Pahlén®
swimming pool equipment

Swedish design and manufacture since 1967



Autodos M1, M2, M3

Manual



ENGLISH

MA60-10-E rev.2

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1. General information about the measuring equipment

Autodos M is designed for the measurement and dosing of chemicals in pools. The device is equipped with 1-3 channels (depending on variant) for measuring chlorine content (free chlorine and combined chlorine) and pH.

Autodos M is delivered in two parts – the flow cell and an electrode kit.
The flow cell is made up of a measuring unit and an control unit, including connections and system manual.
The electrode kit is made up of electrodes, calibration fluids, electrode connection components and electrode manual.

Autodos M can measure and regulate pH (alkali or acid dosing) and chlorine in the form of redox, free chlorine or combined chlorine. For combined chlorine, the total chlorine content is measured. The combined chlorine shown in the display is determined through calculation (total chlorine - free chlorine = combined chlorine).

Alarms can be triggered based on the flow stop setting in the flow cell for dosing error and measurement values outside of limit values.

A three-digit LED display continually displays the pool water condition within the following limits:

Free chlorine:	-.99–9.99 mg/l (ppm)
Combined chlorine:	-.99–9.99 mg/l (ppm)
pH:	0.00–14.0

The measurement range is normally approx.:

pH:	3.00–11.0
Redox	-99.–999. mV
Free/combined chlorine:	electrode dependent

Via a press on the button, the displays can be made to show uncalibrated values.

The pH regulator can be used as follows:

1. Manual Off.
2. Automatic regulation against set value as per:
    a. On/Off control.
    b. Pulse width control
    c. Frequency control — P, PD, PI or PID regulator 10–180 pulses/min.
    d. Current output control — P, PD, PI or PID regulator 4–20 or 0–20 mA.
3. Manual dosing:
    a. On/Off control: — dosing relay pH always On.
    b. Pulse width control: — dosing relay always On.
    c. Frequency control: — maximum deflection (10–180 pulses/min).
    d. Current output control: — maximum deflection (20 mA).

Control is programmed in configuration mode.
Acid dosing or alkali dosing On/Off is programmed in configuration mode.

The chlorine regulators (free chlorine and combined chlorine work the same way) can be used as follows:

1. Manual Off.
2. Automatic regulation against set value:
    a. On/Off control.
    b. Pulse width control
    c. Frequency control — P, PD, PI or PID regulator 10–180 pulses/min.
    d. Current output control — P, PD, PI or PID regulator 4–20 or 0–20 mA.
3. Manual chlorine dosing:
    a. On/Off control: — dosing relay chlorine always On.
    b. Pulse width control: — dosing relay always On.
    c. Frequency control: — maximum deflection (10–180 pulses/min).
    d. Current output control: — maximum deflection (20 mA).

Control is programmed in configuration mode.
Separate high and low alarms (limits can be set) are indicated via flashing alarm LED(s) and a common alarm relay.
The alarm is shown as “Lo” or “Hi” on display 1–3 while the **Reset** button [15] is held depressed.

pH value outside of limit values stops chlorine dosing. This is indicated by a flashing AUTO LED on the chlorine channels and the alarm text “PHF”. Chlorine dosing is stopped until the pH value has returned to a permitted value.

Flow alarm (PNP potential-free connector/turbine sensor that can be deactivated in configuration mode) is indicated via alarm LED and alarm relay in alarm mode. The registered alarm is also shown as “FLo” on display 1–3 while the **Reset** button [15] is held depressed. There is no automatic dosing during stop in flow.

All alarms have a 5-second delay, except for flow alarm, high alarm and low alarm. For the high and low alarms, delay can be set (in Setup) between 5 and 600 seconds. The flow alarm delay can be set (in Setup) between 0 and 30 minutes.

Alarm for dosing error can be selected in configuration mode (time in minutes > 0).
Dosing error is indicated (if dosing time is selected in configuration mode) via flashing alarm LED(s) and a common alarm relay. The alarm is shown as “doS” on display 1–3 while the **Reset** button [15] is held depressed.
Dosing is stopped until the alarm is reset. The dosing time counter is always zeroed with a reset.

A dosing error is generated in the following conditions:

On/Off dosing. An alarm is triggered if dosing is continual for a longer time than the specified max. time in minutes (1-60 as specified in configuration mode). An alarm is also triggered if manual dosing is too long.

Pulse width dosing. An alarm is triggered if dosing (>0%) occurs with exceeded alarm limit for a longer time than the specified max. time in minutes (1-60 as specified in configuration mode). An alarm is also triggered if manual dosing is too long. In such case, the value does not have to be outside the alarm limit.

Frequency dosing. An alarm is triggered if dosing (>0%) occurs with exceeded alarm limit for a longer time than the specified max. time in minutes (1-60 as specified in configuration mode). An alarm is also triggered if manual dosing is too long. In such case, the value does not have to be outside the alarm limit.

Control output-controlled dosing. An alarm is triggered if dosing (>0%) occurs with exceeded alarm limit for a longer time than the specified max. time in minutes (1-60 as specified in configuration mode). An alarm is also triggered if manual dosing is too long. In such case, the value does not have to be outside the alarm limit.

Autodos uses two-point calibration of each measurement channel for best measurement value display.

1–3 current outputs (free chlorine, redox, combined chlorine and pH) 0–20 mA or 4–20 mA are programmed in configuration mode (individually for each channel). Current outputs normally follow the measurement value, but can also be configured so that the control value is followed thereby allowing current output control.

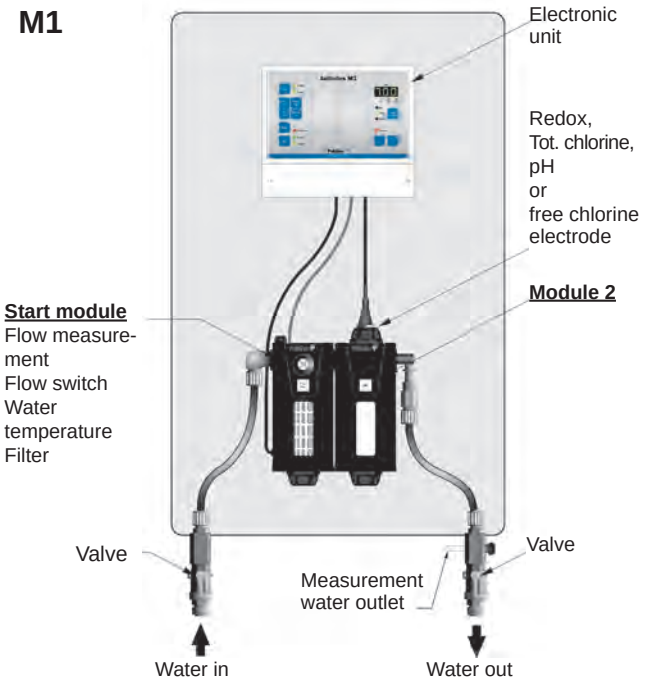
Set values etc. that have been set are saved in EEPROM approx. 10 seconds after they are entered. The values are saved alternatingly in two separate memory areas to avoid errors due to loss of power during the saving phase.

Separate voltaic section for each electrode input.

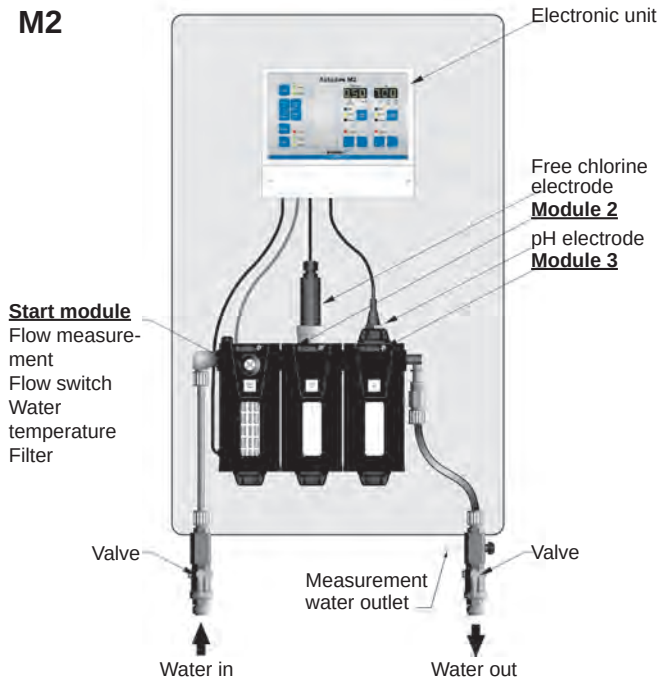
2. Technical data

Measurement computer	Autodos M1	Autodos M2	Autodos M3
Display 7 segments LED	1 x 3 digits	2 x 3 digits	3 x 3 digits
Current output	1 x 4–20 (0–20) mA	2 x 4–20 (0–20) mA	3 x 4–20 (0–20) mA
Relay outputs for dosing	1 x 1A resistive load	2 x 1A resistive load	3 x 1A resistive load
Fuses	2 x T1A 5x20 mm	3 x T1A 5x20 mm	4 x T1A 5x20 mm
Weight	5 kg	5,3 kg	5,6 kg
Height/Width/Depth (mm)	740x410x127		
Power supply	230 VAC +15% -10%		
Power consumption	12 VA		
Temperature sensor connection	Screw terminal		
Flow switch input	14 VDC, PNP, approx. 6 mA		
Electrode connection pH	BNC		
Electrode connection, redox	BNC		
Electrode connection, free chlorine	Electrode dependent		
Electrode connection, total chlorine	4–20 mA current input		
Standby	PNP, approx. 14 VDC, approx. 5 mA		
Level	PNP, approx. 14 VDC, approx. 5 mA		
Alarm output relay	Closing/opening 1 A resistive load		
Maximum load, current outputs	400 Ohm		
Enclosure rating	IP54		
Ambient temperature	5–40ºC		
Nominal flow (min-max)	30 (20–60) l/h		

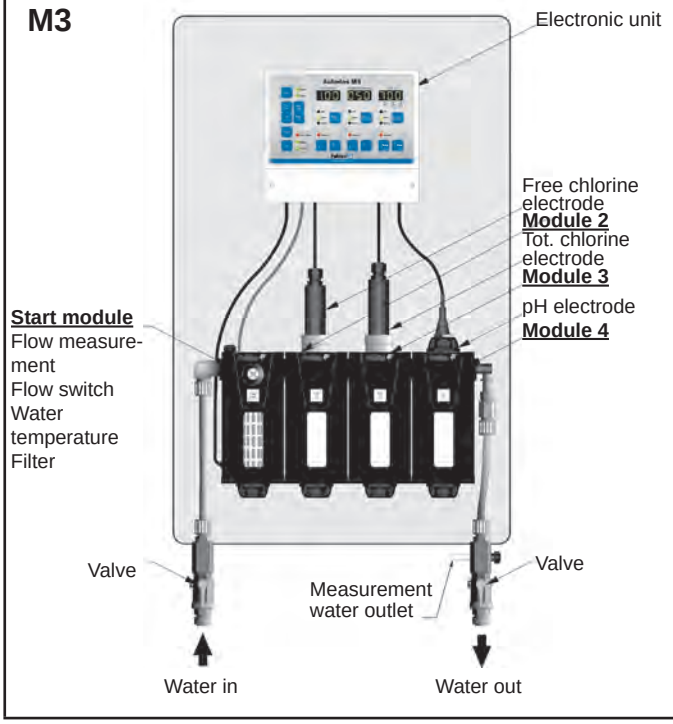
M1



M2



M3



Electrodes



3. Program versions

Ver. 5.3: (2011-04-29)

4. Reservation

We retain the right to modify the functionality of Autodos M without prior notice. We accept no liability for any errors in this manual or any consequences stemming from Autodos M malfunction.
We strive to keep the manual as free from errors as possible. We would therefore be grateful to have any errors or ambiguities pointed out to us so we can correct them.

5. Safety

Separate the chlorine dosing point and the acid/alkali dosing point to prevent direct contact between the chemicals. Refer to the installation example on pages 8–9.
Lock the dosing pumps to the circulation pump using the motor guard or the flow switch.
For best results, use a photometer during calibration.
Proper installation and care is required to prevent invalidation of the warranty.
“Persons (including children) with limited physical or mental capabilities must not use the device without instructions on how to use it in a safe manner,” as per IEC 60335-1.

