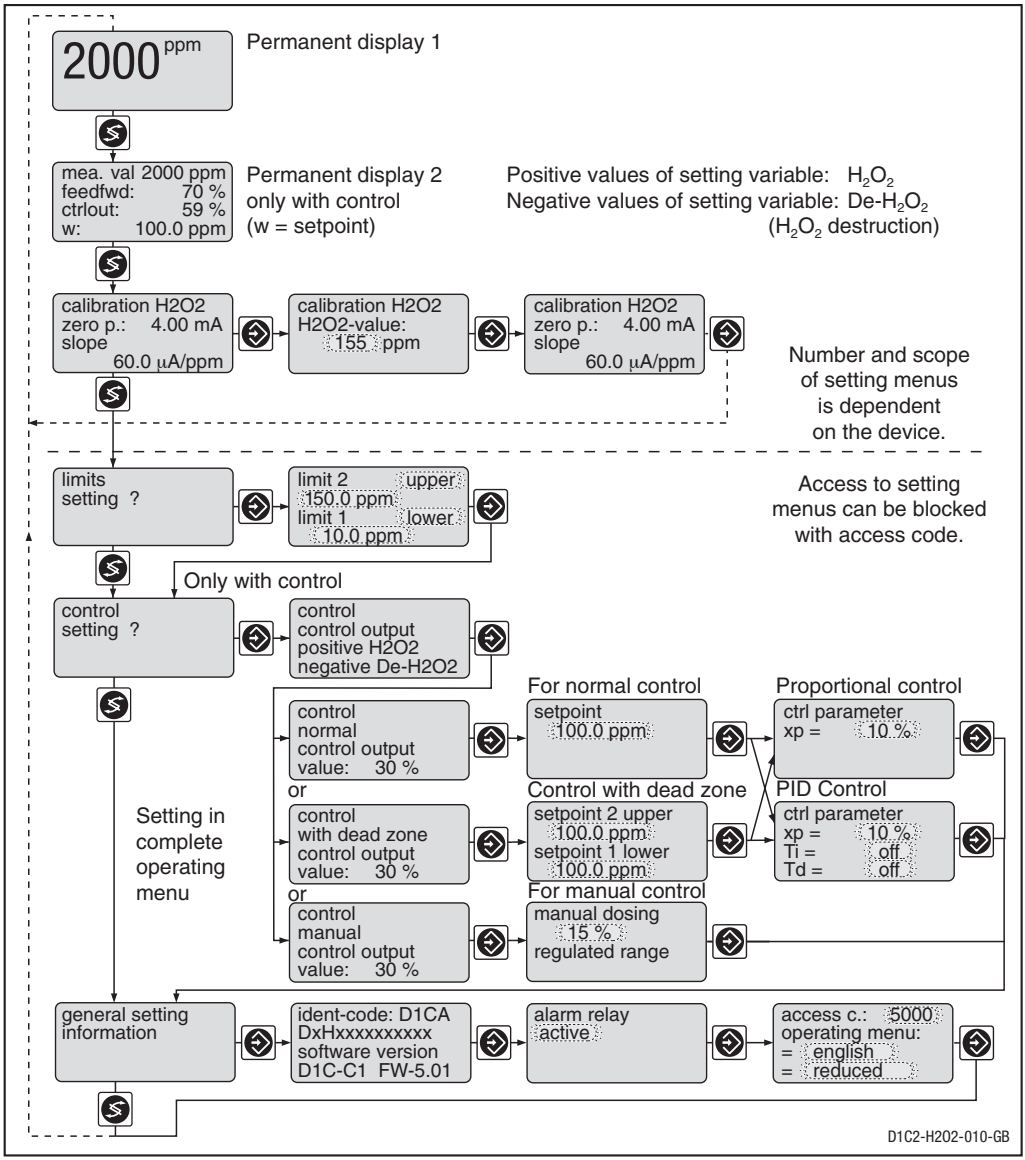
If the access code is selected correctly in a setting menu, then the following setting menus are also accessible!

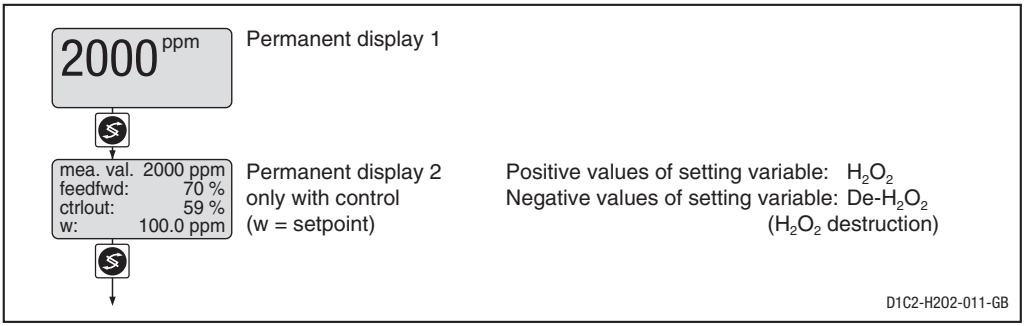
If within a period of 10 minutes no button is pushed, the unit automatically branches back from the calibrating menu or a setting menu to the permanent display 1.



7 Restricted Operating Menu / Overview

The restricted operating menu permits simple operation of the most important parameters. The following overview shows the settings which can be selected:



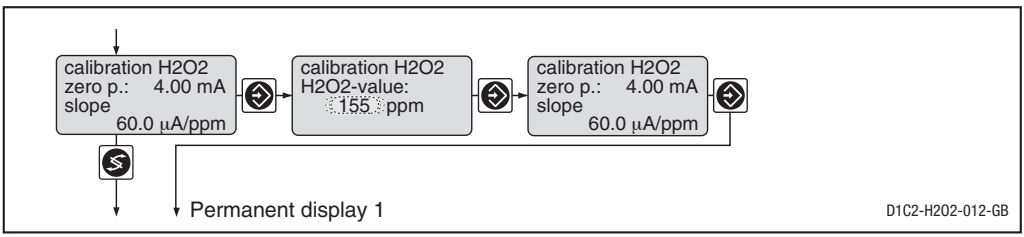


Calibration of the H_2O_2 Probe

During calibration, the D1C sets the positioning outputs to "0". The exception to this is that when a base load or a manual controller output has been set, these are retained during the calibration. The mA standard output signals (measured value or correcting value) are frozen. The measured value frozen at the start of the calibration is suggested as the H_2O_2 value; this value is adjustable (arrow keys!). Calibration is only possible when the H_2O_2 value ≥ 2 % of the range. When the calibration is successfully completed, all fault diagnoses that relate to the measured value are started afresh.

IMPORTANT

The measuring range of the probe must agree with the set measuring range (factory setting: 0–200.0 ppm). The measuring range must be reset prior to calibration (refer to page 14).

