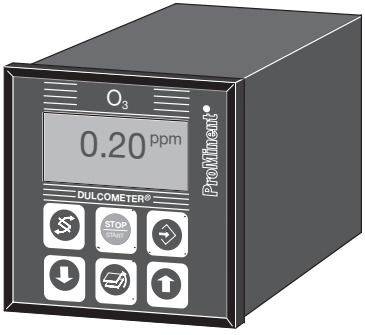
# Operating Instructions

## DULCOMETER® D1C

Part 2: Adjustment and Operation,
Measured Variable Ozone

D1C2-03-001-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 warranty shall be invalidated by damage caused by 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 panel installation) |
| 3 | 100 V 50/60 Hz (only with panel installation) |
| 4 | 24 V AC/DC |
| | **Measured variable** |
| Z | Ozone |
| | **Connection of measured variable** |
| 1 | Terminal, standard signal 0/4-20 mA |
| | **Correction variable** |
| 0 | None |
| 2 | Temperature (PT100) via terminal |
| 3 | Temperature via standard signal 0/4-20 mA |
| | **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 |
| P | Polish |
| A | Swedish |
| U | Hungarian |
| G | Czech |

| D1C A | _ _ _ _ _ _ _ _ _ _ _ _ _ _ |
|---|---|

**Please enter the identity code of your device here!**

# 2 Contents / General User Information



## General User Information

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

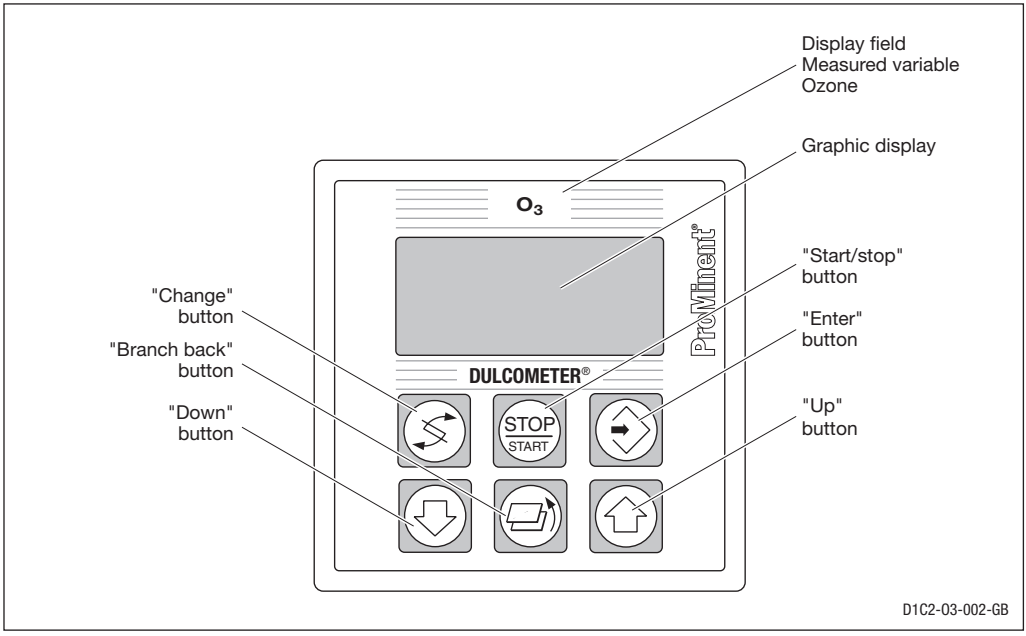
***IMPORTANT***

- ***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 purpose of documenting the controller settings.***

# 3 Device Overview / Controls




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

| | |
|---|---|
|  | UP button<br>To increase a displayed numerical value and to change variables (flashing display) |
|  | BRANCH BACK button<br>Back to permanent display or to start of relevant setting menu. |
|  | DOWN button<br>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 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.

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).

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:

*Control variable = Feed forward variable/rated value x calculated control variable*

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

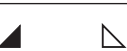
*Control variable (max. 100 %) = Feed forward variable/rated value x max. control variable + calculated control variable*

## 4.5 Error Messages

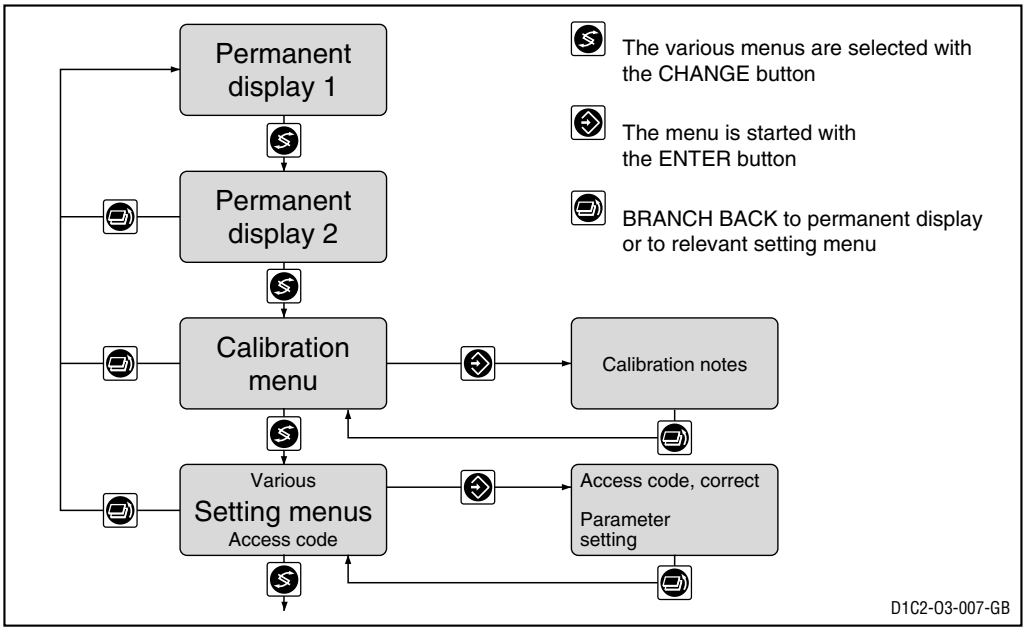
Error messages and information are indicated on the bottom line in the permanent display 1. Errors to be acknowledged (acknowledgement switches off the alarm relay) are indicated by the "E". Errors/notes which still apply after acknowledgement are indicated alternately. During correction variable processing (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<br>Relay 1, upper | Symbol<br>left |  |
| Relay 1, lower | Symbol<br>left |  |
| Relay 2, upper | Symbol<br>right |  |
| Relay 2, lower | Symbol<br>right |  |
| Metering pump 1 (ozone)<br>Control off | Symbol<br>left |  |
| Control on | Symbol<br>left |  |
| Metering pump 2 (De-ozone)<br>Control off | Symbol<br>right |  |
| Controll on | Symbol<br>right |  |
| Solenoid valve 1 (ozone)<br>Controll off | Symbol<br>left |  |
| Controll on | Symbol<br>left |  |
| Solenoid valve 2 (De-ozone)<br>Controll off | Symbol<br>right |  |
| Control on | Symbol<br>right |  |
| Servomotor<br>Control, open relay | |  |
| Control, close relay | |  |
| Without control | |  |
| Position feedback | Thickness of bar<br>increases from left to right<br>during opening |  |
| Stop button pressed | |  |
| Manual metering | |  |
| Fault | |  |