6. Installation

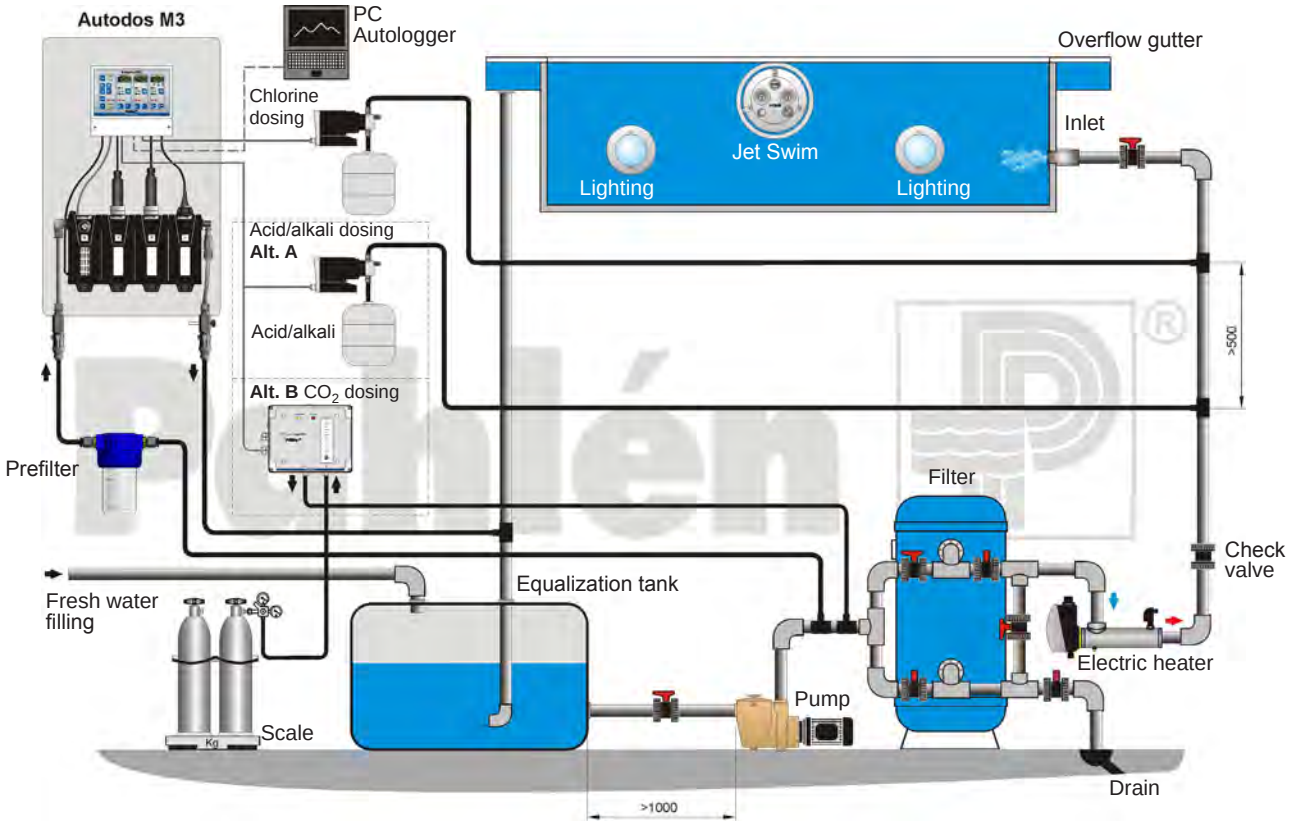
General

Install Autodos M at a dry and vibration-free location.
The flow cell should be positioned as close to the monitoring point as possible to prevent unnecessarily long response times.
If the position of the Autodos puts it at risk of freezing, the flow cell modules must be emptied of all water and the electrodes must be stored frost-free standing in water (save the electrode packaging for this purpose).
The display must be well visible and the buttons easily accessible. Note the direction of flow.
When installing Autodos M with free chlorine electrode in pools where organic chlorine (Trichlor or Dichlor) was previously used, all water must be drained and replaced with new water as the cyanuric acid content in the pool water from the organic chlorine produces a significantly higher chlorine value in a DPD no. 1 test. This makes correct calibration impossible.
The system can be installed at any time point without consideration to the life span of the electrodes as these are delivered separately and can even be delivered at a later point in time.
When installing electrodes check that the electrode kit being used has the right configuration for the system.
Refer to configuration in the chapter on variants.

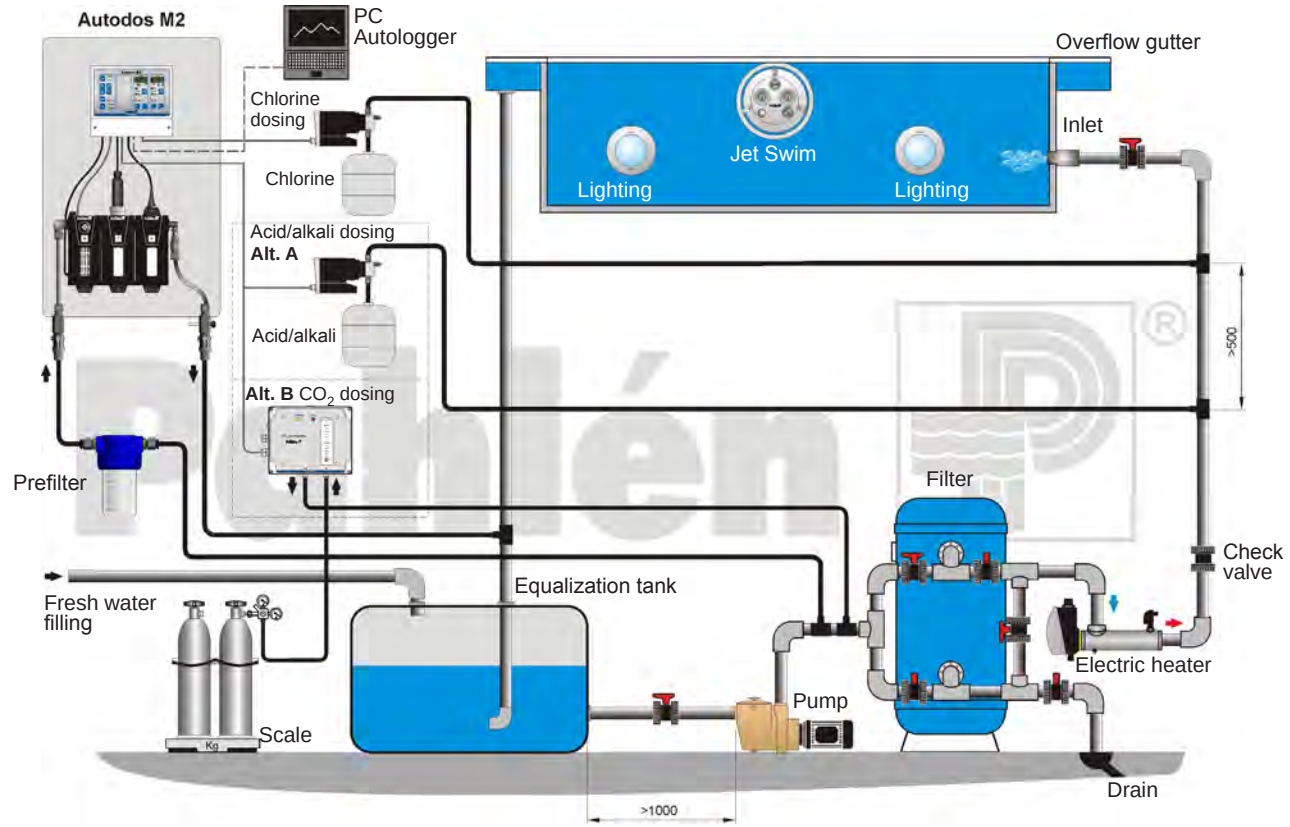
Installation, pipes

The outlet from the flow cell should be kept free from pressure, e.g. by leading outlet water to an equalization tank or a drain.
For installations in which the flow cell outlet cannot be routed without pressure to a drain or equalization tank, the measurement water should be sampled after the filter and the return of the pump suction line.
Connections only need to be tightened by hand.
Monitoring and dosing points are most easily made with saddle clamps.
In order to prevent air from being mixed in with the measurement water (which could affect the measurement value), the measurement connection on the pipes should not sit at the highest point.