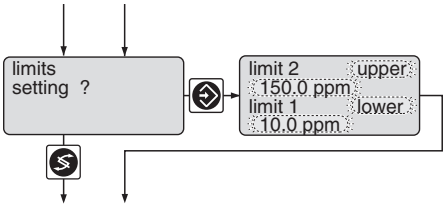


	Initial value	Possible values Increment	Lower value	Upper value	Remarks
	Measured value	0.01 %	-0.20 %	2.20 %	for measurement range up to 2 %
		0.01 %	-0.10 %	1.10 %	for measurement range up to 1 %
		1 ppm	-200 ppm	2200 ppm	for measurement range up to 2000 ppm
		0.1 ppm	-20.0 ppm	220.0 ppm	for measurement range up to 200 ppm
		0.01 ppm	-5.00 ppm	55.00 ppm	for measurement range up to 50 ppm
		0.01 ppm	-2.00 ppm	22.00 ppm	for measurement range up to 20 ppm

Error message	**Condition**	**Effect**
Calibrate H_2O_2 not possible! Probe slope too low	H_2O_2 slope too low (<25 % of norm slope)	Calibrate again
Calibrate H_2O_2 not possible! Probe slope too high	H_2O_2 slope too high (>300 % of norm slope)	Calibrate again
H_2O_2 value too low H_2O_2 > x.xx ppm	H_2O_2 <2 % measuring range	

Limits

Access to all setting menus can be blocked with an access code !



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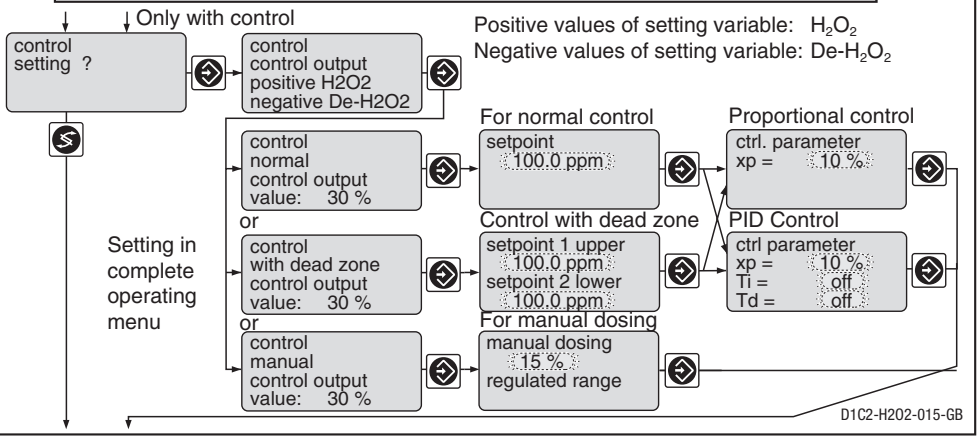
		Initial value	Possible values Increment	Lower value	Upper value	Remarks
Type of limit transgression	Limit 1:	lower	upper lower			Limit transgression when exceeding or dropping below value *only with limit relays
	Limit 2:	upper	off*			
Limit value	Limit 1:	0.50 %	0.01 %	2.20 %	-0.20 %	
	Limit 2:	1.50 %				
	Limit 1:	0.25 %	0.01 %	1.10 %	-0.10 %	
	Limit 2:	0.75 %				
	Limit 1:	100 ppm	1 ppm	2200 ppm	-200 ppm	
	Limit 2:	1500 ppm				
	Limit 1:	10.0 ppm	0.1 ppm	220.0 ppm	-20.0 ppm	
	Limit 2:	150.0 ppm				
	Limit 1:	2.50 ppm	0.01 ppm	55.00 ppm	-5.00 ppm	
	Limit 2:	37.50 ppm				
	Limit 1:	1.00 ppm	0.01 ppm	22.00 ppm	-2.00 ppm	
	Limit 2:	15.00 ppm				

Control

Access to all setting menus can be blocked with an access code !

Note: The controlled variable is recalculated every second. Only suitable for processes with time constants greater than 30 s !



D1C2-H2O2-015-GB

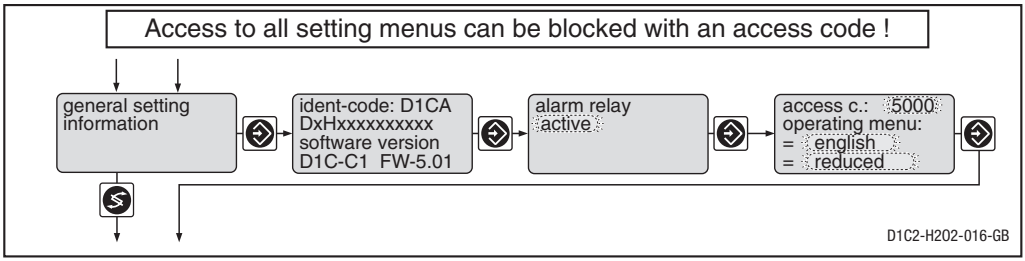
Restricted Operating Menu / Description

	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Setpoint	1.00 % 0.50 % 1000 ppm 100.0 ppm 25.00 ppm 10.00 ppm	0.01 % 0.01 % 1 ppm 0.1 ppm 0.01 ppm 0.01 ppm	2.10 % 1.05 % 2100 ppm 210.0 ppm 52.50 ppm 21.00 ppm	-0.10 % -0.05 % -100 ppm -10.0 ppm -2.50 ppm -1.00 ppm	2 setpoints necessary for control with dead zone. Setpoint 1 < setpoint 2
Control parameter xp	10 %	1 %	1 %	500 %	xp referred to measuring range
Control parameter Ti	off	1 s	1 s	9999 s	Function off = 0 s
Control parameter Td	off	1 s	1 s	2500 s	Function off = 0 s
Manual metering	0 %	1 %	-100 %	+100 %	

Abbreviations for control variables:

x_p: 100 %/Kp (inverse proportional coefficient)
T_i: Integration time of I-controller [s]
T_d: Differential time of D-controller [s]