# 6 Operation



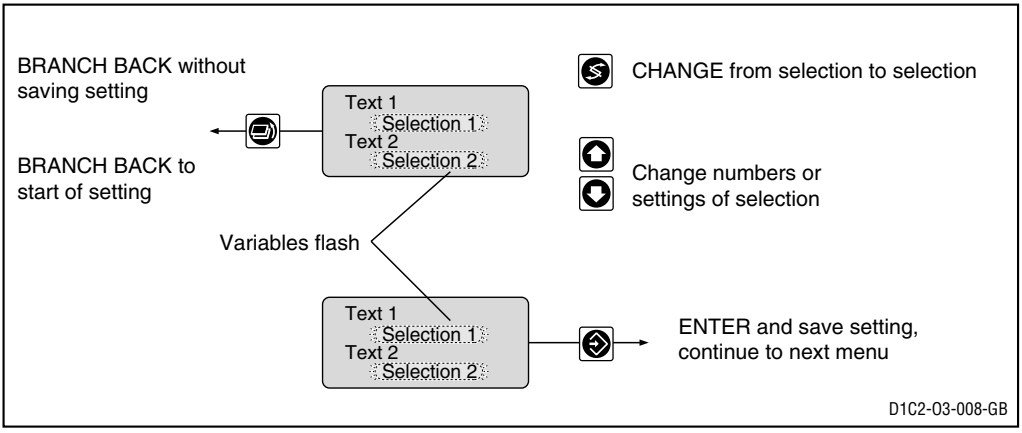

***NOTE***

***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!***

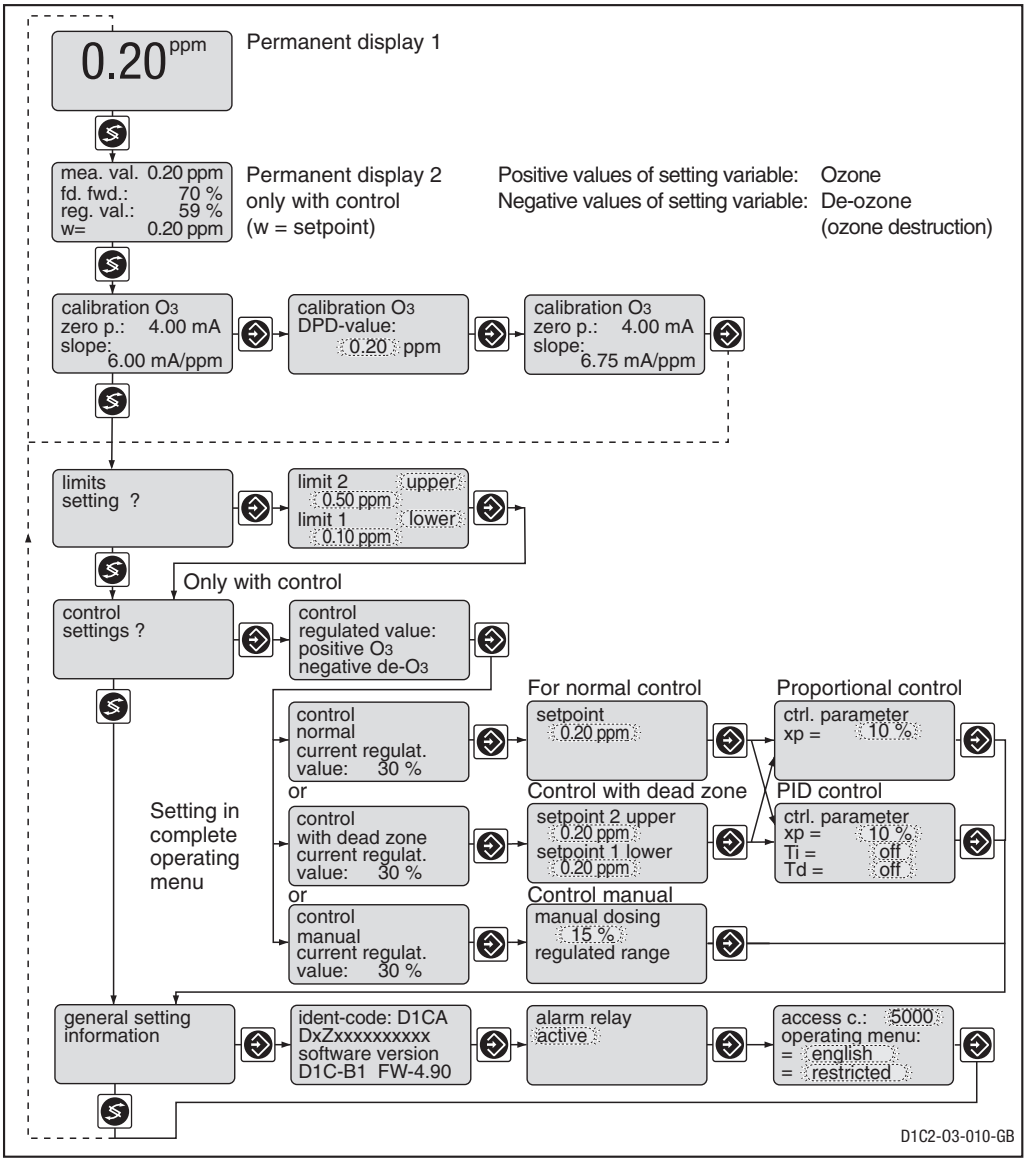
***If the access code is selected correctly in a setting menu, then the following setting menus are also accessible!***

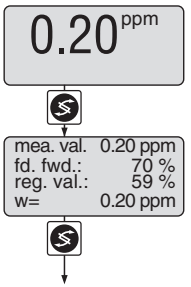
***If within a period of 10 minutes no button is pushed, the unit automatically branches back from the calibrating menu or a setting menu to the permanent display 1!***



# 7 Restricted Operating Menu / Layout

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






Permanent display 1

Permanent display 2
only with control
(w = setpoint)

Positive values of setting variable: Ozone
Negative values of setting variable: De-ozone
($O_3$-destruction)

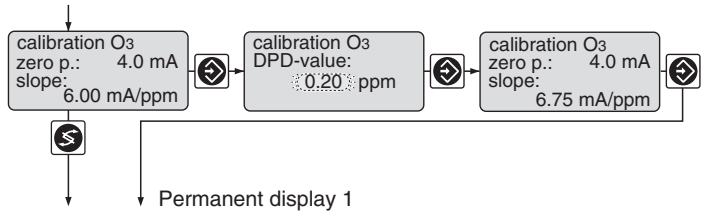
D1C2-O3-011-GB

**Calibration the Ozone Probe**

During the calibration, the D1C sets the control variable to "0". Exception: If a base load or manual control variable was set, these are maintained during the calibration. The standard signal outputs mA (measured value or correction value) are frozen. The measured value registered during the start of the calibration is proposed as the DPD value; this value is adjustable (arrow keys). Calibration is only possible if the DPD value is ≥ 2 % of the measuring range. On successful completion of calibration, all error checks which refer to the measured value are restarted.