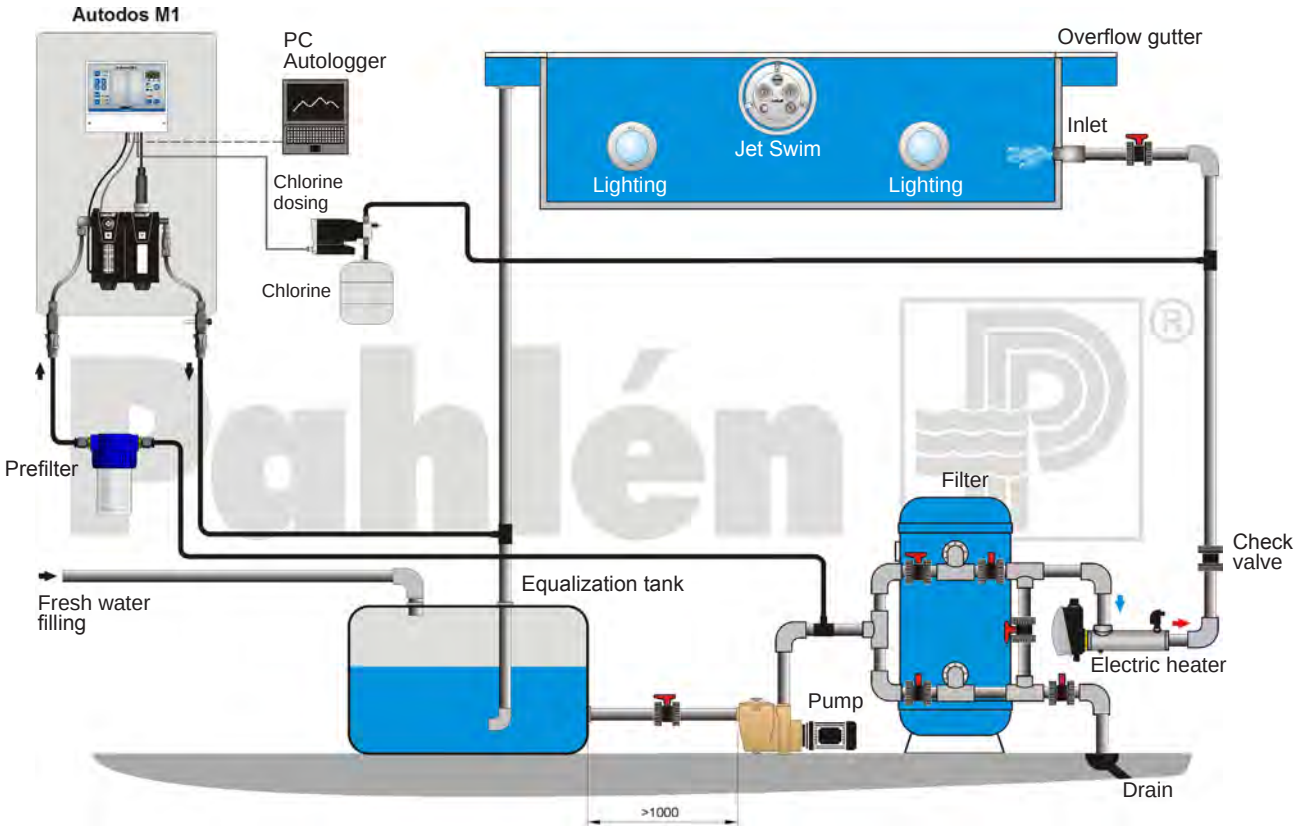
Installation example 1: Autodos M3



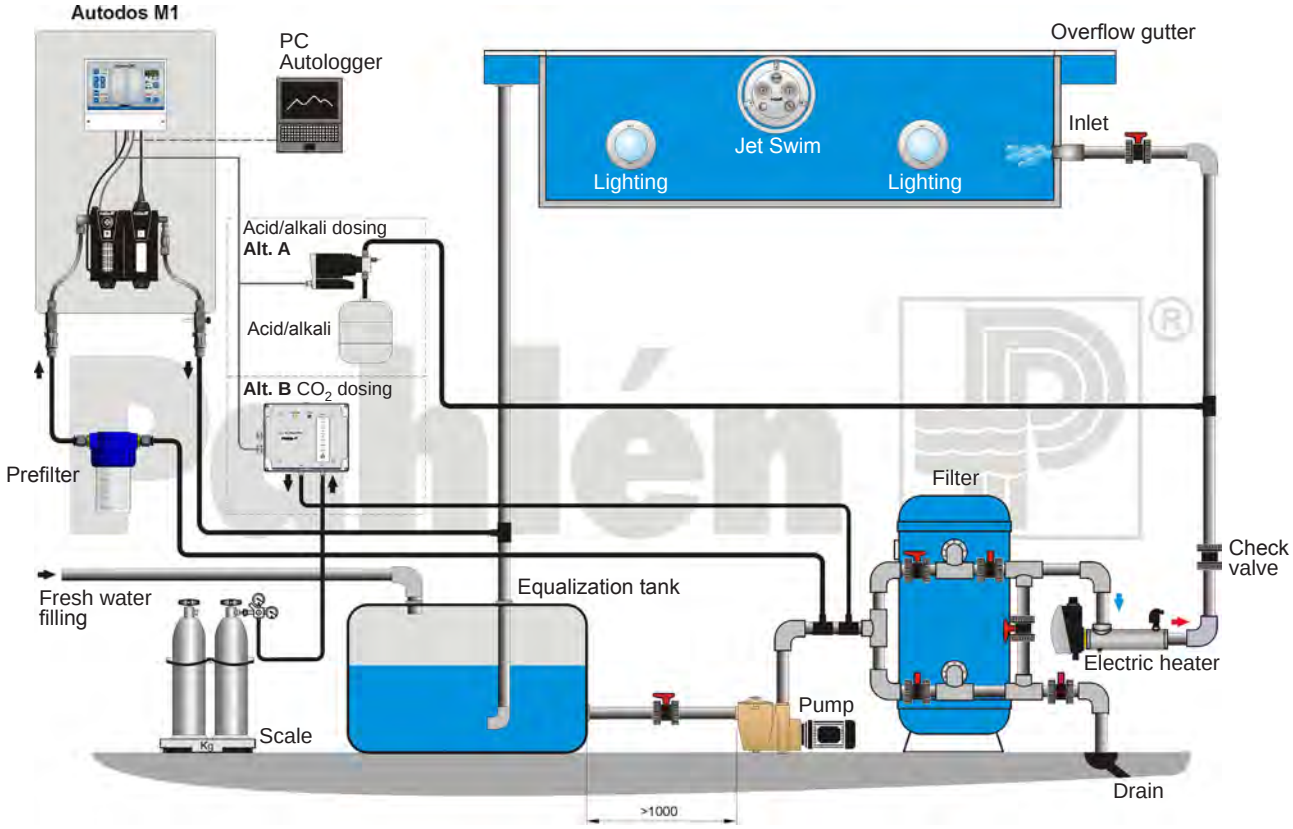
Installation example 2: Autodos M2



Installation example 1: Autodos M1 – chlorine

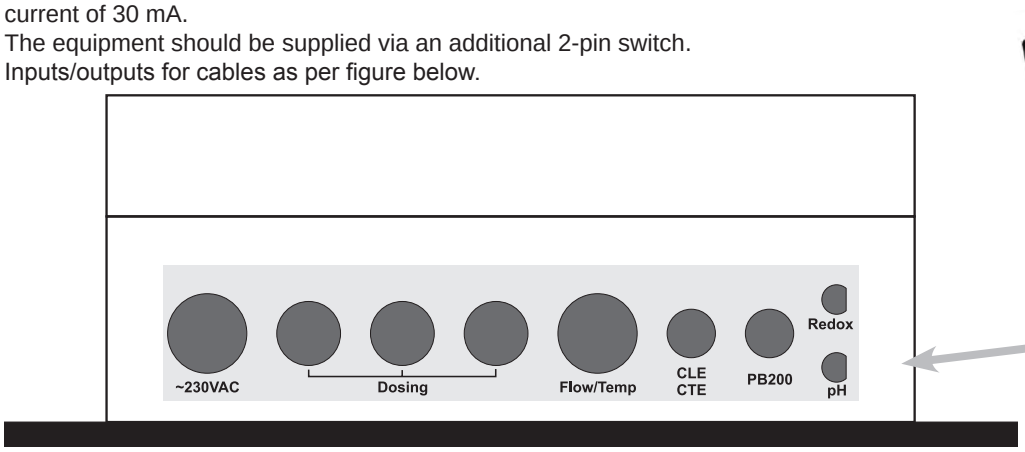


Installation example 2: Autodos M1 – acid/alkali



Installation, electrics

Electrical installation must only be carried out by an authorized electrical installation technician.
Electrical installation must be performed after pipe installation is complete.
The equipment must be permanently grounded and monitored by a residual current device (RCD) with a maximum leakage current of 30 mA.
The equipment should be supplied via an additional 2-pin switch.
Inputs/outputs for cables as per figure below.

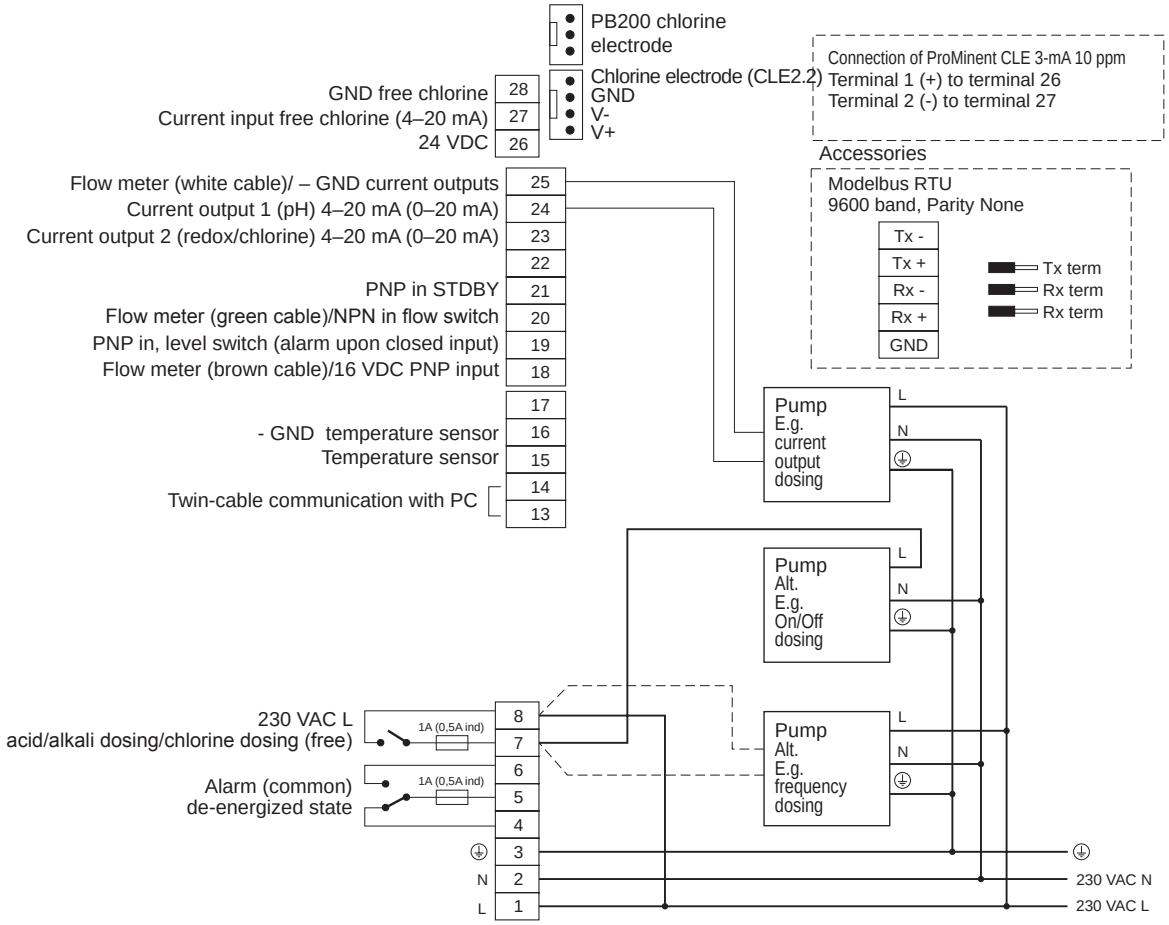




View from below

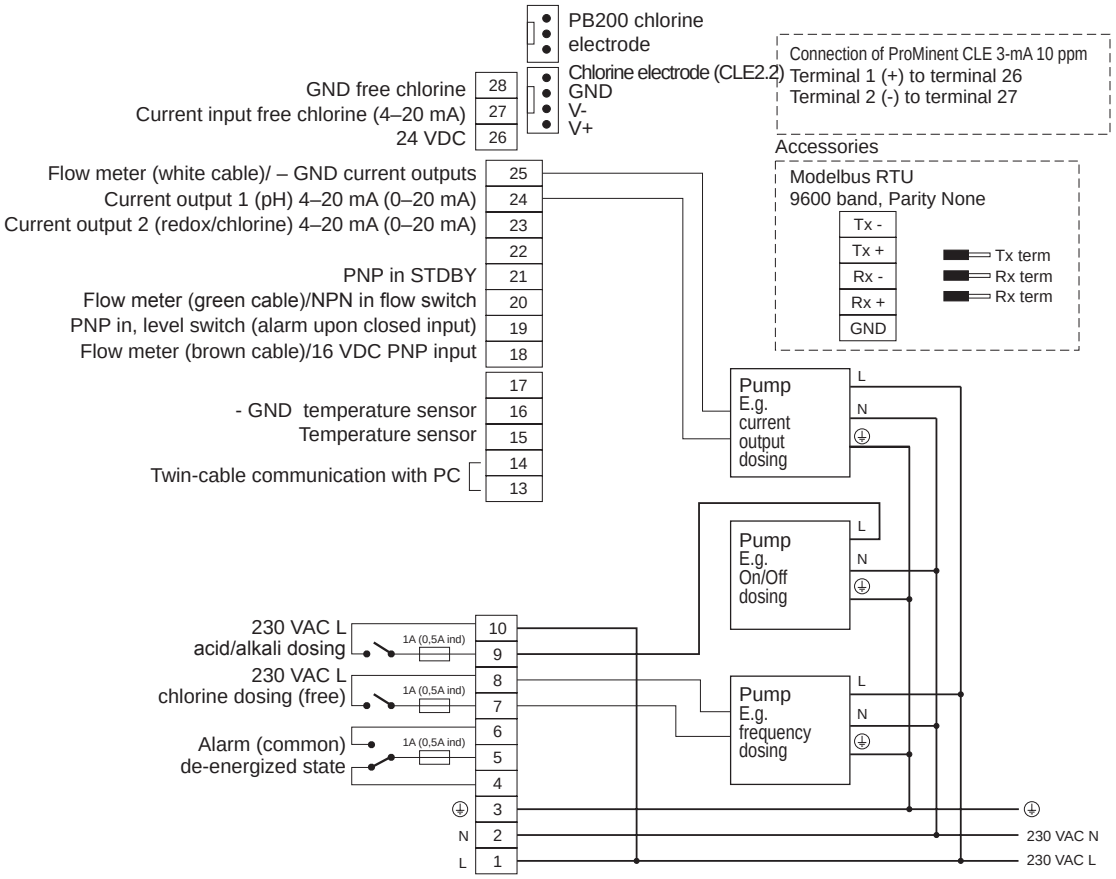
The following is an example of how connections are to be made.