General Settings



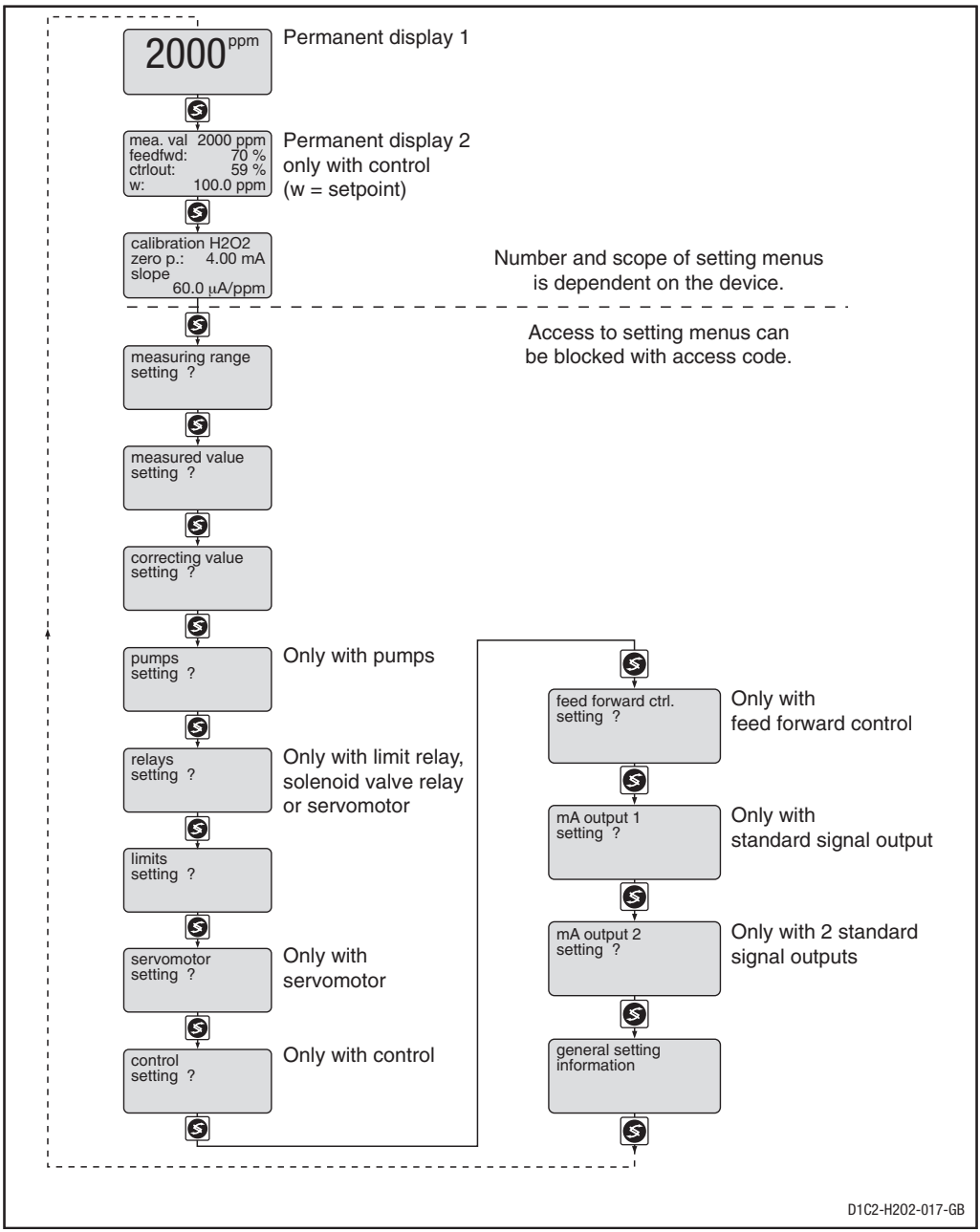
	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Alarm relay	active	active not active			
Access code	5000	1	1	9999	
Language	as per identity code	as per identity code			
Operating menu	restricted	restricted complete			

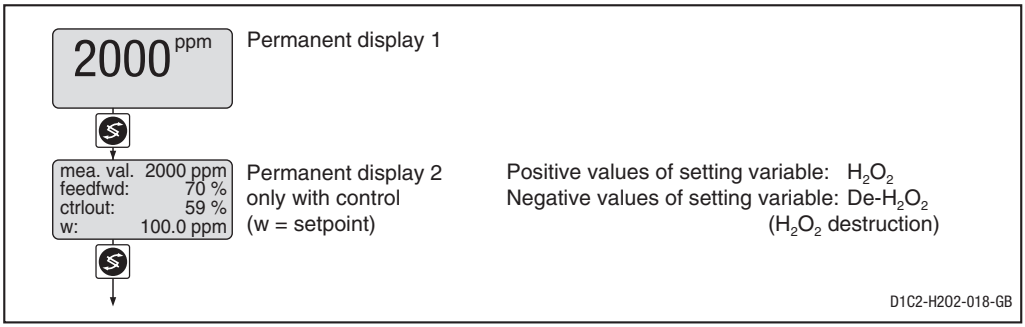
Access Code

Access to the setting menu can be prevented by setting up an access code. The DULCOMETER® D1C controller is supplied with the access code 5000 which permits free access to the setting menu. The calibration menu remains freely accessible even when access to the setting menu is blocked by the code.

8 Complete Operating Menu / Overview

All parameters of the controller can be set in the complete operating menu (access see previous page). The following overview shows the settings which can be selected:





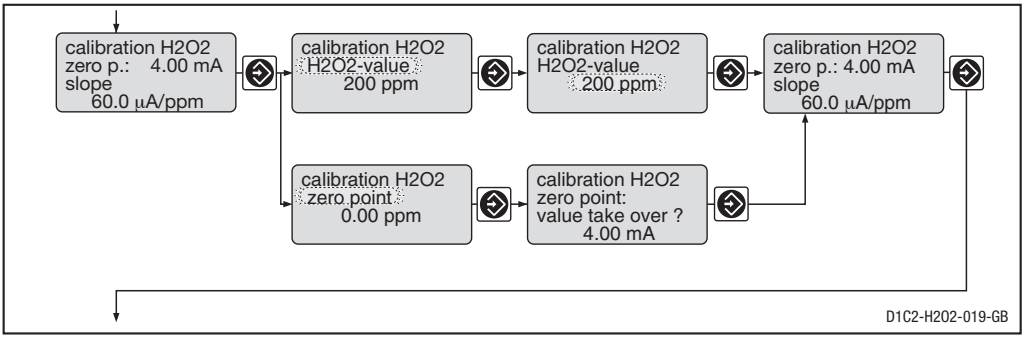
Calibration of the H_2O_2 Probe (zero point and slope)

During calibration, the D1C sets the positioning outputs to "0". The exception to this is that when a base load or a manual controller output has been set, these are retained during the calibration. The mA standard output signals (measured value or correcting value) are frozen. The measured value frozen at the start of the calibration is suggested as the H_2O_2 value; this value is adjustable (arrow keys!). Calibration is only possible when the H_2O_2 value ≥ 2 % of the range. When the calibration is successfully completed, all fault diagnoses that relate to the measured value are started afresh.

The zero calibration must be made under realistic conditions in H_2O_2-free water. This is normally only necessary when the measuring at the lower limit of the range.

IMPORTANT

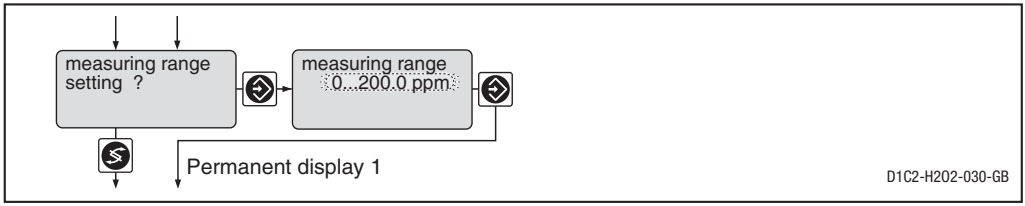
The measuring range of the probe must agree with the set measuring range (factory setting: 0–200.0 ppm). The measuring range must be reset prior to calibration (refer to page 14).