***IMPORTANT***

***The measuring range of the probe must agree with the set measuring range (factory setting: 0-2 ppm). The measuring range must be reset prior to calibration (refer to page 14 "Measured value setting").***

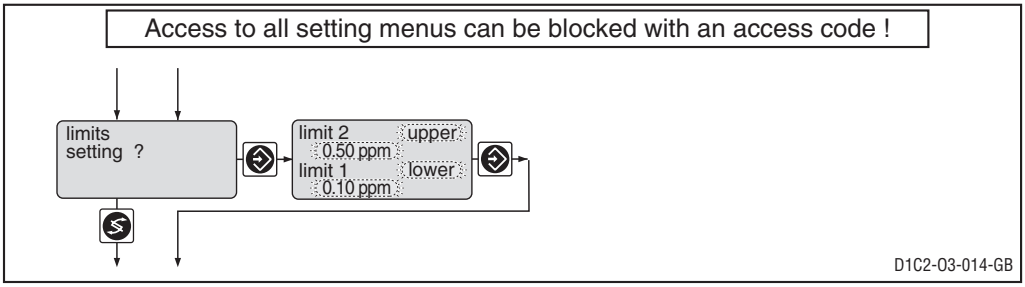



D1C2-O3-012-GB

| | Initial value | Possible values Increment | Lower value | Upper value | Remark |
|---|---|---|---|---|---|
| | Measured value | 0.01 ppm | 0 ppm | 20 ppm | |

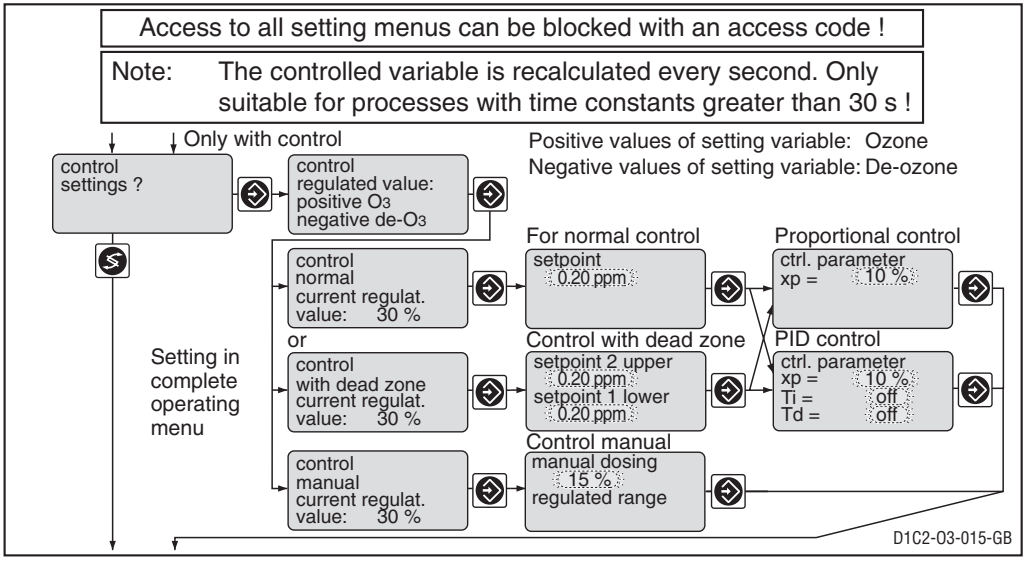
| Error message | Condition | Remarks |
|---|---|---|
| Calibration $O_3$ not possible!<br>Probe slope too low | $O_3$ slope too low<br>(<25% of norm slope) | Calibrate again |
| Calibration $O_3$ not possible!<br>Probe slope too high | $O_3$ slope too high<br>(>300% of norm slope) | Calibrate again |
| DPD value too low<br>DPD > x.xx ppm | DPD <2 % of the measuring range | Calibrate again after adding ozone |

**Limits**




| | | Initial value | Possible values: Increment | Lower value | Upper value | Remark |
|---|---|---|---|---|---|---|
| Type of limit transgression | Limit 1: | lower | upper | | | Limit transgression when exceeding or dropping below value *) only with limit relays |
| | Limit 2: | upper | lower<br>off*) | | | |
| Limit value | Limit 1: | 0.1 ppm | 0.01 ppm | 0.00 ppm | 20.00 ppm | |
| | Limit 2: | 0.5 ppm | 0.01 ppm | 0.00 ppm | 20.00 ppm | |

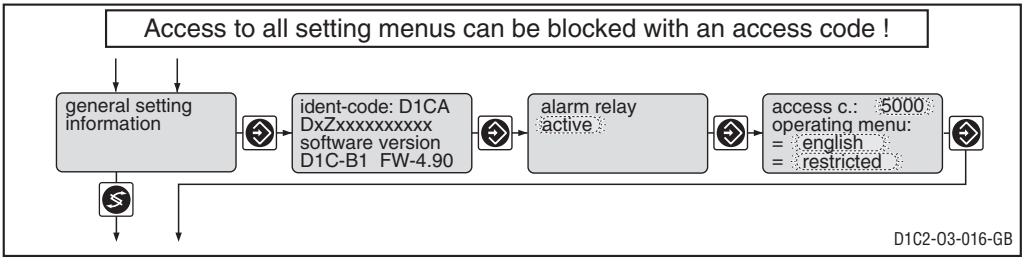
**Control**



# Restricted Operating Menu / Description

| | Initial value | Possible values Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Setpoint | 0.20 ppm | 0.01 ppm | lower limit measuring range | upper limit measuring range | 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 |
| Manual metering | 15 % | 1 % | -100 % | +100 % | |