Connection example – Autodos M1

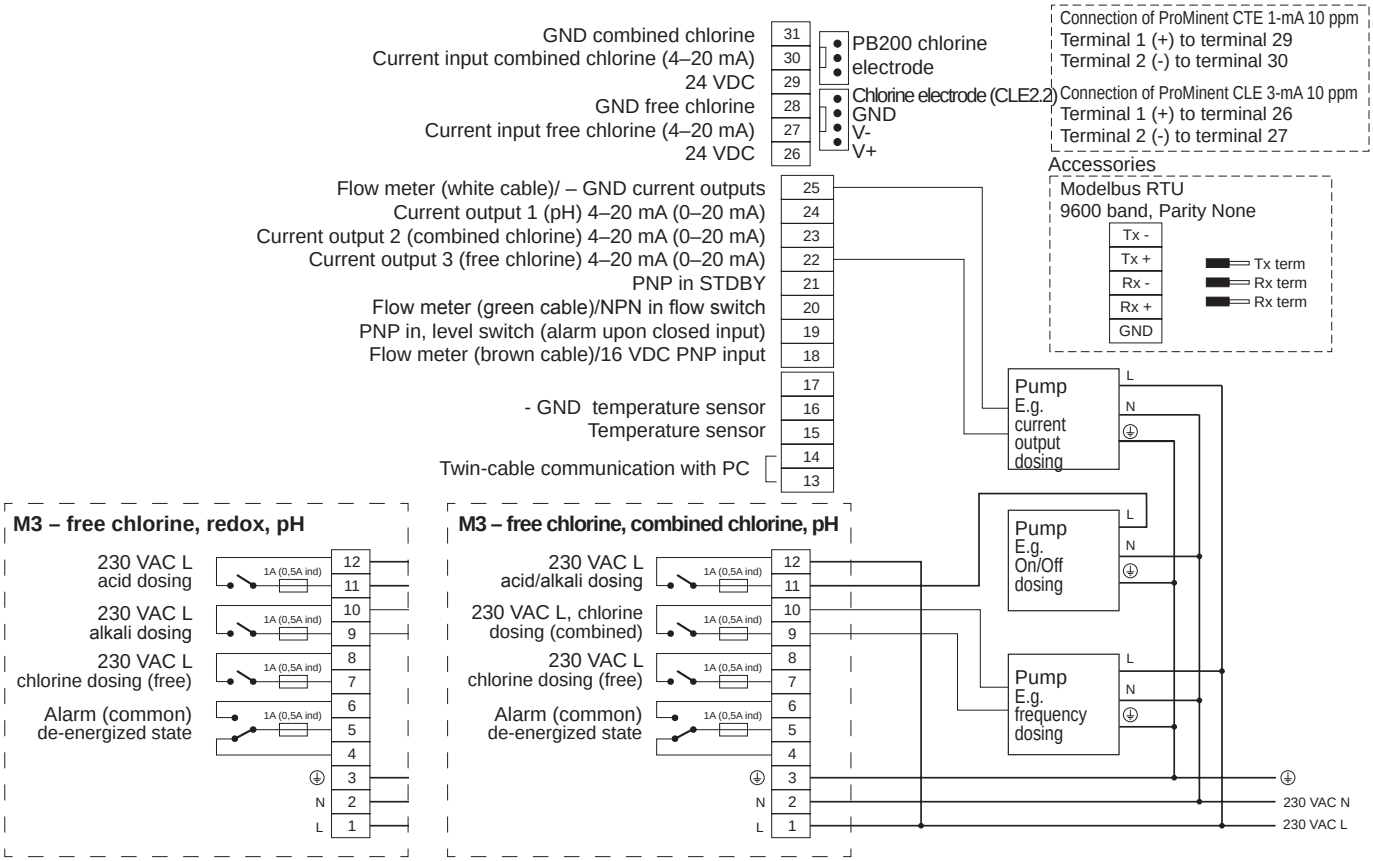


Pahlén swimming pool equipment

Connection example – Autodos M2



Connection example – Autodos M3



Pahlén swimming pool equipment

7. Operation

Displays, buttons and LEDS – general

The panel is divided into 4 groups. Group 1 (on the left) handles all activities and the others show values and handle limit and value settings.

Displays

Depending on the Autodos M module, the values are shown in one, two or three separate displays: free chlorine, combined chlorine and/or redox and pH.
The display to the far right can also be used to show flow and temperature.
The displays can also show simple text messages; see the chapter on text display on page 15.
In displays where different values can be shown in the same field, the actual display is marked by the position of the decimal point. An arrow and explanatory text are found under the illuminated decimal point on the display.

Buttons

Each button has a unique number in the top right-hand corner. In this manual, reference is made to this number with [ ].
The function is described below.

LEDs

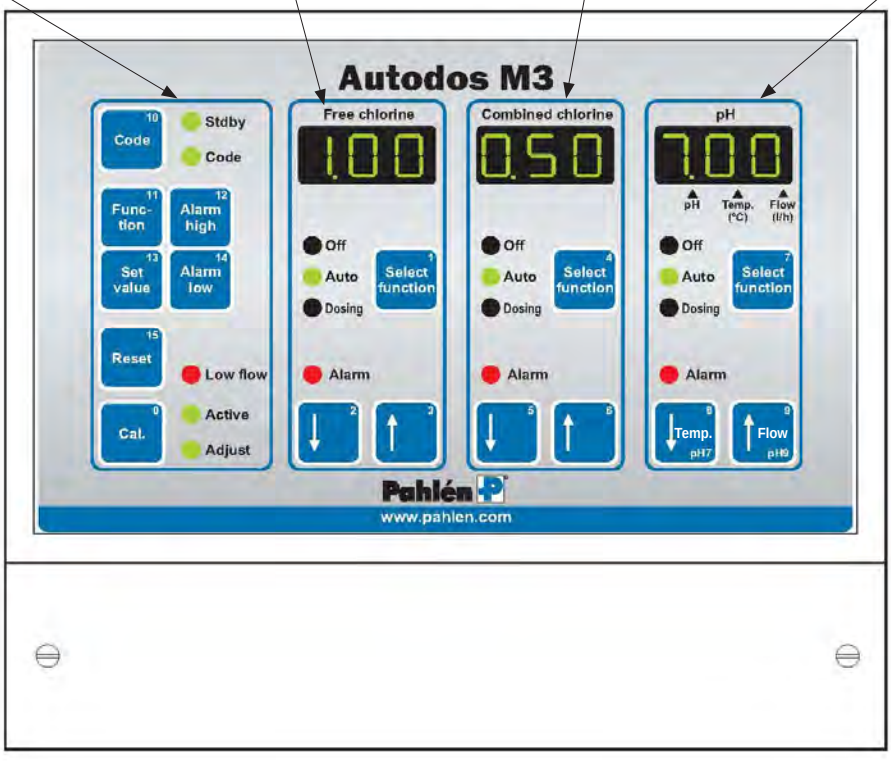
Function activation is indicated with a green LED and all types of alarms are indicated with a red LED.

Group 1	
Button no.	**Function**
0	Calibration
10	Authoriza-tion
11-14	Activity
15	Reset

Group 2	
Button no.	**Function**
1	Function selection
2	Level -
3	Level +

Group 3	
Button no.	**Function**
4	Function selection
5	Level -
6	Level +

Group 4	
Button no.	**Function**
7	Function selection
8	Level - / Temp
9	Level + / Flow



Authorization

To avoid unintentional changes to settings and unauthorized use, two authorization codes can be set.

Authorization	Explanation
Normal mode	No settings can be altered; only Reset is possible
Authorization code 1	Set values, alarm limits and control parameters can be changed. Calibration is also possible.
Authorization code 2	All available changes, including system configuration, are possible.

Activate authorization

If no codes are set, authorization level 2 is accessed automatically when the **Code** button [10] is pressed.
When the Code button [10] is held depressed, the opening code can be entered using the buttons indicated below:

Autodos M3: Buttons 0-9
Autodos M2: Buttons 0 and 4–9
Autodos M1: Buttons 0 and 7–9

Reset [15] clears the display and up to six digits can be entered for the code. If the entered code is the same as opening code 1 you access authorization level 1 and if the entered code is the same as opening code 2 you access authorization level 2 when the **Code** button [10] is released. This is indicated via the "**Code**" LED being illuminated for authorization level 1 and flashing for authorization level 2.

Set authorization code

The opening code can only be changed in authorization level 2. If you forgot the code for authorization level 2, it can be displayed by pressing **Code** [10] during the start-up sequence (after the countdown of seconds has begun).

Enter the opening code (for authorization level 1 or level 2):

1. Access authorization level 2.
2. Enter calibration mode.
3. Hold the Code button [10] depressed and enter the opening code with buttons [0] – [9]. Use Reset [15] to clear the display and enter up to six digits for the code. The display shows "Cd1" when the Code button [10] is pressed the first time. "Cd2" is shown the next time the button is pressed. The display then switches back and forth each time the button is pressed. The text indicates which code (for authorization level 1 or 2) should be entered.

View/change set values

M3	Press and hold the **Set value** button [13] (or the **Set alk/Cl** button [13]) to display the set value - for free chlorine dosing on display 1 - for combined chlorine dosing on display 2 - for pH dosing on display 3 To change the set value, hold the button [13] depressed while pressing ↑ or ↓ under the relevant display.
M2	Press and hold the **Set value** button [13] to display the set value - for chlorine/redox on display 1 - for pH on display 2 To change the set value, hold the button depressed while pressing ↑ or ↓ under the relevant display.
M1	Press and hold the **Set value** button [13] to display the set value. To change the set value, hold the button depressed while pressing ↑ [9] or ↓ [8].

View/change alarm limits

HIGH ALARM	Press and hold the **Alarm high** button [12] to display the high alarm limit value on the relevant display. To change the limit value, hold the button depressed while pressing ↑ or ↓ under the relevant display. At least authorization level 1 is required in order to make changes.
LOW ALARM	Press and hold the **Alarm low** button [14] to display the low alarm limit value on the relevant display. To change the limit value, hold the button depressed while pressing ↑ or ↓ under the relevant display. At least authorization level 1 is required in order to make changes.

Showing other information on the display

Show **Uncalibrated values**	Press and hold the **Set value** [13] (or **Set Alk/Cl** [13]) and **Alarm low** [14] buttons simultaneously to show uncalibrated values on the relevant display.
Show **Flow**	Press and hold the ↑ button [9] to display flow in litres per hour.
Show **Temperature**	Press and hold the ↓ button [8] to display temperature in °C.
Show **Version**	Press and hold the **Alarm high** [12] and **Alarm low** [14] buttons simultaneously to display the program version.
Show **Serial number**	Press and hold the **Function** [11] (or **Set Acid** [11]) and **Alarm high** [12] buttons simultaneously to display the factory-programmed serial number.

Dosing selection

Select **Function**	Press the **Select function** button [1], [4] or [7] to switch dosing selection between Off and Auto. Dosing can be deselected in configuration mode. Press and hold the Select function and Set value [13] buttons simultaneously to access manual dosing. (The **Set value** button [13] is called **Set alk/Cl** [13] on M3 with redox.) Deactivate manual dosing by pressing the **Select function** button.

Off No dosing
Auto Automatic dosing based on set parameters (normal setting)
Dosing Continual dosing (including when there is an error; stopped if there is a dosing time error)

Other buttons

Reset	Press and hold the **Reset** button [15] to display triggered alarms for the respective channel in the form of a brief text. If the button is depressed for less than about one second, the alarms are reset and the common alarm relay is de-energized. The dosing time counter is always zeroed with a reset.
Cal.	Press the **Cal.** button [0] to page in calibration mode between Off – Active – Adjust ... This is indicated via unlit LEDs (Off), illuminated Active LED or illuminated Active and Adjust LEDs. (Exit calibration mode by pressing and holding **Cal.** [0] until the LEDs go out.)
↑↓	Use the arrow buttons to adjust set values, limits and calibration values on the relevant display. If an arrow button is held in, a “fast forward” function engages after about one second.

LED indicators

LEDs – dosing indicators

Off Dosing of pH-regulating or chlorine-regulating agent is deactivated
Auto Dosing of pH-regulating or chlorine-regulating agent is regulated automatically
Dosing Dosing of pH-regulating or chlorine-regulating agent is in progress

If neither LED “**Off**” nor “**Auto**” is illuminated, then manual dosing is selected. If dosing does not occur at this time (LED “**Dosing**” is not lit), then dosing was deselected at setup. It may also be deactivated due to excessively long dosing time if this function has been selected. If this is the case the “**Alarm**” LED will also flash (or be illuminated).

If the pH value is outside of alarm limits, there is an alarm on the chlorine channel if chlorine dosing is active. Chlorine dosing is stopped until the pH values are once again within permitted limits. The alarm is indicated via a flashing “**Auto**” LED on the chlorine channel and the alarm test “PHF” at Reset.

LEDs – alarm indicators

Low flow Insufficient flow in the flow cell
Alarm High alarm, low alarm, dosing error or flow error

If the “**Alarm**” LED flashes, there is an error that has not been cleared. If an error has been cleared but remains active, the LED is illuminated with a steady glow.

LEDs – indicators for calibration in progress

Active Calibration in progress; calibration of pH7, pH9 and chlorine zero points possible.
Adjust Calibration in progress; calibration of chlorine values possible.

If the "**Active**" LED flashes, it indicates you are in configuration mode (see separate chapter page 20). To exit configuration mode, press and hold the **Cal**. button [0] until the "**Active**" LED stops flashing.

LEDs – indicators for other functions

Code Indicates code mode (change of settings possible), steady = authorization level 1, flashing = authorization level 2.
Stdby Indicates input that switches off alarm and dosing; the alarm relay is activated when the input is activated.

Text on the display

Runtime texts

A list of texts that may be displayed during normal program operation and the contexts in which they occur is found below:

- - - EEP Er1	at first start-up or EEPROM error; reset gives default setting.
dEL SEC # # #	restart performed, # # # indicates the time before start delay is finished.