	Initial value	Possible values Increment	Lower value	Upper value	Remarks
	Measured value	0.01 %	-0.20 %	2.20 %	for measurement range up to 2 %
		0.01 %	-0.10 %	1.10 %	for measurement range up to 1 %
		1 ppm	-200 ppm	2200 ppm	for measurement range up to 2000 ppm
		0.1 ppm	-20.0 ppm	220.0 ppm	for measurement range up to 200 ppm
		0.01 ppm	-5.00 ppm	55.00 ppm	for measurement range up to 50 ppm
		0.01 ppm	-2.00 ppm	22.00 ppm	for measurement range up to 20 ppm

Error message	Condition	Effect
Calibrate H_2O_2 not possible! Probe slope too low	H_2O_2 slope too low (<25 % of norm slope)	Calibrate again
Calibrate H_2O_2 not possible! Probe slope too high	H_2O_2 slope too high (>300 % of norm slope)	Calibrate again
H_2O_2 value too low H_2O_2 > x.xx ppm	H_2O_2 <2 % of measuring range	
Zero point too low Zero point too high	< 3.7 mA > 5 mA	Check probe/cable Repeat calibration in H_2O_2-free water

Measuring Range

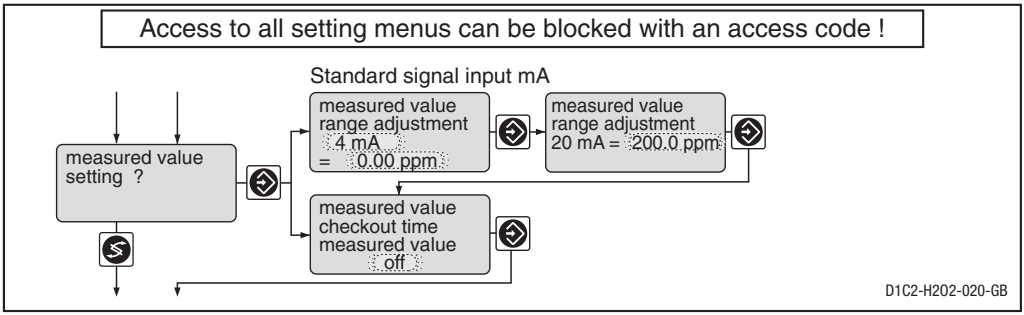


	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Measuring range	0...200 ppm	0...2.00 % 0...1.00 % 0...2000 ppm 0...200.0 ppm 0...50.00 ppm 0...20.00 ppm			

IMPORTANT

If the area allocation is changed, the H_2O_2 probe must be re-calibrated and all the menu settings must be checked!

Measured Value



IMPORTANT

If the area allocation is changed, the H_2O_2 probe must be re-calibrated and all the menu settings must be checked!

Checkout Time Measured Value

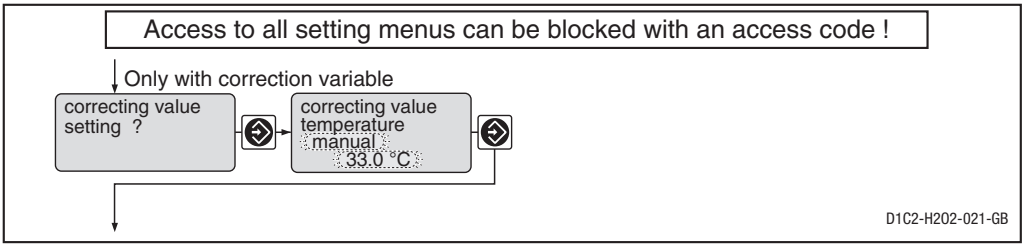
IMPORTANT

This function must not be enabled with applications where it can be assumed that the measured value does not change.

This function checks whether the measured value from the probe (at the measured value input) changes within the “measured value check time”. It is assumed that it will change with an intact probe.
If the measured value does not change during this check time, the DULCOMETER® D1C sets the controller output to “0” and the alarm relay drops off. The “Check H_2O_2 probe” message, for example, appears in the LCD display.

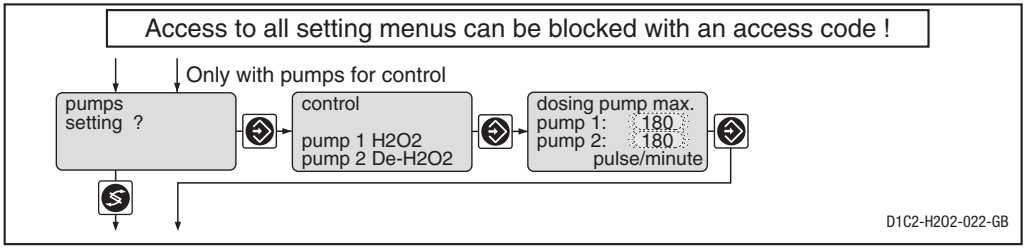
		Possible values			
	Initial value	Increment	Lower value	Upper value	Remarks
Standard signal input lower signal limit	4 mA	0 mA 4 mA			
Allocated measured value	0	0.01 %	-0.20 %	2.20 %	
lower	0	0.01 %	-0.10 %	1.10 %	
	0	1 ppm	-200 ppm	2200 ppm	
	0	0.1 ppm	-20.0 ppm	220.0 ppm	
	0	0.01 ppm	-5.00 ppm	55.00 ppm	
	0	0.01 ppm	-2.00 ppm	22.00 ppm	
upper	2 %	0.01%	-0.20 %	2.20 %	
	1 %	0.01 %	-0.10 %	1.10 %	
	2000 ppm	1 ppm	-200 ppm	2200 ppm	
	220 ppm	0.1 ppm	-20.0 ppm	220.0 ppm	
	50 ppm	0.01 ppm	-5.00 ppm	55.00 ppm	
	20 ppm	0.01 ppm	-2.00 ppm	22.00 ppm	
Checkout time	off	1 s	1 s	9999 s	Constant measurement signal results in message and alarm. Function off = 0 s

Correction Variable



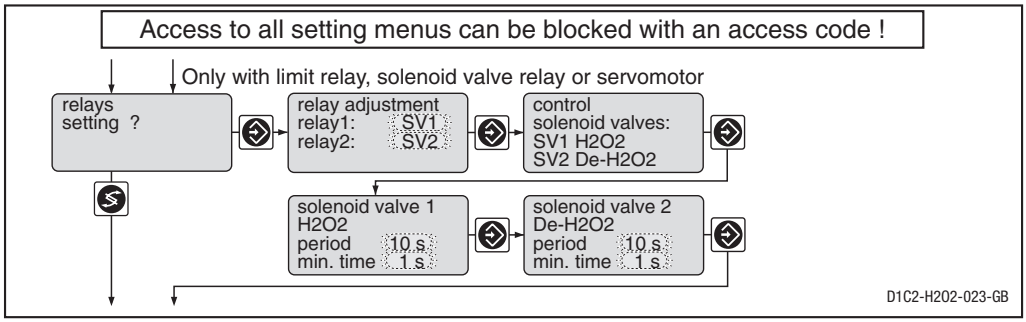
		Possible values			
	Initial value	Increment	Lower value	Upper value	Remarks
Type of temperature compensation	as per identity code	manual automatic off			Switching only when identity code shows = automatic
Manual temperature compensation	25 °C	0.1 °C	0 °C	100 °C	