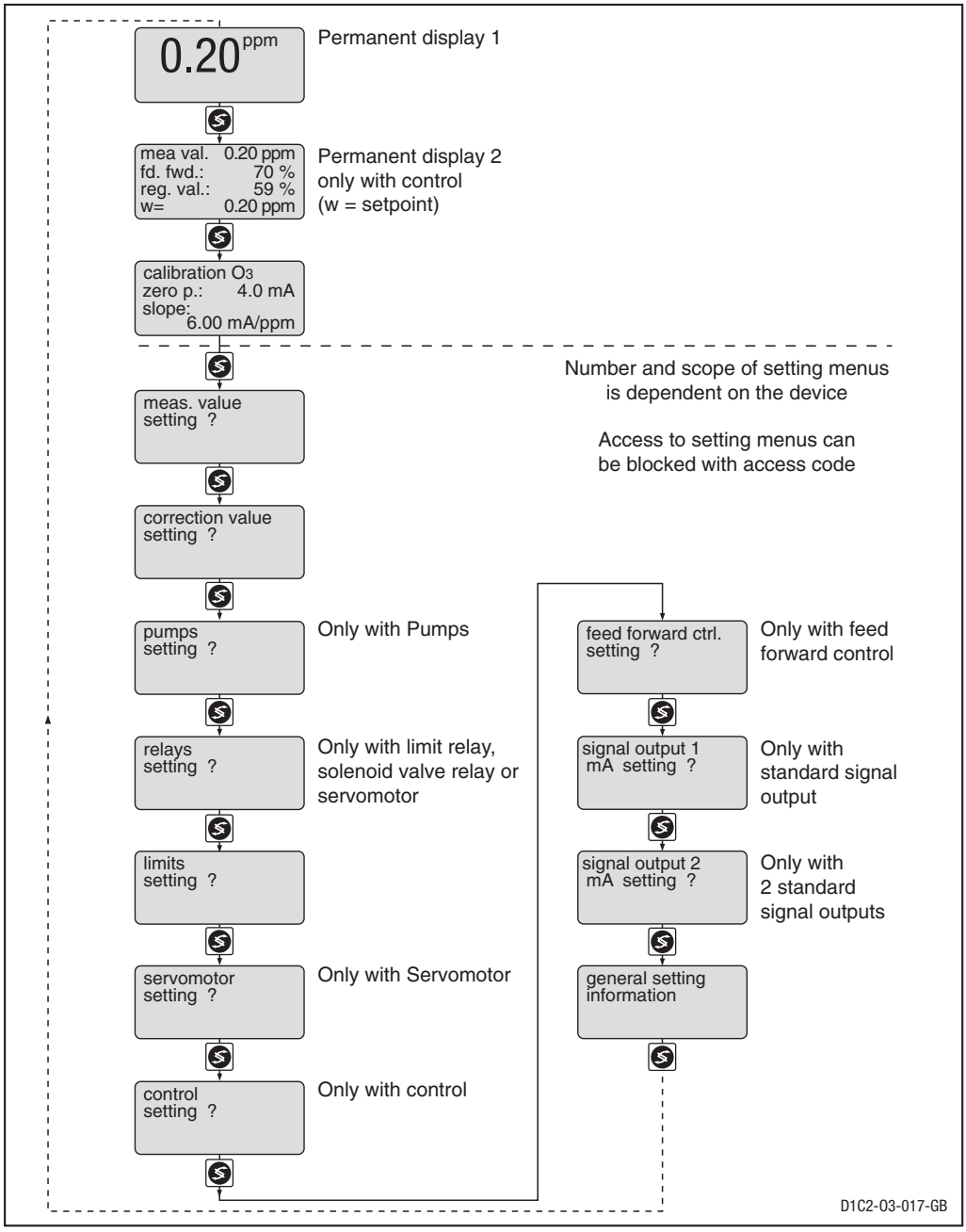
**General Settings**

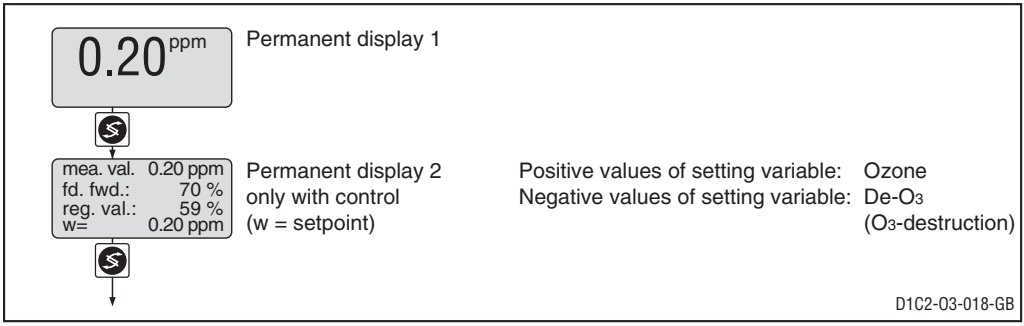



| | Initial value | Possible values Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Alarm relay | active | active<br>not active | | | |
| Access code | 5000 | 1 | 1 | 9999 | |
| Language | as per identity code | German<br>English<br>French<br>Italian<br>Dutch<br>Spanish<br>Polish<br>Swedish<br>Hungarian<br>Czech | | | |
| Operating menu | restricted | restricted<br>complete | | | |

# 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:



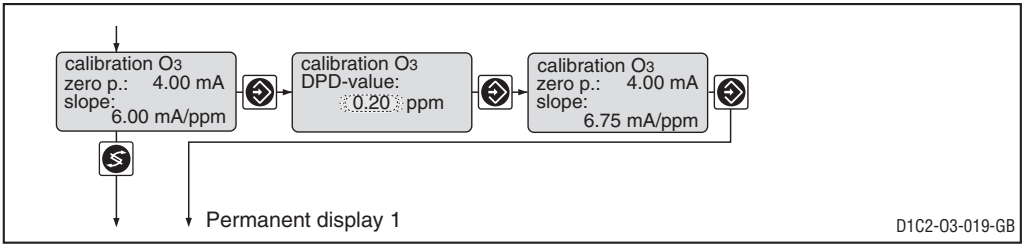



**Calibration the Ozone Probe**

During the calibration, the D1C sets the control variable to "0". Exception: If a base load or manual control variable was set, these are maintained during the calibration. The standard signal outputs mA (measured value or correction value) are frozen. The measured value registered during the start of the calibration is proposed as the DPD value; this value is adjustable (arrow keys). Calibration is only possible if the DPD value is ≥ 2 % of the measuring range. On successful completion of calibration, all error checks which refer to the measured value are restarted.