Error codes

Code	Cause
EL1	active electrode error 1 (low calibration point < min)
EL2	active electrode error 2 (low calibration point > max)
EL3	active electrode error 3 (high calibration point < min)
EL4	active electrode error 4 (high calibration point > max)
noC	chlorine value too low; calibration not possible

The following error codes can occur when the **Reset** button [15] is held depressed:

Code	Meaning
FLo	active flow error on channel X
Lo	active low alarm on channel X
Hi	active high alarm on channel X
doS	incorrect dosing
PHF	stopped chlorine dosing because pH value outside permitted limits
SbY	standby
LoL	active level switch alarm
- - -	everything OK

Start-up sequence

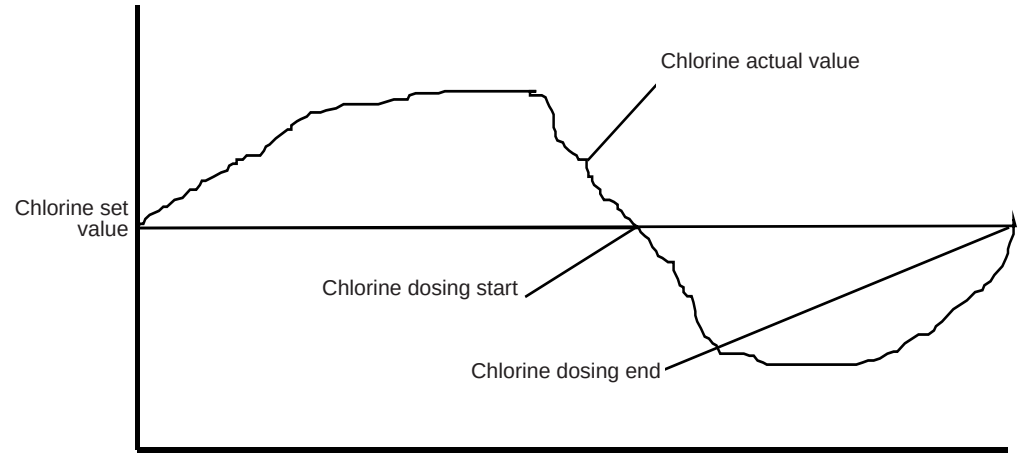
When Autodos M is started up, a text (see below) is shown. The three digits in the text indicate how many seconds are left until the end of the start-up sequence. The waiting time during start-up is intended to avoid problems with alarms being triggered because the measurement values have not had time to stabilize, etc. (The start delay can be bypassed by pressing and holding the **Reset** button [15] for about one second.)

Autodos M3: "dEL SEC 059"
Autodos M2: "SEC 059"
Autodos M1: "059"

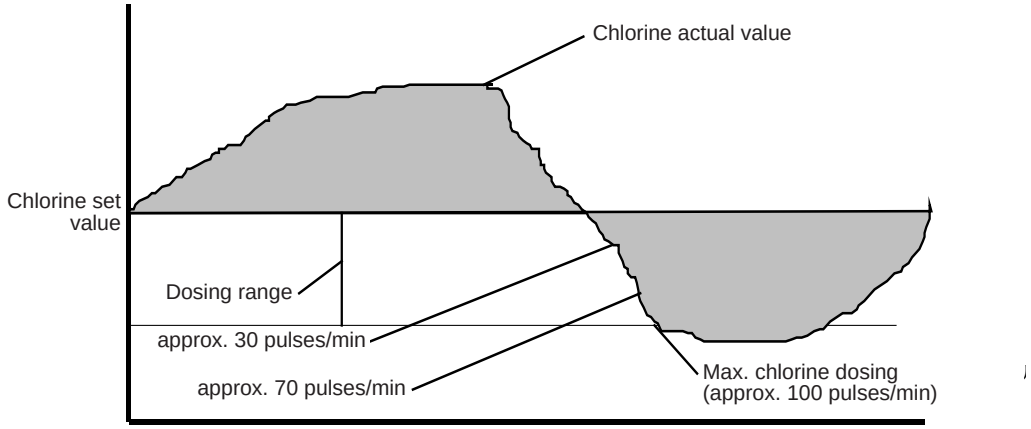
Adjusting set value – Chlorine regulation (free chlorine)

Set value adjustment for free chlorine regulation is carried out by pressing and holding the **Set value** button [13].
The selected chlorine set value is then shown in the display.
To change the set value, press and hold the button while pressing ↑ or ↓ under the display. Pressing and holding an arrow button for about one second triggers a “fast forward” function until the button is released.
The set value can be adjusted within the interval 0.00–9.99

On/Off-controlled chlorine regulation (free chlorine)



Frequency-controlled chlorine regulation (free chlorine)



Dosing range indicates the interval within which dosing is steplessly changed (pband) between 0 pulses/min and max. number of pulses/min. Adjustment of dosing range size is done in configuration mode (see separate chapter).
If the actual value (in figure) is greater than the chlorine set value, there is no chlorine dosing (0 pulses/min).
If actual value = (set value - dosing range) there is full dosing (approx. 100 pulses/min). In the range between the two, dosing is modified based on the actual value. For example, if the actual value is in the middle of the dosing range, half-dosing is carried out (approx. 50 pulses/min).

Adjusting set value – Chlorine regulation (combined chlorine)

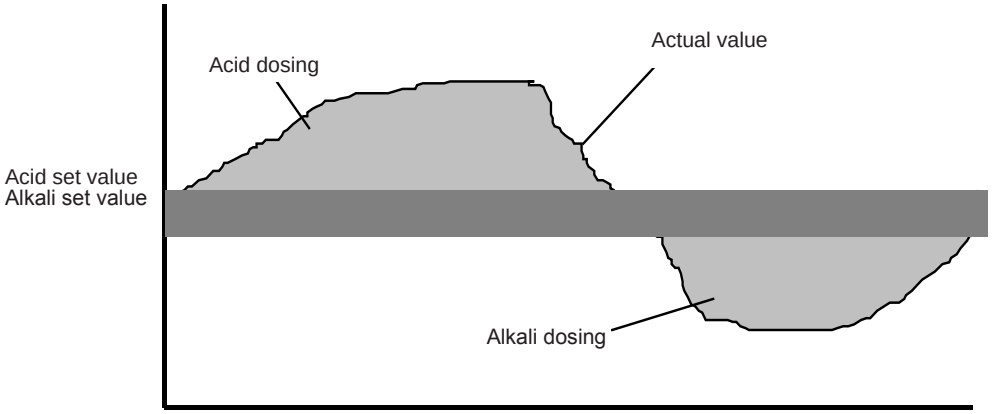
The procedure is the same as that for free chlorine, except that the arrows [5] and [6] under display 2 are used and regulation is done against the measurement value for combined chlorine.

Adjusting set value – pH regulation

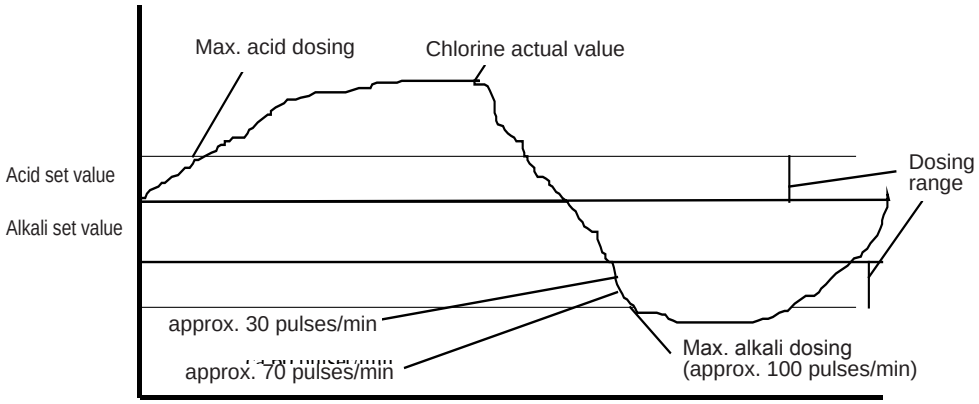
Set value adjustment for pH regulation is carried out by pressing and holding the **Set value** button [13].
The selected pH set value is then shown in the display. To change the set value, hold the button depressed while pressing ↑ or ↓ under display 3. Pressing and holding an arrow button for about one second triggers a “fast forward” function until the button is released.
The set value can be adjusted within the interval 0.00–14.0

The figures below show dosing with both pH-elevating (alkali) and pH-lowering (acid) agent. The principle is the same, but the direction is reversed.

On/Off-controlled pH regulation



Frequency-controlled pH regulation

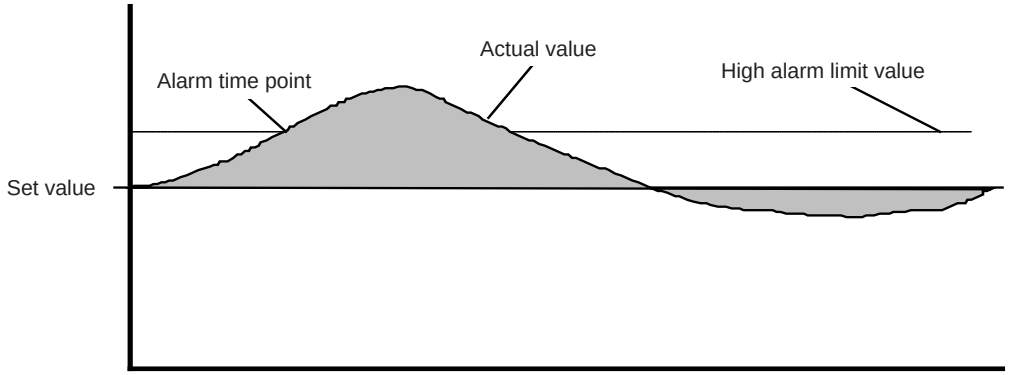


P-band* indicates the range within which dosing is steplessly changed from 0 to maximum dosing. In the example above, acid is dosed when the actual value (= pH value) is greater than the set value. Acid and alkali are dosed when the actual value is less than the alkali set value.
At maximum dosing, the dosing pump gives max. frequency* strokes/minute.

Presume there is acid dosing (pH value = 7.54, acid set value = 7.40), P regulation (P-band = 0.20) and frequency dosing (max. frequency = 50 strokes/minute). Dosing is then calculated as follows:
Does = (pH actual value – acid set value) / P-band x Max. frequency = (7.54–7.40) / 0.20 × 50 = 35 strokes/minute.
If the dose as calculated above is negative, 0 strokes/minute is dosed. If the dose is greater than 50, then 50 strokes/minute is dosed.

*set in “Electrode-specific configuration”.

Setting high alarm

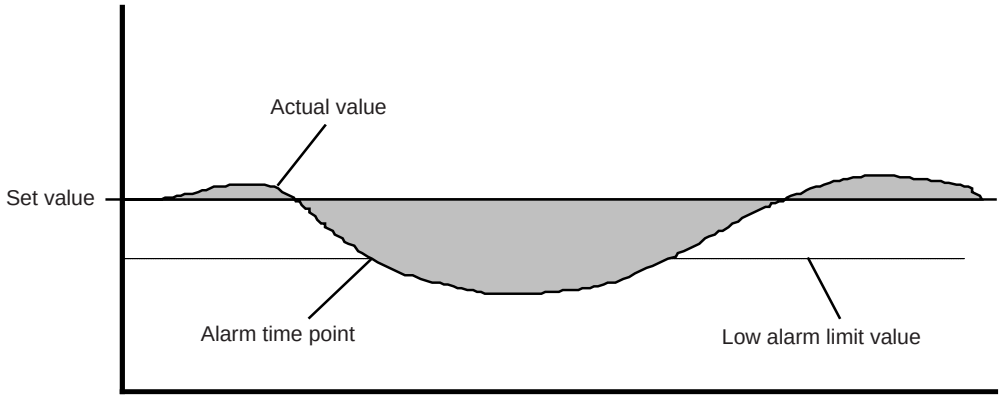


High alarm setting is done by pressing and holding the **Alarm high** button [12]. The high alarm limits for free chlorine, combined chlorine and pH are then displayed in the measurement value windows.

To change the limit, press and hold the button while pressing ↑ or ↓ for the relevant channel.
Pressing and holding an arrow button for about one second triggers a “fast forward” function until the button is released.
High alarm limits can be adjusted within the intervals:

free chlorine	-.99–9.99 ppm
combined chlorine	-.99–9.99 ppm
pH	-.99–9.99

Setting low alarm



Low alarm setting is done by pressing and holding the **Alarm low** button [14]. The low alarm limits for free chlorine, combined chlorine and pH are then displayed in the measurement value windows.