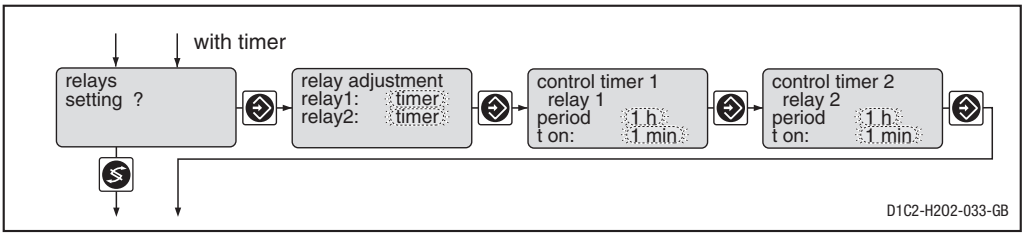
Pumps



	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Max. stroke/minute of pumps 1 and 2	180	1	1	500	off = 0 strokes/min

Relay for power control

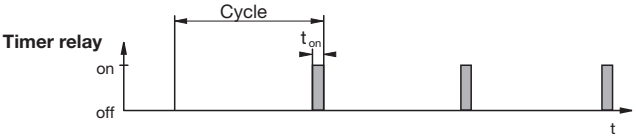




	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Relay adjustment	as per identity code				
Relay 1		Solenoid valve 1 Limit value 1* Actuator 1 Timer 1 Servomotor off			*For “limit value”, the relays remain active, even in the event of a fault. only with servomotor
Relay 2		Solenoid valve 2 Limit value 2* Actuator 2 Timer 2 off			
Period (Cycle) min. time	10 s 1 s	1 s 1 s	10 s 1 s	9999 s Cycle/2	for solenoid valve for solenoid valve Set here the smallest permitted operating factor of the connected device.
Period (Cycle) t on	off 1 min	1 h 1 min	1 h / off 1 min	240 h 60 min	for timer for timer

NOTE

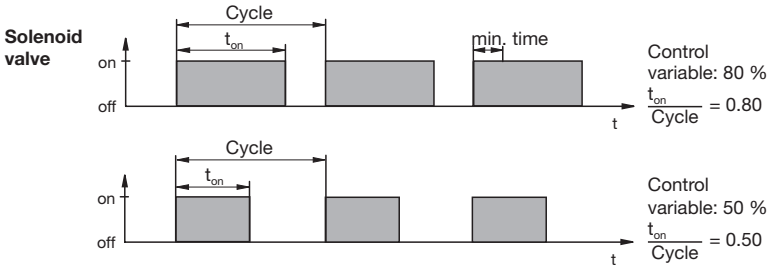
The limit value relay can be defined in such a way as to respond as a control element, i.e. if a limit value relay closes a circuit, it opens when a pause contact is activated and/or for a subsequent delay period t_d (if t_d is set to > 0 min in “General settings”).



IMPORTANT

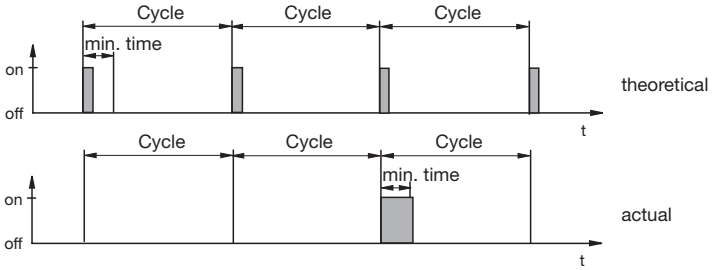
The timer will be reset if there is a drop in the power supply.

At the end of the (timer) cycle time, the DULCOMETER® D1C closes the assigned relay for the duration of “t on” (timer). “Pause” interrupts the timer.
When the clock is shown in the LC display, the timer can be reset to the start of the cycle at precisely this point using the enter button.
The % figure in the LC display indicates the progress of the current cycle.
Timer relays may be used, e.g. for shock metering or sensor cleaning.



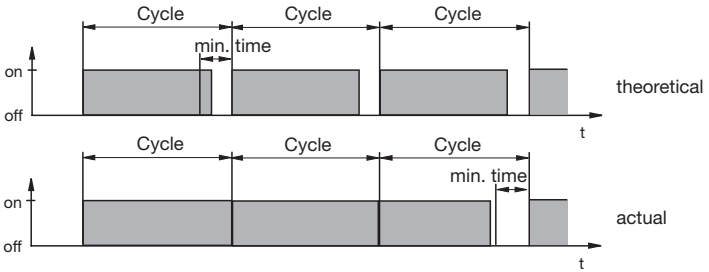
The switching time of the DULCOMETER® D1C (solenoid valve) depend on the actuating variable and the "min. time" (smallest permitted operating factor of the connected device).
The actuating variable determines the ratio t_{on}/cycle and thus the switching times (see fig. above).
The "min. time" influences the switching times in two situations:

a) theoretical switching time < min. time:



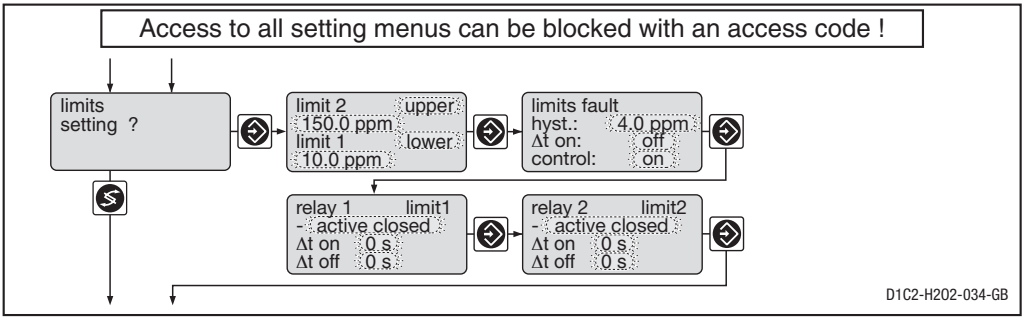
The DULCOMETER® D1C does not switch for a certain number of cycles until the sum of the theoretical switching times exceeds the "min. time". Then the DULCOMETER® D1C switches for the duration of this total time.

b) theoretical switching time > (cycle - min. time) and calculated switching time < cycle



The DULCOMETER® D1C does not deactivate for a certain number of cycles until the differences between cycle and theoretical switching time exceed the "min. time".