***IMPORTANT***

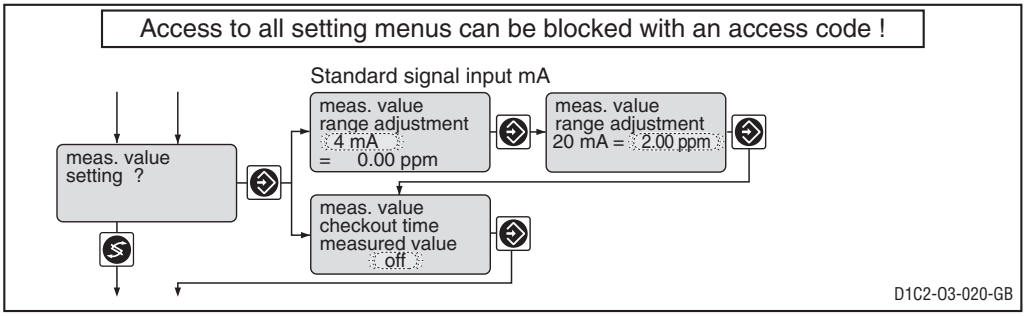
***The measuring range of the probe must agree with the set measuring range (factory setting: 0-2 ppm). The measuring range must be reset prior to calibration (refer to page 14 "Measured value setting").***




| | | Possible values | | | |
|---|---|---|---|---|---|
| | Initial value | Increment | Lower value | Upper value | Remark |
| | Measured value | 0.01 ppm | 0 ppm | 20 ppm | |

| Error message | Condition | Remark |
|---|---|---|
| Calibration $O_3$ not possible!<br>Probe slope too low | $O_3$ slope too low<br>(<25% of norm slope) | Calibrate again |
| Calibration $O_3$ not possible!<br>Probe slope too high | $O_3$ slope too high<br>(>300% of norm slope) | Calibrate again |
| DPD value too low<br>DPD > x.xx ppm | DPD <2 % of the measuring range | Calibrate again after adding ozone |

**Measured Value**




***IMPORTANT***

***When changing the range adjustment, the ozone probe must be new calibrated and the adjustments in all menus have to be checked!***

**Measured value control period**

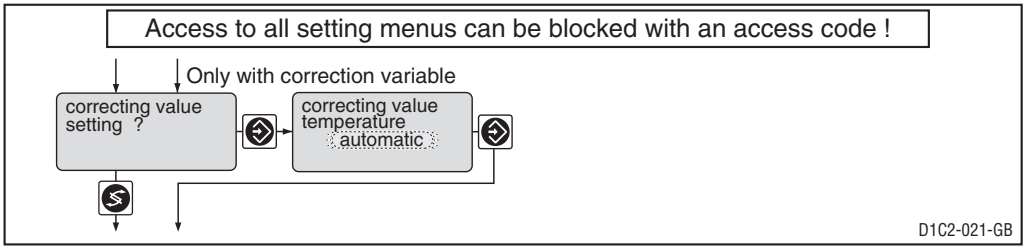
***IMPORTANT***

***This function may not be activated for applications in which it can be assumed that the measured value will not change.***

This function tests whether the measured value changes from that of the probe (at the measured value input) within the "Measured value control period". It is assumed that it will do so for an intact probe.
If the measuring value does not change during this control time, the DULCOMETER® D1C sets the control variable to „0“ and the alarm relay drops out. The LCD display shows e.g. the message “Check pH probe”.

| | | Possible values | | | |
|---|---|---|---|---|---|
| | Initial value | Increment | Lower value | Upper value | Remarks |
| Standard signal input<br>lower signal limit | 4 mA | 0 mA<br>4 mA | | | |
| Allocated measured value | | | | | |
| lower | 0 ppm | | | | |
| upper | 2 ppm | 0.01 ppm | 0.00 ppm | 20.00 ppm | |
| Checkout time | off | 1 s | 1 s | 9999 s | Constant measurement signal results in message and alarm. Function off = 0 s |

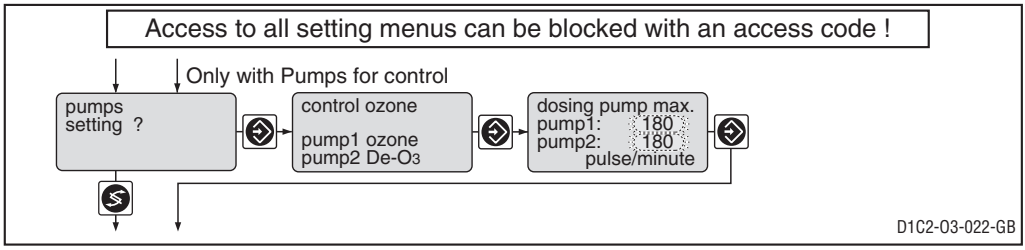
**Correction Variable***




*The setting menu “Correction variable” enables this device to display the temperature or to receive a temperature-proportional mA signal. There will be no temperature correction of the measured value!

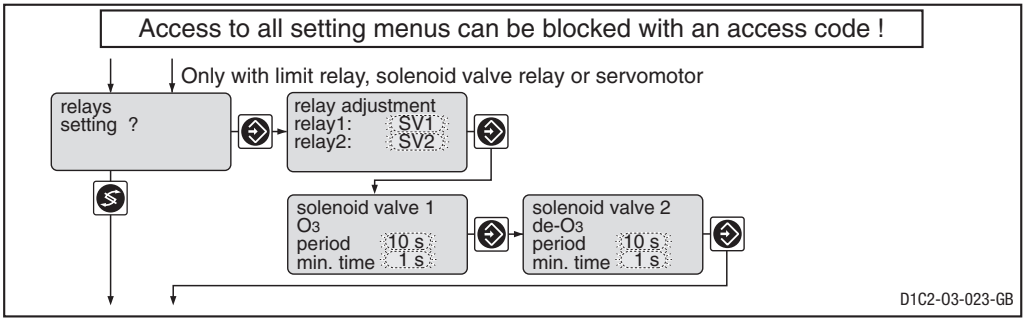
| | Initial value | Possible values Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Type of temperature compensation | as per identity code | Manual<br>Automatic<br>off | | | Changeover only if specified in identity code = automatic |
| Manual temperature compensation | 25 °C | 0.1 °C | 0 °C | 100 °C | |

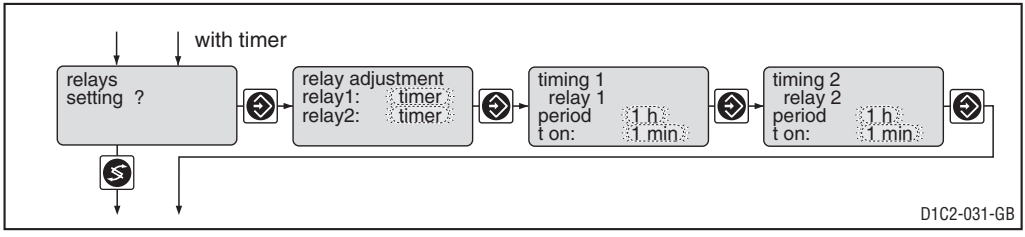
**Pumps**



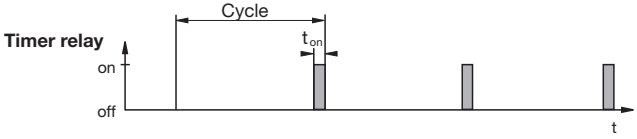

| | Initial value | Possible values Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Max. stroke/minute of pumps 1 and 2 | 180 | 1 | 1 | 500 | off = 0 strokes/min |