To change the limit, press and hold the button while pressing ↑ or ↓ for the relevant channel.
Pressing and holding an arrow button for about one second triggers a “fast forward” function until the button is released.
Low alarm limits can be adjusted within the intervals:

free chlorine	-.99–9.99 ppm
combined chlorine	-.99–9.99 ppm
pH	-.99–9.99

Alarm LEDs

The alarm LEDs indicate an alarm by flashing. The alarm relay is de-energized when the LED flashes (thus, a shutdown device triggers an alarm). The LED is illuminated with a steady glow after reset if the alarm remains active or goes out if no alarm is active.
Indication is made for low alarm, high alarm, dosing error and flow error.

Dosing is affected by alarm as follows:

Flow error	stops all dosing (starts when flow is correct)
Low alarm pH	stops chlorine dosing (starts when value is within limits)
High alarm pH	stops chlorine dosing (starts when value is within limits)
Low alarm redox/chlorine	no effect on dosing
High alarm redox/chlorine	no effect on dosing
Low alarm free/combined chlorine	no effect on dosing
High alarm free/combined chlorine	no effect on dosing
Dosing error pH	stops all dosing (starts after reset)
Dosing error free/combined chlorine	stops chlorine dosing (starts after reset)
Alarm level switch	no effect on dosing

All alarms have a 5-second delay.

Alarm delay

The high and low alarms have a delay of 5–600 seconds (set in electrode-specific configuration).
The flow switch alarm has a delay of 0–30 minutes (set in system configuration).

The alarm delay works as described below.
- Delay time is counted up when an “alarm condition” applies.
- Delay time is counted down when an “alarm condition” does not apply.
- “Alarm” is activated (LED flashes) when delay time has reached the set delay time limit.
- “Alarm” is deactivated when the alarm is reset with the **Reset** button [15] and when delay time has been counted down to zero.

Alarm relay delay

The alarm relay has a delay of 0–30 minutes (set in system configuration). Function as follows:
- The delay time is counted up when there is an alarm that has not been reset and when the alarm delay time has not been zeroed.
- The delay time is reset when it is not counted up (as per condition above).
- The alarm relay is activated when the delay time has reached the set delay time limit.
- Reset deactivates the alarm relay and resets the delay time.

Alarm reset

Alarm reset is carried out by pressing and holding the **Reset** button [15] for about one second until the LEDs stop flashing and the alarm relay is de-energized.
While the **Reset** button [15] is held depressed, the display(s) show text indicating which alarms were active when the button was pressed (see chapter on text display on page 14).
If several alarms are active, these are displayed at a 1-second interval.
The acknowledged, non-active alarms disappear when the button is released. Pressing the button again will display the remaining active alarms.
Reset is not possible while in calibration mode.
The dosing time counter is always zeroed with a reset.

Showing uncalibrated values

Display of the factory-calibrated values (as if no calibration was carried out since delivery from the factory) can be carried out by pressing the **Function** [11] and **Alarm low** [14] buttons simultaneously (also works during calibration).
NOTE: On Autodos M3 with acid/alkali dosing, these buttons are called **Set acid** [11] and **Alarm low** [14].
The function is a good troubleshooting aid if the electrodes are not functioning normally.
This function helps troubleshooting if the electrodes do not work as usual.

System configuration

If there is a need to change the factory-programmed settings, access configuration mode. Do this by accessing authorization level 2 with the code and activating calibration mode.
(The unit comes from the factory with no authorization code programmed.)

NOTE: Check that the setting for channel-specific SETUP on line 01 of the respective channel (redox/chlorine or pH) matches the electrical connection (On/Off or Frequency dosing) in the relevant wiring diagram. If the wiring diagram is not followed, the circuit board will be destroyed and will have to be replaced.

Factory-set system configuration:

	Free chlorine	Combined chlorine	pH	Redox
Set value	1.00	0.50	7.40	740
Low alarm	0.40	0.00	6.80	600
High alarm	2.00	1.00	7.80	800

Enter configuration mode

Press and hold the **Code** button [10], enter the opening code and then release the button. The "**Code**" LED flashes as confirmation.
Press the **Cal.** button [10] to enter configuration mode. The "**Active**" LED illuminates as confirmation.
There are different configuration modes depending on the Autodos model. However, they all have a common mode in which settings made affect basic functions and a mode with specific settings for the different electrodes.

The following button combinations are used to enter the different configuration modes:

All models of M1, M2 and M3 – free chlorine, combined chlorine, pH

Basic functions:	**Function** [11] + **Reset** [15]
Configuration for electrode 1:	**Set value** [13] + **Select function** [1]
Configuration for electrode 2:	**Set value** [13] + **Select function** [4]
Configuration for electrode 3:	**Set value** [13] + **Select function** [7]

M3 – free chlorine, redox, pH

Basic functions:	**Set acid** [11] + **Reset** [15]
Configuration for electrode 1:	**Set alk/Chl** [13] + **Select function** [1]
Configuration for electrode 3 (acid):	**Set acid** [11] + **Select function** [7]
Configuration for electrode 3 (alkali):	**Set alk/Chl** [13] + **Select function** [7]

Flashing LEDs confirm which configuration mode you accessed when the buttons are released:
Active configuration is indicated by the "**Active**" LED flashing. If any of the electrode-specific configuration modes are active, the LEDs "**Off**" and "**Auto**" flash for the relevant electrode.

Changing text/value

Autodos M2 and M3

Select the line for which you want to change the setting on by pressing ↑ or ↓ under display 2.
When the arrow button is held depressed, display 3 shows the actual line number and display 2 shows the selected configuration type (e.g. "FCL" "-01").
When the buttons are released, display 2 shows a text indicating which setting can be changed and display 3 shows a text or a numeric value.
To change a text or value, press ↑ or ↓ under the relevant display.
The selected configuration type is indicated via one of the following texts: "SEt", "FCL", "CCL", "ACi" or "bAS".

Autodos M1

Select the line for which you want to change the setting by pressing the **Alarm high** [12] or **Alarm low** [14] button.
When the **Alarm high** [12] or **Alarm low** [14] button is held depressed, the display shows the actual line number.
When the buttons are released, the display shows either a text or a numeric value.
To change a text or value, press ↓ or ↑.
The selected configuration type is indicated via one of the following texts: "SEt", "FCL", "ACi" or "bAS" depending on variant.

Configuration of basic functions

Proceed as follows to configure all channels:

Model Autodos M3 – free chlorine, redox, pH: press the buttons **Set acid** [11] + **Reset** [15].
On all other models: press the buttons **Function** [11] + **Reset** [15].

This is indicated via the text “SEt UP” and the “**Off**” and “**Auto**” LEDs being unlit.
To exit configuration, press the **Cal.** button [0] or scroll past the last line.
The following can be changed in the common configuration; see relevant model pages 20-24.

Configuration – Autodos M3 free chlorine, combined chlorine, pH

Line	Text	Setting	Explanation
-01	FLo		Selection of flow switch and alarm for low flow.
		oFF	No flow switch. Flow alarm OFF.
		Son	Flow switch that closes with flow. Flow alarm ON.
		Pof	Turbine flow meter. Flow alarm OFF.
		Pon*	Turbine flow meter. Flow alarm ON.
-02	FCL		Selection of electrode type for chlorine measurement.
		Pb*	PB200 or CLE2.2
		Cur	4–20 mA sensor, e.g. CLE3
-03	C-P		Selection of function for relay output 2, DOS2. CCh = Combined chlorine/rHF, rLF, rH-, rL- = freely programmed.
		CCh*	Doses when: actual value > set value. Blocked by pH alarm, flow alarm.
		rHF	Doses when actual value > set value. Blocked by flow alarm.
		rLF	Doses when actual value < set value. Blocked by flow alarm.
		rH-	Doses when actual value > set value.
		rL-	Doses when actual value < set value.
-04	FCL		Selection of compensation of free chlorine against flow and/or pH.
		non	No compensation.
		Flo	Compensated against flow.
		PH-	Compensated against pH.
		FPH*	Compensated against flow and pH.
-05	PHd		Selection of pH-adjusted dosing.
		ACi*	Doses acid (doses when actual value > set value).
		bAS	Doses alkali (doses when actual value < set value).
-06	PHc		Selection of pH calibration point 2. Calibration point 1 = pH 7.00
		PH9*	Calibration point 2 = pH 9.00
		PH4	Calibration point 2 = pH 4.00
-07	PC		Setting of access from PC.
		No*	No access (display only).
		rES	Alarm reset only.
		Prg	Fully programmable.
-08	Sio	001-255 (001*)	Selection of Modbus ID number.
-09	FLd	000-030 (000*) [minutes]	Flow alarm delay time.
-10	rEL	000-030 (000*) [minutes]	Alarm relay delay time.
-11	SbY		The SbY input blocks all dosing plus the alarm relay.
		rEL*	Activates the alarm.
		non	Does not activate the alarm.

*factory default!

Configuration – Autodos M3 free chlorine, redox, pH

Line	Text	Setting	Explanation
-01	FLo		Selection of flow switch and alarm for low flow.
		oFF	No flow switch. Flow alarm OFF.
		Son	Flow switch that closes with flow. Flow alarm ON.
		Pof	Turbine flow meter. Flow alarm OFF.
		Pon*	Turbine flow meter. Flow alarm ON.
-02	FCL		Selection of electrode type for chlorine measurement.
		Pb*	PB200, CLE2.2 or redox.
		Cur	4–20 mA sensor, e.g. CLE3.
-03	FCC		Selection of compensation of free chlorine against flow and/or pH.
		non	No compensation.
		Flo	Compensated against flow.
		PH-	Compensated against pH.
		FPH*	Compensated against flow and pH.
-04	PHc		Selection of pH calibration point 2. Calibration point 1 = pH 7.00
		PH9*	Calibration point 2 = pH 9.00
		PH4	Calibration point 2 = pH 4.00
-05	PC		Setting of access from PC.
		No*	No access (display only).
		rES	Alarm reset only.
		Prg	Fully programmable.
-06	Sio	001-255 (001*)	Selection of Modbus ID number.
-07	FLd	000-030 (000*) [minutes]	Flow alarm delay time.
-08	rEL	000-030 (000*) [minutes]	Alarm relay delay time.
-09	SbY		The SbY input blocks all dosing plus the alarm relay.
		rEL*	Activates the alarm.
		non	Does not activate the alarm.

*factory default!

Configuration – Autodos M2 free chlorine/redox, pH

Line	Text	Setting	Explanation
-01	FLo		Selection of flow switch and alarm for low flow.
		oFF	No flow switch. Flow alarm OFF.
		Son	Flow switch that closes with flow. Flow alarm ON.
		Pof	Turbine flow meter. Flow alarm OFF.
		Pon*	Turbine flow meter. Flow alarm ON.
-02	FCL		Selection of electrode type for chlorine measurement.
		Pb*	PB200, CLE2.2 or redox
		Cur	4–20 mA sensor, e.g. CLE3
-03	C-o		Selection of chlorine or redox measurement
		FCL*	Free chlorine
		orP	Redox
-04	FCC		Selection of compensation of free chlorine against flow and/or pH.
		non	No compensation.
		Flo	Compensated against flow.
		PH-	Compensated against pH.
		FPH*	Compensated against flow and pH
-05	PHd		Selection of pH-adjusted dosing.
		ACi*	Doses acid (doses when actual value > set value).
		bAS	Doses alkali (doses when actual value < set value).
-06	PHc		Selection of pH calibration point 2. Calibration point 1 = pH 7.00
		PH9*	Calibration point 2 = pH 9.00
		PH4	Calibration point 2 = pH 4.00
-07	PC		Setting of access from PC.
		No*	No access (display only).
		rES	Alarm reset only.
		Prg	Fully programmable.
-08	Sio	001-255 (001*)	Selection of Modbus ID number.
-09	FLd	000-030 (000*) [minutes]	Flow alarm delay time.
-10	rEL	000-030 (000*) [minutes]	Alarm relay delay time.
-11	SbY		The Stdby input blocks all dosing plus the alarm relay.
		rEL*	Activates the alarm.
		non	Does not activate the alarm.

*factory default!

Configuration – Autodos M1 chlorine

Line	Text	Setting	Explanation
-01	FLo		Selection of flow switch and alarm for low flow.
		oFF	No flow switch. Flow alarm OFF.
		Son	Flow switch that closes with flow. Flow alarm ON.
		Pof	Turbine flow meter. Flow alarm OFF.
		Pon*	Turbine flow meter. Flow alarm ON.
-02	FCL		Selection of electrode type for chlorine measurement.
		Pb*	PB200 or CLE2.2
		Cur	4–20 mA sensor, e.g. CLE3
-03	PC		Setting of access from PC.
		No*	No access (display only).
		rES	Alarm reset only.
		Prg	Fully programmable.
-04	Sio	001-255 (001*)	Selection of Modbus ID number.
-05	FLd	000-030 (000*) [minutes]	Flow alarm delay time.
-06	rEL	000-030 (000*) [minutes]	Alarm relay delay time.
-07	SbY		The SbY input blocks all dosing plus the alarm relay.
		rEL*	Activates the alarm.
		non	Does not activate the alarm.