Limit values



		Initial value	Possible values Increment	Lower value	Upper value	Remarks
Type of limit transgression			upper			Limit transgression when
	Limit 1:	lower	lower			exceeding or dropping below value
	Limit 2:	upper	off*			*only with limit relay
Limit value	Limit 1:	0.50 %	0.01 %	2.20 %	-0.20 %	
	Limit 2:	1.50 %				
	Limit 1:	0.25 %	0.01 %	1.10 %	-0.10 %	
	Limit 2:	0.75 %				
	Limit 1:	100 ppm	1 ppm	2200 ppm	-200 ppm	
	Limit 2:	1500 ppm				
	Limit 1:	10.0 ppm	0.1 ppm	220.0 ppm	-20.0 ppm	
	Limit 2:	150.0 ppm				
	Limit 1:	2.50 ppm	0.01 ppm	55.00 ppm	-5.00 ppm	
	Limit 2:	37.50 ppm				
	Limit 1:	1.00 ppm	0.01 ppm	22.00 ppm	-2.00 ppm	
	Limit 2:	15.00 ppm				
Hysteresis limits		0.04 %	0.01 %	0 %	2.20 %	Effective in direction of
		0.02 %	0.01 %	0 %	1.10 %	“Cancelling limit transgression”
		40 ppm	1 ppm	0 ppm	2200 ppm	
		4.0 ppm	0.1 ppm	0 ppm	220.0 ppm	
		1.00 ppm	0.01 ppm	0 ppm	55.00 ppm	
		0.40 ppm	0.01 ppm	0 ppm	22.00 ppm	
Checkout time limits Δt on		off	1 s	1 s	9999 s	Results in message and alarm. off = 0 s: Function switched off, no message, no alarm
Control		on	on off			
Switching direction Limit value 1; Limit value 2		active closed	active closed active open			Acts as N/O Acts as N/C
Switch-on delay Δt on		0 s	1 s	0 s	9999 s	
Switch-off delay Δt off		0 s	1 s	0 s	9999 s	

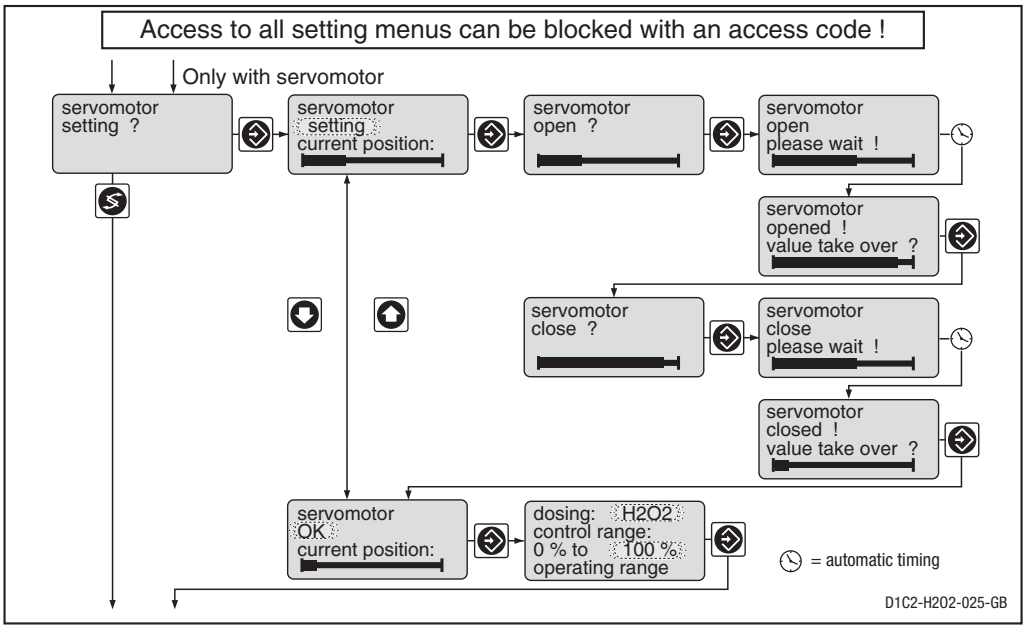
If the limit is exceeded for longer than the “Delay time - limit values” an error message is given, which must be acknowledged, and the alarm relay circuit is broken. If “Controller” is also set to “off” the control process stops.

Servomotor

The **operating range** is defined by the total resistance range of the feedback potentiometer. The maximum limit of the range actually used is set by defining the **control range**.

IMPORTANT

- ***Activation of the servomotor must be carried out with the same meticulous care as taken when calibrating a measuring probe.***
- ***To ensure correct operation, the activation time of the actuator used should not be less than 25 seconds for the control range from 0...100 %!***

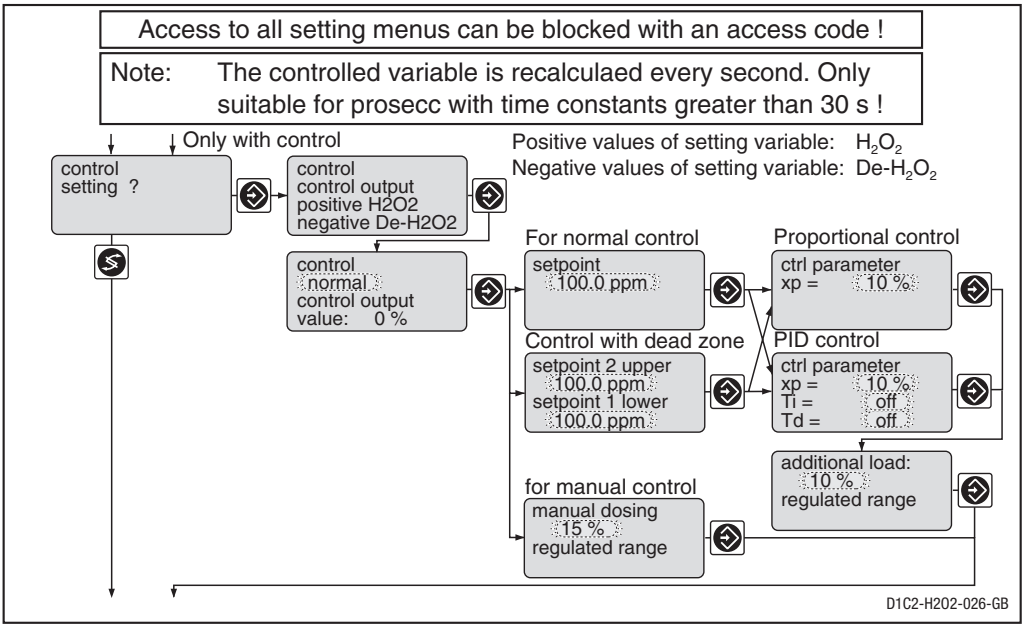


	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Servomotor	setting	setting ok off			
Control direction	H_2O_2	H_2O_2 De-H_2O_2			
Control range	100 %	1 %	10 %	100 %	in % of operating range

NOTE

- ***When the wide bar is as far right as it will go the stroke adjustment motor is fully open.***
- ***The permanent display shows to what degree the motor has opened in % (the greater the percentage, the farther open the stroke adjustment motor).***