**Relay for power control**



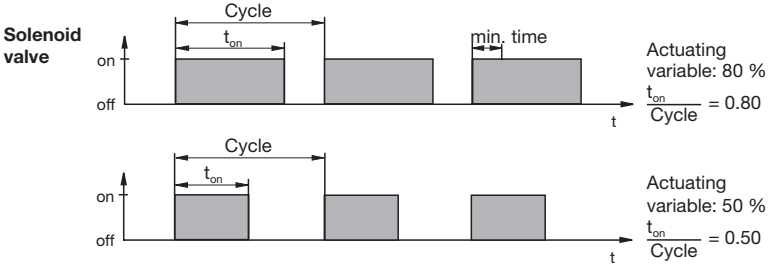
| | Initial value | Possible values<br>Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Relay adjustment | as per identity code | | | | |
| Relay 1 | | Solenoid valve 1<br>Limit value 1*<br>Actuator 1<br>Timer 1<br>Servomotor<br>off | | | *At "limit value" the relays remain active also in the case of fault.<br>Only with servomotor |
| Relay 2 | | Solenoid valve 2<br>Limit value 2*<br>Actuator 2<br>Timer 2<br>off | | | |
| Cycle | 10 s | 1 s | 10 s | 9999 s | for solenoid valve |
| min. time | 1 s | 1 s | 1 s | Cycle/2 | for solenoid valve |
| Cycle | off | 1 h | 1 h/off | 240 h | for timer |
| t on | 1 min | 1 min | 1 min | 60 min | for timer |




***IMPORTANT***

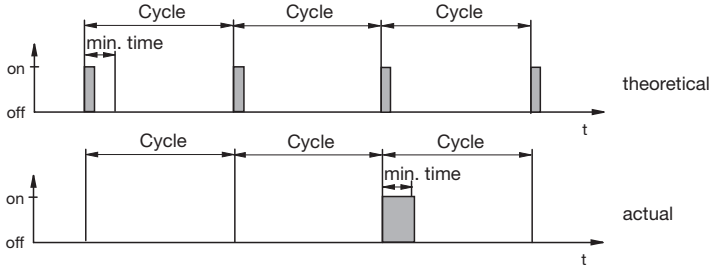
***The timer will be reset if there is a drop in the power supply.***

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.



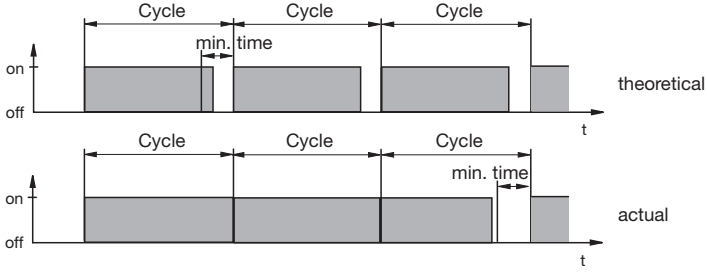

The switching time of the DULCOMETER® D1C (solenoid valve) depends on the actuating variable and the "min. time" (smallest permitted operating factor of the connected device).
The actuating variable determines the ratio $t_{on}$/cycle and thus the switching times (see fig. above).
The "min. time" influences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

a) theoretical switching time < min. time:



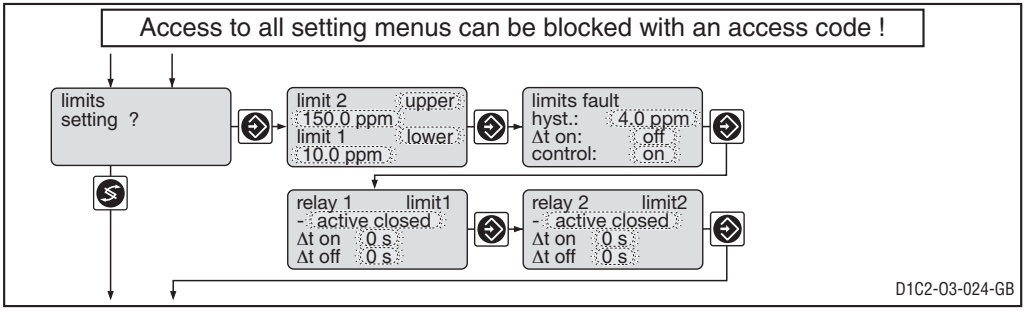

The DULCOMETER® D1C does not switch for a certain number of cycles until the sum of the theoretical switching times exceeds the “min. time”. Then the DULCOMETER® D1C switches for the duration of this total time.

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”.

**Limits**




| | Initial value | Possible values<br>Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Type of limit trans-<br>gression Limit 1:<br>Limit 2: | <br>lower<br>upper | <br>upper<br>lower<br>off *) | | | Limit transgression<br>when exceeding or<br>dropping below value<br>*) only with limit relays |
| Limit value Limit 1:<br>Limit 2: | 0.10 ppm<br>0.50 ppm | 0.01 ppm<br>0.01 ppm | 0.00 ppm<br>0.00 ppm | 20.00 ppm<br>20.00 ppm | |
| Hysteresis limits | 0.04 ppm | 0.01 ppm | 0.02 ppm | 20.00 ppm | Effective in direction of<br>"cancelling limit transgression" |
| Checkout time limits t on | off | 1 s | off | 9999 s | Results in message and<br>alarm. off = 0 s:<br>Function switched off,<br>no message, no alarm. |
| Control | on | on<br>off | | | |
| Switching direction<br>Limit value 1, Limit value 2 | active closed | active closed<br>active open | | | Acts as N/O<br>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 "control" is also set to "off" the control process stops.

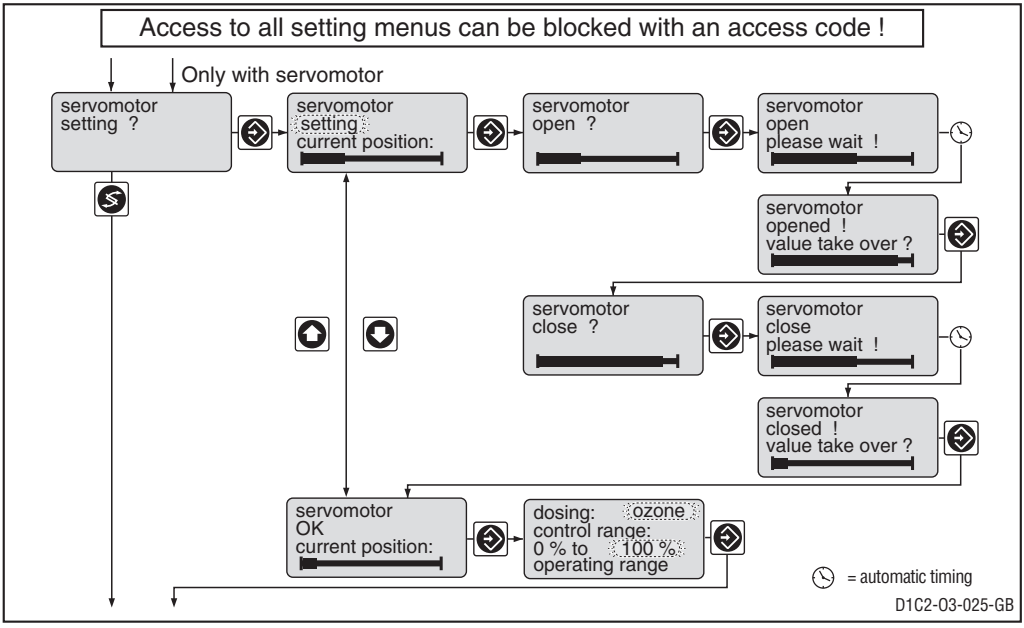
# Complete Operating Menu / Description

**Servomotor**

Activation of the servomotor must be carried out with the same meticulous care as taken when calibrating a measuring probe. 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***