*factory default!

Configuration – Autodos M1 redox

Line	Text	Setting	Explanation
-01	FLo		Selection of flow switch and alarm for low flow.
		oFF	No flow switch. Flow alarm OFF.
		Son	Flow switch that closes with flow. Flow alarm ON.
		Pof	Turbine flow meter. Flow alarm OFF.
		Pon*	Turbine flow meter. Flow alarm ON.
-02	PC		Setting of access from PC.
		No*	No access (display only).
		rES	Alarm reset only.
		Prg	Fully programmable.
-03	Sio	001-255 (001*)	Selection of Modbus ID number.
-04	FLd	000-030 (000*) [minutes]	Flow alarm delay time.
-05	rEL	000-030 (000*) [minutes]	Alarm relay delay time.
-06	Sby		The Stdby input blocks all dosing relays. Also select whether it should activate the alarm relay.
		rEL*	Activates the alarm.
		non	Does not activate the alarm.

*factory default!

Configuration – Autodos M1 pH

Line	Text	Setting	Explanation
-01	FLo		Selection of flow switch and alarm for low flow.
		oFF	No flow switch. Flow alarm OFF.
		Son	Flow switch that closes with flow. Flow alarm ON.
		Pof	Turbine flow meter. Flow alarm OFF.
		Pon*	Turbine flow meter. Flow alarm ON.
-02	PHd		Selection of pH-adjusted dosing.
		ACi*	Doses acid (doses when actual value > set value).
		bAS	Doses alkali (doses when actual value < set value).
-03	PHc		Selection of pH calibration point 2. Calibration point 1 = pH 7.00
		PH9*	Calibration point 2 = pH 9.00
		PH4	Calibration point 2 = pH 4.00
-04	PC		Setting of access from PC.
		No*	No access (display only).
		rES	Alarm reset only.
		Prg	Fully programmable.
-05	Sio	001-255 (001*)	Selection of Modbus ID number.
-06	FLd	000-030 (000*) [minutes]	Flow alarm delay time.
-07	rEL	000-030 (000*) [minutes]	Alarm relay delay time.
-08	Sby		The SdY input blocks all dosing plus the alarm relay.
		rEL*	Activates the alarm.
		non	Does not activate the alarm.

*factory default!

Electrode-specific configuration – general

Text inside ( ) in the tables indicates dosing setting (on line -01).

Autodos M2 and M3

Select the desired line with the ↑ or ↓ button under the relevant display.
While the ↑ or ↓ button is depressed, display 2 shows the selected configuration type (e.g. “FCL” “-01”) and display 3 shows the actual line number.

When the button is released, display 2 shows a text indicating which setting can be changed and display 3 shows a text or a numeric value.
To change a text or value, press ↑ or ↓ under the relevant display.

Autodos M1

Select the line for which you want to change the setting by pressing the **Alarm high** [13] or **Alarm low** [14] button.
When the **Alarm high** [13] or **Alarm low** [14] button is held depressed, the display shows the actual line number.
When the button is released, the display shows either a text or a numeric value. To change a text or value, press ↓ or ↑.
The selected configuration is indicated via one of the following texts: “FCL”, “ACi” or “bAS”.

Electrode-specific configuration – free chlorine/redox (PB200, CLE 3, Jesco, Redox)

For configuration of free chlorine electrodes.

Model Autodos M3 – free chlorine, redox, pH: press the buttons **Set alc/chlor** [13] + **Select function** [1].
For all other models: press the buttons **Set value** [13] + **Select function**.

This is indicated via the text “SEt FCL” and flashing of the “**Off**” and “**Auto**” LEDs.
To exit configuration, press the **Cal.** button [0] or scroll past the last line.

The following can be modified in the channel-specific configuration – Free chlorine:

Line	Text	Setting		Explanation
-01	doS			Selection of dosing outlet and function.
		oFF		No dosing.
		ono*		On/Off dosing.
		Pdo		Pulse width dosing.
		FrE		Frequency dosing.
		Cur		Dosing via current output.
-02	P	0.10-2.00 (0,20*)	ppm	P-band. (Pdo, FrE, Cur)
-03	I	000-100 (000*)	minutes	I-time, 000=no I-regulation. (Pdo, FrE, Cur)
-04	d	000-100 (000*)	seconds	D-time, 000=no D-regulation. (Pdo, FrE, Cur)
-05	dF	010-180 (100*)	strokes/minute	Max. frequency dosing. (FrE)
-06	Pdo	005-015 (010*)	minutes	Pulse width during pulse width dosing. (Pdo)
-07	Ldt	000-060 (000*)	minutes	Long dosing time alarm, 0 = no function.
-08	oFt	000-600	seconds	Min. time OFF for relay, 0 = no function. (ono)
-09	ont	000-600	seconds	Min. time ON for relay, 0 = no function. (ono)
-10	Cur	- - 0 / - - 4 (- - 4*)		Current output, selection of range 0–20 mA/4–20 mA.
-11	C-L	0.00-9.99 (0.00*)	ppm	Current output, value for 0/4 mA.
-12	C-H	0.00-9.99 (9.99*)	ppm	Current output, value for 20 mA.
-13	AHd	005-600 (005*)	seconds	Delay time for high alarm.
-14	ALd	005-600 (005*)	seconds	Delay time for low alarm.

*factory default!

Electrode-specific configuration – combined chlorine (CTE 1)

For configuration of combined chlorine electrodes, press the buttons **Set value** [13] + **Select function**. This is indicated via the text “SEt CCL” and flashing of the “**Off**” and “**Auto**” LEDs.
To exit configuration, press the **Cal.** button [0] or scroll past the last line.

The following can be modified in the channel-specific configuration – Combined chlorine:

Line	Text	Setting		Explanation
-01	doS			Selection of dosing outlet and function.
		oFF		No dosing.
		ono*		On/Off dosing.
		Pdo		Pulse width dosing.
		FrE		Frequency dosing.
		Cur		Dosing via current output.
-02	P	0.10-2.00 (0.20*)	ppm	P-band. (Pdo, FrE, Cur)
-03	I	000-100 (000*)	minutes	I-time 000 = no I-regulation. (Pdo, FrE, Cur)
-04	d	000-100 (000*)	seconds	D-time, 000 = no D-regulation. (Pdo, FrE, Cur)
-05	dF	010-180 (100*)	strokes/minute	Max. frequency dosing. (FrE)
-06	Pdo	005-015 (010*)	minutes	Pulse width during pulse width dosing. (Pdo)
-07	Ldt	000-060 (000*)	minutes	Long dosing time alarm, 0 = no function.
-08	oFt	000-600 (000*)	seconds	Min. time OFF for relay, 0 = no function. (ono)
-09	ont	000-600 (000*)	seconds	Min. time ON for relay, 0 = no function. (ono)
-10	Cur	- - 0 / - - 4 (- - 4*)		Current output, selection of range 0–20 mA/4–20 mA.
-11	C-L	0.00-9.99 (0.00*)	ppm	Current output, value for 0/4 mA.
-12	C-H	0.00-9.99 (5.00*)	ppm	Current output, value for 20 mA.
-13	AHd	005-600 (005*)	seconds	Delay time for high alarm.
-14	ALd	005-600 (005*)	seconds	Delay time for low alarm.

*factory default!

Electrode-specific configuration – pH

For configuration of pH electrodes.
Autodos M1-3 with acid or alkali dosing: press the buttons Set value [13] + Function [11].
Autodos M3 with acid dosing: press the buttons Set acid [11] + Select function [7].
Autodos M3 with alkali dosing: press the buttons Set alk/chlor [13] + Select function [7].

This is indicated via the text “SEt ACi” or “SEt bAS” (depending on whether acid or alkali dosing is selected) and flashing of the “**Off**” and “**Auto**” LEDs.
To exit configuration, press the **Cal.** button [0] or scroll past the last line.

The following can be modified in the channel-specific configuration – pH:

Line	Text	Setting		Explanation
-01	doS			Selection of dosing outlet and function.
		oFF		No dosing.
		ono*		On/Off dosing.
		Pdo		Pulse width dosing.
		FrE		Frequency dosing.
		Cur		Dosing via current output.
-02	P	0.10-2.00 (0.20*)	pH	P-band. (Pdo, FrE, Cur)
-03	I	000-100 (000*)	minutes	I-time, 000=no I-regulation. (Pdo, FrE, Cur)
-04	d	000-100 (000*)	seconds	D-time, 000=no D-regulation. (Pdo, FrE, Cur)
-05	dF	010-180 (100*)	strokes/minute	Max. frequency dosing. (FrE)
-06	Pdo	005-015 (010*)	minutes	Pulse width during pulse width dosing. (Pdo)
-07	Ldt	000-060 (000*)	minutes	Long dosing time alarm, 0 = no function.
-08	oFt	000-600 (000*)	seconds	Min. time OFF for relay, 0 = no function. (ono)
-09	ont	000-600 (000*)	seconds	Min. time ON for relay, 0 = no function. (ono)
-10	Cur	- - 0 / - - 4 (- - 4*)		Current output, selection of range 0–20 mA/4–20 mA.
-11	C-L	0.00-9.99 (6.00*)	pH	Current output, value for 0/4 mA
-12	C-H	0.00-9.99 (8.50*)	pH	Current output, value for 20 mA.
-13	AHd	005-600 (005*)	seconds	Delay time for high alarm.
-14	ALd	005-600 (005*)	seconds	Delay time for low alarm.

*factory default!

8. Calibration

At a minimum, authorization level 1 is required to access calibration mode, i.e. the "**Code**" LED must be illuminated or flash.

During calibration, no settings can be made and high alarm, low alarm and flow alarm are not activated. Automatic dosing is stopped during calibration.

Calibration mode "**Active**" is accessed by pressing and holding the **Cal.** button [0] until the "**Active**" LED illuminates. Dosing stops automatically during calibration and output signals on the current outputs are frozen at the last measured value before calibration.
In calibration mode "**Active**" calibration of pH7, pH9 and chlorine zero points is possible.

Calibration mode "**Adjust**" is accessed by pressing and holding the **Cal.** button [0] until the "**Adjust**" LED illuminates (presuming the "**Active**" is already lit). If combination with pH exists, no pH value is displayed. "- - -" is instead displayed to indicate that pH calibration is not possible.

Calibration mode "**Off**" is accessed by pressing and holding the **Cal.** button [0] until the "**Adjust**" and "**Active**" LEDs go out.

To exit calibration mode, press the **Code** button [10]. The LED goes out as confirmation.

Calibration – pH

Calibration is done at two points – normally pH7 and pH9.

1. Activate calibration mode "**Active**".
2. Take the cleaned and rinsed pH electrode and place it in the pH7 calibration solution (not in the buffer bottle). Move the electrode up and down for a good reading. Give the measurement value time to stabilize (5-30 seconds). Then press the calibration button **pH7** [8] until the display shows "- - -".
3. Rinse the electrode and then place it in the pH9 calibration solution (not in the buffer bottle). Move the electrode up and down a little for a good reading. Give the measurement value time to stabilize (5-30 seconds). Then press the calibration button pH9 [9] until the display shows "- - -".
4. pH calibration is complete. Exit calibration mode by pressing the **Cal.** button [0] twice until the "**Adjust**" and "**Active**" LEDs go out.
5. Discard used buffer solution after calibration.

NOTE: If the electrode voltage during zero point calibration deviates too greatly from the expected value, electrode error is indicated with the text "EL1", "EL2", "EL3" or "EL4" while the calibration button is held depressed.
When the button is released, Autodos M uses the calibration values that applied before the failed calibration attempt.

Text meaning:

EL1	active electrode error 1 (low calibration point < min)
EL2	active electrode error 2 (low calibration point > max)
EL3	active electrode error 3 (high calibration point < min)
EL4	active electrode error 4 (high calibration point > max)

Calibration – redox

1. Activate calibration mode by pressing and holding the **Cal.** button [0] until the "**Active**" LED illuminates.
2. Zero point calibration is carried out by lifting the electrode out of the flow cell, drying it off and placing it in the reference fluid with a known redox value. Wait about 1 minute.
3. Access calibration mode by pressing and holding the **Cal.** button [0] until the "**Adjust**" LED illuminates. The meter stores the last measured electrode signal.
4. Take a water sample and determine the correct chlorine value.
5. Set the correct value with the ↑ and ↓ buttons under display 2.
6. Refit the electrode in the flow cell.
7. Exit calibration mode by pressing and holding the **Cal.** button [0] until the "**Adjust**" LED goes out.