Control

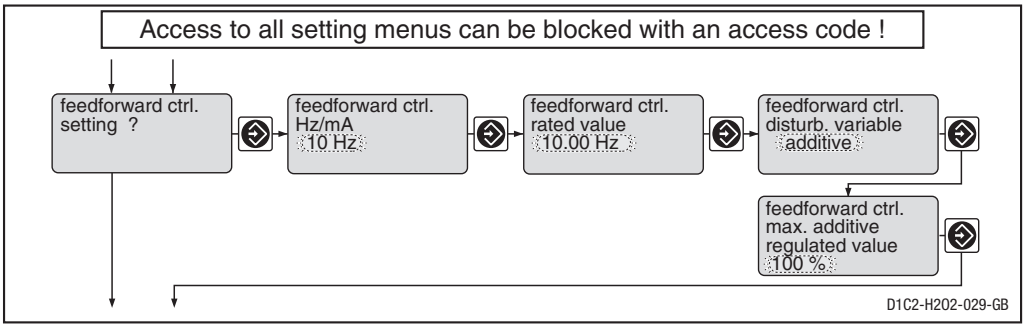


	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Control	normal	normal with dead zone manual			When controlling with dead zone, the regulated value is not used for measured values within the dead zone.
Setpoint setting	1.00 % 0.50 % 1000 ppm 100.0 ppm 25.00 ppm 10.00 ppm	0.01 % 0.01 % 1 ppm 0.1 ppm 0.01 ppm 0.01 ppm	2.10 % 1.05 % 2100 ppm 210.0 ppm 52.50 ppm 21.00 ppm	-0.10 % -0.05 % -100 ppm -10.0 ppm -2.50 ppm -1.00 ppm	2 setpoints necessary for control with dead zone. Setpoint 2 ≥ Setpoint 1
Control parameter xp	10 %	1 %	1 %	500 %	xp referred to measuring range
Control parameter Ti	off	1 s	1 s	9999 s	Function off = 0 s
Control parameter Td	off	1 s	1 s	2500 s	Function off = 0 s
Additional basic load	0 %	1 %	-100 %	+100 %	
Manual metering	0 %	1 %	-100 %	+100 %	

Abbreviations for control variables:

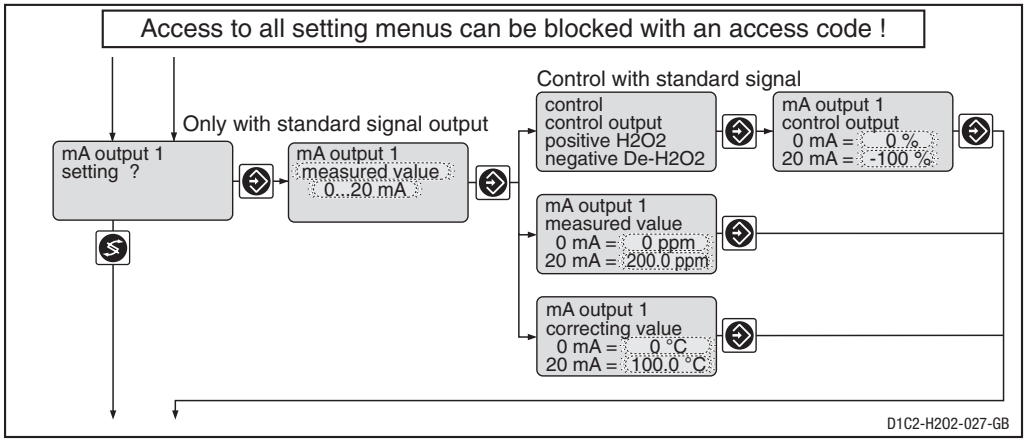
x_p: 100 %/Kp (inverse proportional coefficient)
T_i: Integration time of I-controller [s]
T_d: Differential time of D-controller [s]

Feed Forward Control

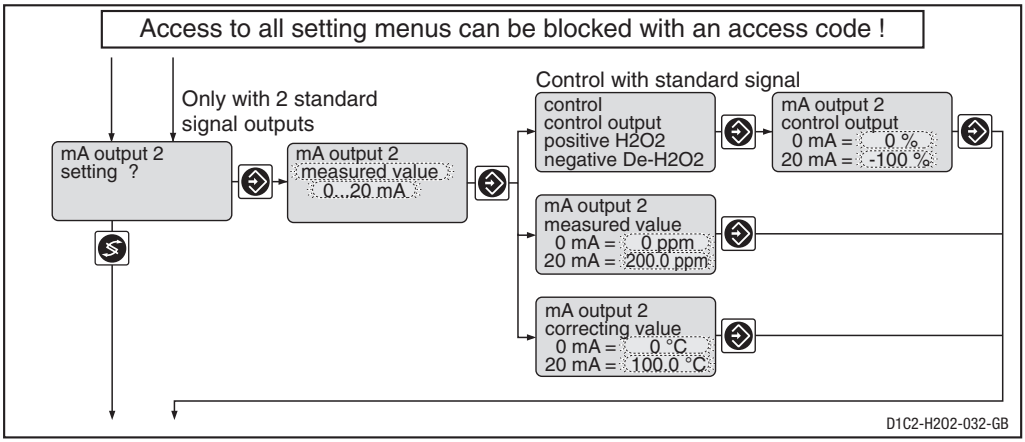


	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Feed forward control (Flow)	as per identity code at standard signal: 4–20 mA	None 10 Hz 500 Hz 0…20 mA 4…20 mA			Signal processing: Signal <0.02 Hz = No flow Signal <0.2 Hz = No flow Signal <0.2 mA = No flow Signal <4.2 mA = No flow
Feed forward control rated value	10 Hz 500 Hz 20 mA	0.01 Hz 1 Hz 0.1 mA	0.1 Hz 1 Hz 0/4 mA	10 Hz 500 Hz 20 mA	Depended on signal type. Maximum limitation of range used.
Feed forward control effect	multiplicative	multiplicative additive			
Max. add. regulated value	100 %	1 %	-500 %	+500 %	only with add. feed forward control