***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 %!***

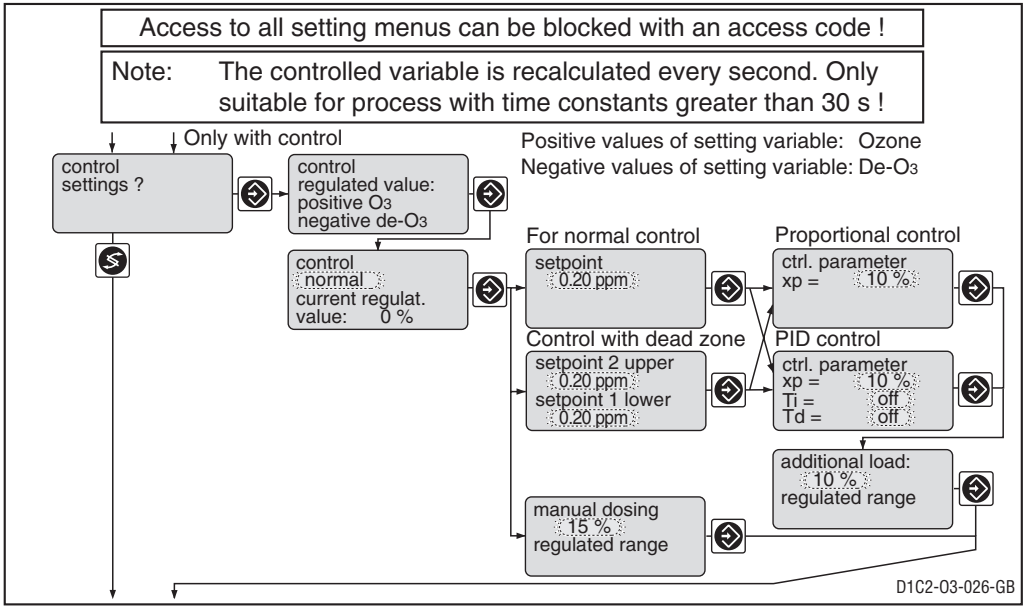



| | Initial value | Possible values<br>Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Servomotor | setting | setting<br>OK<br>off | | | |
| Control direction | Ozone | Ozone<br>de-ozone | | | |
| Control range | 100 % | 1 % | 10 % | 100 % | in % of operating range |

***NOTE***

- ***When the wide bar is as 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.)***

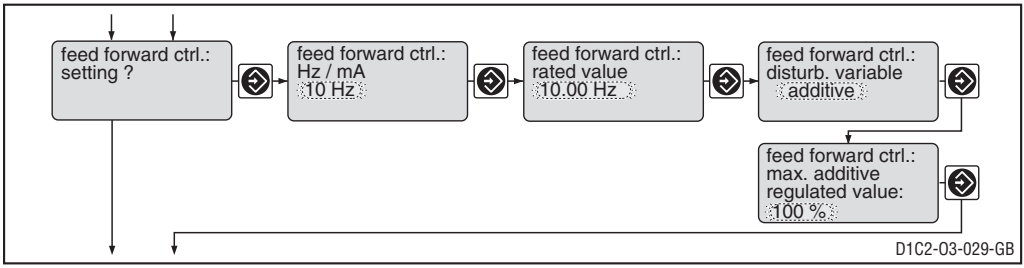
**Control**




| | Initial value | Possible values: Increment | Possible values: Lower value | Possible values: Upper value | Remarks |
|---|---|---|---|---|---|
| Control | normal | normal<br>with dead zone<br>manual | | | When controlling with dead zone, the feed forward control is not used for measured values within the dead zone. |
| Setpoint | 0.20 ppm | 0.01 ppm | Lower measure-ment range limit | Lower measure-ment range limit | 2 setpoints necessary for control with dead zone.<br>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 |
| Additional load | 0 % | 1 % | -100 % | +100 % | |
| Manual metering | 15 % | 1 % | -100 % | +100 % | |

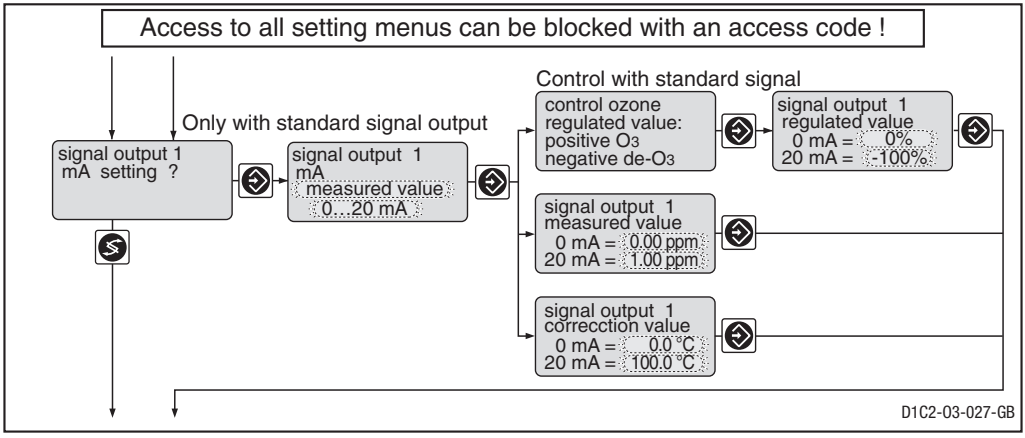
Abbreviation for control variables:
$x_p$ = 1/Kp (inverse proportional co-efficient)
$T_i$ = I controller integration time [s]
$T_d$ = D controller differential time [s]

**Feed forward control**

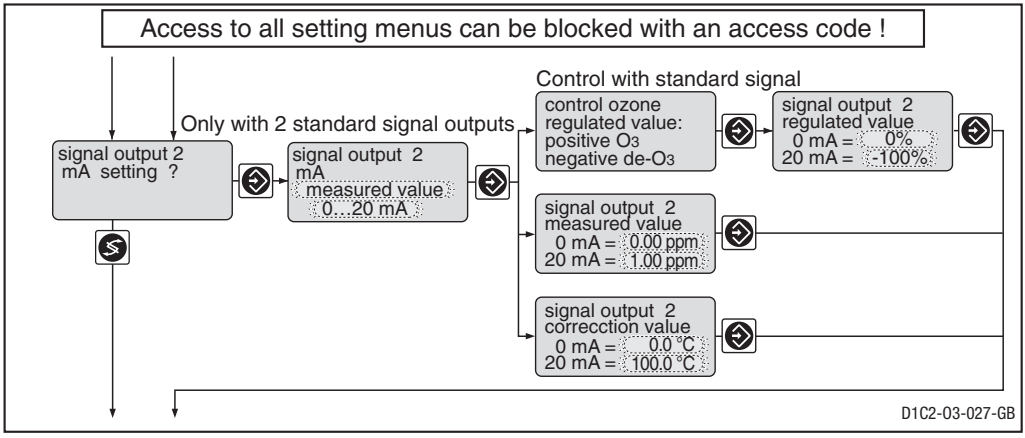



| | Initial value | Possible values<br>Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Feed forward control (Flow) | as per identity code<br><br>Standard signal 4-20 mA | None<br>10 Hz<br>500 Hz<br>0…20 mA<br>4…20 mA | | | Signal processing:<br>Signal <0,02 Hz = No flow<br>Signal <0,2 Hz = No flow<br>Signal <0,2 mA = No flow<br>Signal <4,2 mA = No flow |
| Feed forward control rated value | 10 Hz<br>500 Hz<br>20 mA | 0.01 Hz<br>1 Hz<br>0.1 mA | 0.1 Hz<br>5 Hz<br>0/4 mA | 10 Hz<br>500 Hz<br>20 mA | Depended on signal type.<br>Maximum limitation of range used. |
| Feed forward control effect | multiplicative | multiplicative<br>additive | | | |
| Max. additive regulated value | 100 % | 1 % | -500 % | +500 % | only with additive feed forward control |

**Standard Signal Output 1**



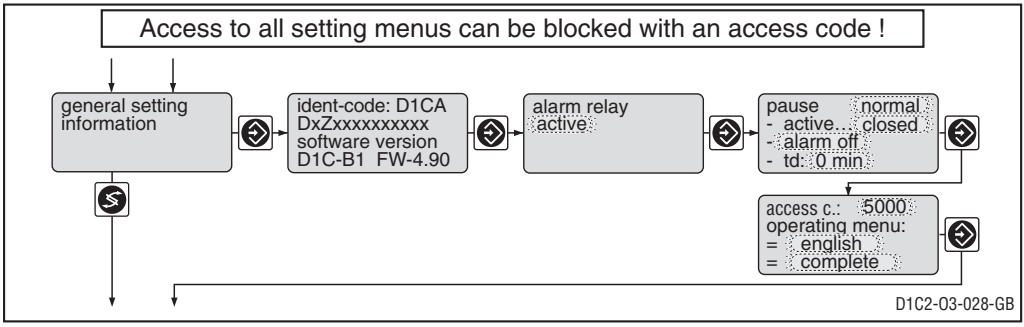

**Standard Signal Output 2**




| | Initial value | Possible values<br>Increment | Lower value | Upper value | Remarks |
|---|---|---|---|---|---|
| Variable allocation | as per identity code | Measured value<br>Controlled variable<br>Correction value | | | If control applicable only with correction variable |
| Output range | 0…20 mA | 0…20 mA<br>4…20 mA | | | |
| Range measured value | 0…5 ppm | 0.01 ppm | 0 ppm | 11.00 ppm | Minimum range 0.1 ppm |
| Range controlled variable | 0 %…100 % | 1 % | -100 % | +100 % | Minimum range 1 % |
| Range correction value | 0...100 °C | 0,1 °C | 0 °C | 100 °C | Minimum range 1 °C |

# Complete Operating Menu / Description

**General setting**




| | | Possible values | | | |
|---|---|---|---|---|---|
| | Initial value | Increment | Lower value | Upper value | Remarks |
| Alarm relay | active | active<br>not active | | | |
| Pause | Normal | Normal<br>Hold | | | |
| Control input pause | active closed | active closed<br>active open | | | |
| Alarm Pause | Alarm off | Alarm off<br>Alarm on | | | Alarm relay can be triggered by pause contact |
| td | 0 min | 1 min | 0 min | 60 min | |
| Access code | 5000 | 1 | 1 | 9999 | |
| Language | as per identity code | German<br>English<br>French<br>Italian<br>Dutch<br>Spanish<br>Polish<br>Swedish<br>Hungarian<br>Czech | | | |
| Operating menu | complete | restricted<br>complete | | | |

**Pause Normal**

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-proportionand (if Ti is set > 0) with the newly established I-proportion.

| Fault | Fault text | Symbol | Effect on metering | Effect on control | Alarm with acknowledgement | Remarks | Remedy |
|---|---|---|---|---|---|---|---|
| **Measured value** Checkout time measured value exceeded | Check $O_3$ probe | ε | Basic load | Stop | Yes | Function defeatable | Check function of probe, extend check time |
| Signal exceeded/drops below value | Check $O_3$ input | ε | 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 | Check $O_3$ calibration | ε | Basic load | Stop | No | Metering continues in case of error with unsteady measured values | Check probe, replace if necessary, recalibrate if necessary |
| **Correction variable** Signal exceeded/drops below value | *Check te-input* | ε | Basic load | Stop | 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 exceeded/drops below value | Check feed forward input | ε | | | Yes | Signal <4.0 ±0.2 mA or >23 ±0.2 mA Value last valid is used | Check probe, transducer and cable connection |
| **Limit transgression** after checkout time limits Control "on" Control "off" | $O_3$ limit 1 ↑↓ $O_3$ limit 2 ↑↓ | ε ε | Stop or Basic load | Stop | Yes Yes | Function defeatable | Define cause, reset values if necessary |
| **Servomotor** Position not reached | Servomotor defective | ε | | | Yes | Servomotor closes | Check servomotor |
| **Electronics error** | System error | ε 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 | ε O | Stop | Stop | No/Yes* | No further fault check | – |
| | Pause/Hold | ε | | PI-component frozen | | | |
| **Stop button** | Stop | ε O | Stop | Stop | No | Relay drops out | – |
| **During calibration** Probe | | | Basic load | Stop | No | No error processing of measured variable | – |
| Probe slope too low Probe slope too high | Slope $O_3$ low Slope $O_3$ high | ε | Basic load | Stop | No | 25% > probe slope > 300% of norm slope | Check probe, replace if necessary |
| DPD value <2 % measuring range | DPD value too low | | | | No | | Recalibrate after adding $O_3$ |
| **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 |

*depending on whether "Alarm on" or "Alarm off" set in "General settings"

Operating Instructions DULCOMETER® D1C, Part 2/Ozone
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