Standard Signal Output 1



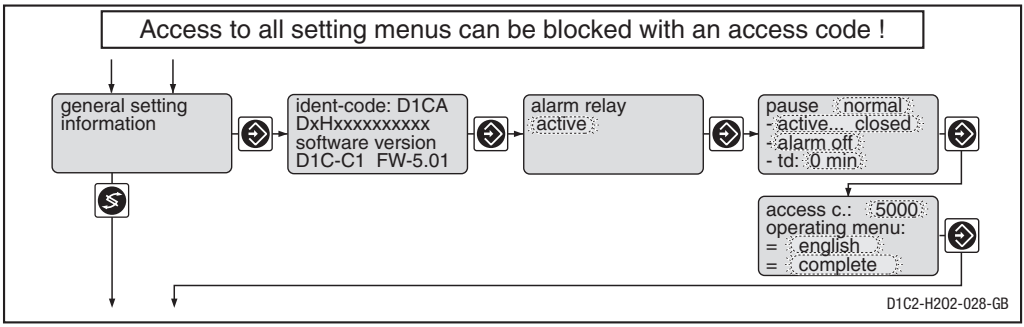
Standard Signal Output 2



	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Variable allocation	as per identity code	Measured value Control output variable Correcting value			If control is present only with correcting variable
Output range	0…20 mA	0…20 mA 4…20 mA 3.6/4-20 mA			Reduction to 3.6 mA when alarm relay switches (not limit value violation)
Range measured value	0...2.00 % 0...1.00 % 0...2000 ppm 0...200.0 ppm 0...50.00 ppm 0...20.00 ppm	0.01 % 0.01 % 1 ppm 0.1 ppm 0.01 ppm 0.01 ppm	-0.20 % -0.10 % -200 ppm -20.0 ppm -5.00 ppm -2.00 ppm	2.20 % 1.10 % 2200 ppm 220.0 ppm 55.00 ppm 22.00 ppm	Minimum range 1 %
Range control output variable	-100 %...0 %	1 %	-100 %	+100 %	Minimum range 1 %
Range correcting value	0...100 °C	0.1 °C	0 °C	100 °C	Minimum range 1 °C

Complete Operating Menu / Description

General Setting



	Initial value	Possible values Increment	Lower value	Upper value	Remarks
Alarm relay	active	active not active			
Pause	normal	normal hold			
Control input pause	active closed	active closed active open			acts as N/O acts as N/C
Pause alarm	alarm off	alarm off alarm on			Alarm relay can be activated by pause contact.
td	0 min	1 min	0 min	60 min	
Access code	5000	1	1	9999	
Language	as per identity code	as per identity code			
Operating menu	complete	restricted complete			

Standard Pause

If the pause-switch is off, the DULCOMETER® D1C sets the operating outputs to “0” for as long as the pause-switch is off or for a set time-delay t_d (if t_d is set to > 0 min). Whilst the pause-switch is off, the D1C establishes the P-proportion in the background.
With PID-control (Identity code characteristics “control characteristic” = 2): the I-proportion is stored when the pause is switched off (I-proportion then usually only present if Ti > 0 has been selected in the “Control setting?” setting menu).
Exception: the standard signal outputs mA for the measured value or correction value are not affected by the pause.
After pause is activated the operating outputs remain at “0” for the length of the time-delay t_d. The time-delay t_d must be set up in such a way that, in this time e.g. sample water (process-specific current concentration) flows to the sensor.
With PID-control (Identity code characteristics “control characteristic” = 2): The control variable output resulting from the pause and the expiry of the time-delay t_d is reconciled jointly with the current P-component and (if Ti is set > 0) with the stored I-component.

Pause Hold

If the pause-switch is off, the DULCOMETER® D1C freezes the operating output at the most recent value for as long as the pause-switch is off or for a set time-delay t_d (if t_d is set to > 0 min). Whilst the pause-switch is off, the D1C establishes the P-proportion in the background.
With PID-control (Identity code characteristics “control characteristic” = 2):
Even the mA standard signal outputs for measured value or correction value are frozen.
After pause is activated the operating outputs remain frozen for the length of the time delay t_d. The time delay t_d must be set up in such a way that, in this time e.g. sample water (process-specific current concentration) flows to the sensor.
With PID-control (Identity code characteristics “control characteristic” = 2): The control variable output resulting from the pause and the expiry of the time-delay t_d is reconciled jointly with the current P-proportion and (if Ti is set > 0) with the newly established I-proportion.

Access Code

Access to the setting menu can be prevented by setting up an access code. The DULCOMETER® D1C controller is supplied with the access code 5000 which permits free access to the setting menu. The calibration menu remains freely accessible even when access to the setting menu is blocked by the code.

Fault	Fault text	Symbol	Effect on metering	Effect on control	Alarm with acknowledgement	Remarks	Remedy
Measured value Checkout time measured value exceeded	*Check H_2O_2 sensor*	Ɛ	Basic load	Stop	Yes	Function defeatable	Check function of probe, extend check time
Signal exceeded/drops below value	*H_2O_2 input < 3 mA* *H_2O_2 input > 23 mA*	Ɛ	Basic load	Stop	Yes	Signal <3.0 ±0.2 mA or >23 ±0.2 mA	Check probe, transducer and cable connection
Calibration probe with error	*calibration H_2O_2 not possible!*	Ɛ	Basic load	Stop	No	Metering continues in case of error with unsteady measured values	Check probe, replace if necessary, recalibrate if necessary
Correction measured variable Signal exceeded/drops below value	*temp. input* ↑↓	Ɛ			yes	Pt100-signal >138.5 Ω Signal <3.0 ±0.2 mA or >23 ±0.2 mA Value last valid is used	Check probe, transducer and cable connection
Feed forward control Signal drops below value multiplicative additive Signal exceeded	*feedfwd. < 4 mA* *feedfwd. > 23 mA*	Ɛ Ɛ	Stop		Yes Yes	Signal <3.8 ±0.2 mA or >23 ±0.2 mA Value last valid is used	Check probe, transducer and cable connection
Limit transgression after checkout time limit value Control “on” Control “off”	*H_2O_2 limit 1* *H_2O_2 limit 2*	Ɛ Ɛ	Stop or Basic load	Stop	Yes Yes	Function defeatable	Define cause, reset values if necessary
Servomotor Position not reached	*Servomotor defective*	Ɛ			Yes	Servomotor closes	Check servomotor
Electronics error	*System error*	Ɛ O	Stop	Stop	Yes	Elektronic data defective	Call in service

Operation	Note text	Symbol	Effect on metering	Effect on control	Alarm with acknowledgement	Remarks	Remedy
Pause contact	*Pause*	Ɛ O	Stop	Stop	No/Yes*	No further fault check	–
	Pause/Hold	Ɛ		PI-part frozen			
Stop button	*Stop*	Ɛ O	Stop	Stop	No	Relay drops out	–
During calibration probe			Basic load + Feed forward control	Stop in complete operating menu	No	No error processing of measured variable	–
Probe slope too low Probe slope too high	*Slope low* *Slope high*	Ɛ	Basic load	Stop	No	25% > probe of slope > 300% norm slope	Check probe, replace if necessary
H_2O_2-value <2 % measuring range	*H_2O_2 too low*					< 2 % from meas. range	
Zero point	*Zero point low* *Zero point high*	Ɛ	Basic load	Stop	No	Signal < 3 mA Signal > 5 mA	Check probe/cable Repeat calibration in H_2O_2-free water
During servomotor setting Position feed back wrong Upper position <40 % max. value Lower position >30 % range	*Direction check* *Final value small* *Final value big*					Without correct adjustment the last valid values are still used	Check connection of relay, potentiometer Adjust the operation region of the servomotor correctly

*dependent on whether “Alarm on” or “Alarm off” is set in “General settings”

Operating Instructions DULCOMETER® D1C, Part 2/H_2O_2 for sensor PER 1
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