Some buffer solutions for redox and approximate readings:

Mixture	Redox potential		
	at 20 °C	at 25 °C	at 30 °C
Buffer pH 2 + quinhydrone (undissolved crystals in the solution)	385 mV	381 mV	377 mV
Buffer pH 4 + quinhydrone (undissolved crystals in the solution)	268 mV	263 mV	258 mV
Buffer pH 7 + quinhydrone (undissolved crystals in the solution)	92 mV	86 mV	79 mV
Buffer pH 8 + quinhydrone (undissolved crystals in the solution)	33 mV	27 mV	19 mV

Note: Quinhydrone solution is unstable and must be discarded after use. The time required for stabilization of the new measurement value is an indication of electrode condition as age and contamination increase stabilization time.

Zero point calibration

Press and hold the ↓ button for 4 seconds until the display shows: -, -, -, - - -. Calibration is then complete.
To reset zero point calibration to the factory settings, press and hold ↑ for 4 seconds until the display shows: F, F, F, FFF; the reset is then complete.
NOTE: If electrode voltage during zero point calibration deviates too much from the expected value, electrode error is indicated with the text “EL1”, “EL2” while the calibration button is held depressed.
When the button is released, Autodos M uses the calibration values that applied before the failed calibration attempt.
The amplification setting is limited both up and down by limits for feasible electrode signal.
The chlorine value can be calibrated down to 0.05 ppm.

Text meaning:

EL1	active electrode error 1 (low calibration point < min)
EL2	active electrode error 2 (low calibration point > max)

Two-point calibration (zero point and amplification) to value measured with photometer (e.g. DPD no.1).
If zero point calibration is not required, skip point 2 below (with correct flow).

Calibration – free chlorine: PB-200 chlorine electrode

1. Activate calibration mode by pressing and holding the **Cal.** button [0] until the “**Active**” LED illuminates.
2. Zero point calibration is carried out by lifting the electrode out of the flow cell, waiting about 1 minute and then pressing the ↓ button under display 1. Before calibration to the laboratory-measured value is possible, the electrode must be
3. refitted in the flow cell and allowed to measure in the cell for about 2 minutes to obtain a correct value.
4. Access calibration mode by pressing and holding the **Cal.** button [0] until the “**Adjust**” LED illuminates. The meter stores the last measured electrode signal.
5. Take a water sample and determine the correct chlorine value with DPD1.
6. Set the correct chlorine value with the ↑ and ↓ buttons under display 1.
7. Access calibration mode by pressing and holding the **Cal.** button [0] until the “**Adjust**” and “**Active**” LEDs go out.

Calibration – free chlorine: Prominent 4–20mA chlorine electrode CLE 3-mA-10ppm

1. Activate calibration mode by pressing and holding the **Cal.** button [0] until the “**Active**” LED illuminates.
2. Zero point calibration is carried out by placing the electrode in chlorine-free water or in the air. Wait about 1 hour and then press the ↓ button under display 1. Before calibration can continue, the electrode must be allowed to measure in the flow cell for about 5 minutes to obtain a correct value.
3. Access calibration mode by pressing and holding the **Cal.** button [0] until the “**Adjust**” LED illuminates. The meter stores the last measured electrode signal.
4. Take a water sample and determine the correct chlorine value with DPD1.
5. Set the correct chlorine value with the ↑ and ↓ buttons under display 1.
6. Access calibration mode by pressing and holding the Cal. button [0] until the “**Adjust**” and “**Active**” LEDs go out.

Calibration – combined chlorine

Combined chlorine is a calculated value (total chlorine – free chlorine).
In calibration mode, TOTAL chlorine (i.e. free + combined chlorine) is shown on display 2 and calibration is done on TOTAL chlorine.
Note that calibration mode always shows total chlorine (i.e. the value measured by the electrode).

Calibration – combined (total) chlorine: ProMinent 4–20mA chlorine electrode CTE 1-mA-10ppm

1. Activate calibration mode by pressing and holding the **Cal.** button [0] until the "**Active**" LED illuminates.
2. Zero point calibration is carried out by placing the electrode in chlorine-free water or in the air. Wait about 1 hour and then press the ↓ button under display 2. Before calibration can continue, the electrode must be allowed to measure in the flow cell for about 5 minutes to obtain a correct value.
3. Access calibration mode by pressing and holding the **Cal.** button [0] until the "**Adjust**" LED illuminates. The meter stores the last measured electrode signal.
4. Take a water sample and determine the correct chlorine value with DPD 1 and then DPD 3.
5. Set the correct chlorine value with the ↑ and ↓ buttons under display 2.
6. Exit calibration mode by pressing and holding the **Cal.** button [0] until the "**Adjust**" and "**Active**" LEDs go out.

9. Maintenance

Flow cell

On a daily basis, check that the water flows as it should. Flow should be approx. 30 litres per hour.
Clean the water filter before the flow cell as necessary.

Electrodes

Refer to the electrode manual.

Water quality

As water quality varies and electrodes wear over time, measurement values should be checked regularly. This can be done with "amplification calibration" (calibration point high) and should be carried out once a week.
Zero point calibration is done less frequently.
Two-point calibration (i.e. both zero point and amplification calibration) is carried out upon initial start-up and when electrodes are replaced.

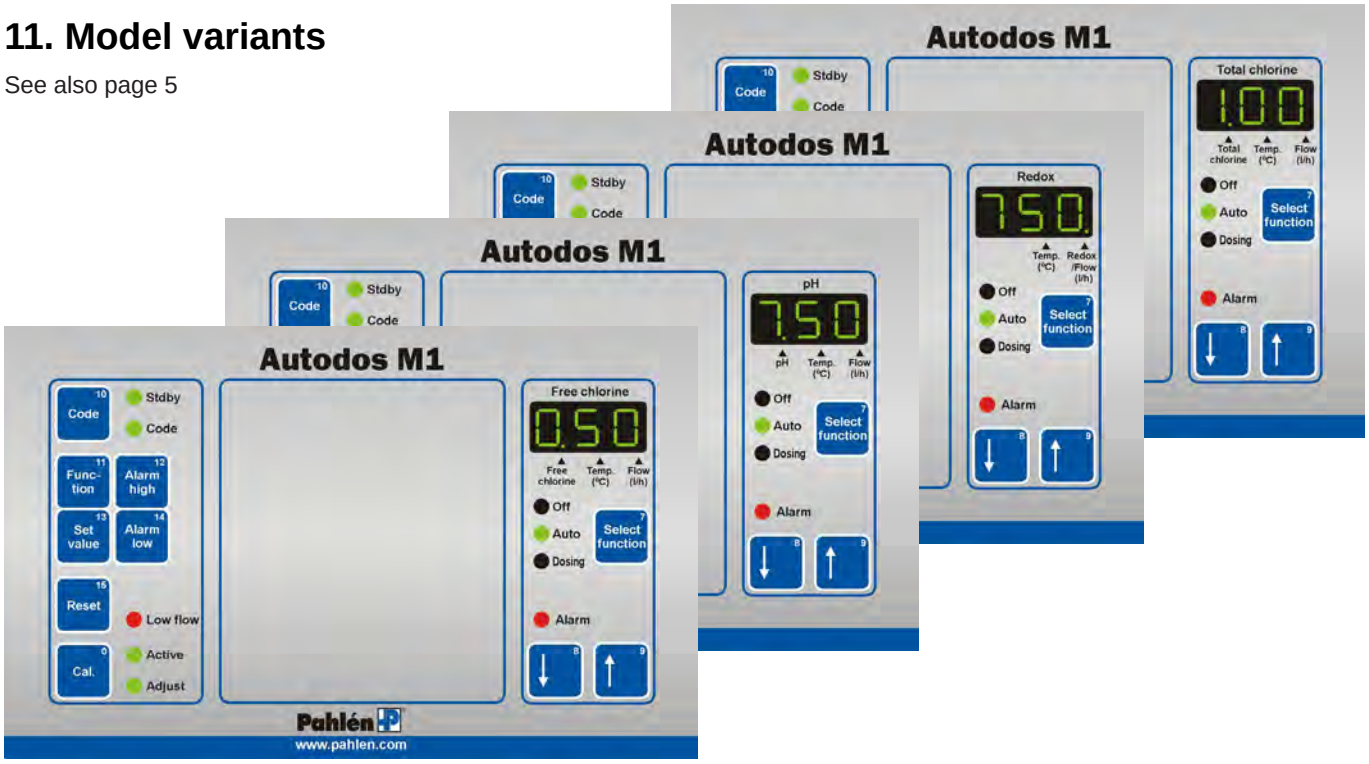
10. Troubleshooting

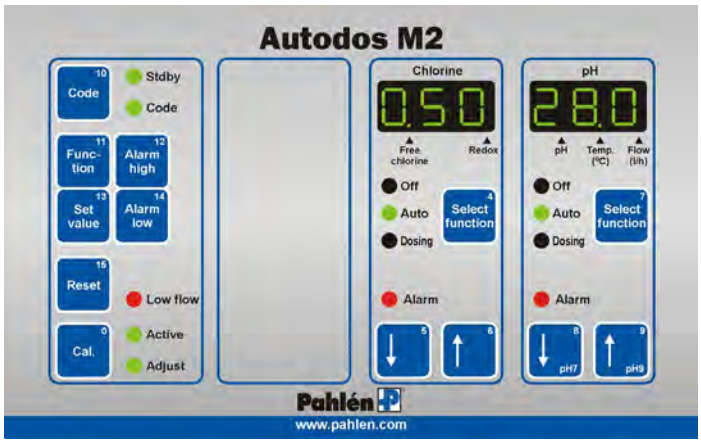
Error	Probable cause	Action
Meter completely dead	No power supply.	Check the electrical connection.
Measurement value fluctuates greatly up and down.	Electrode not connected.	Check the connection.
	Cable fault.	Check the cable.
	Electrode without measurement water.	Check the flow cell.
Incorrect measurement values (pH or chlorine).	Dirty electrode.	Clean the electrode.
	Incorrectly calibrated meter.	Carry out calibration with fresh buffer solution.
	Defective electrode.	Try shaking the electrode (if there is an air bubble in the glass ball); otherwise replace the electrode.
Calibration cannot be carried out.	Defective electrode.	Replace the electrode.
	Poor contact with the meter.	Check the cables, including the cables on the inside connecting the BNC connectors on the outside with the circuit board.
	Defect buffer solution.	Check the buffer solution.
Electrodes give sluggish but correct value in buffer solution but incorrect during measurement	Dirty electrode.	Clean the electrode.
	Electrode used up.	Replace the electrode.
Measurement value stuck at pH = 7 and 0 mV or 0 mg/l	Short-circuit of measurement signal.	Check electrode, cables and connections.
Meter is not dosing, dosing lamp is not illuminated or AUTO is flashing.	Meter in “manual” mode.	Put the meter in “auto” mode.
	“PHF” error.	Determine the cause and reset the alarm; chlorine dosing starts when the pH value is correct.
The meter is not dosing, the dosing lamp is illuminated.	Dosing equipment is not connected correctly.	Check connection.
	Dosing relay defective	Return the meter for repair.
Incorrect chlorine measurement values (Prominent measuring cell).	Air bubbles in the membrane.	Carefully tap on the outside of the electrode's glass casing or temporarily increase flow past the cell.
	Dirty membrane.	Clean the membrane and fill with fresh electrolyte.
	Pressure changes.	Depressurize the outlet from the flow cell.
	Unstable pH value.	The pH value must be stable during chlorine measurement; adjust pH to 7.4
	Incorrectly calibrated meter.	Calibrate chlorine.
Chlorine value too low to be adjusted to measured value (Prominent measuring cell).	Poor electrolyte.	Replace the electrolyte or wipe off the gold tip of the measuring cell with a napkin.
	Oxides on the gold tip of the measuring cell.	Carefully polish with wet grinding paper.
Incorrect chlorine measurement values (PB-200 measuring cell).	Test water flow too low.	Ensure that the flow through the measuring cell is correct.
	Unstable pH value.	The pH value must be stable during chlorine measurement; adjust pH to 7.4
	Incorrectly calibrated meter.	Calibrate chlorine.
Chlorine value shows zero all the time (PB-200 measuring cell).	Cable connection to metal cylinder loose.	Fasten the cable connection.
No “click” during dosing; dosing lamp is illuminated.	Dosing relay defective.	Return the meter for repair.

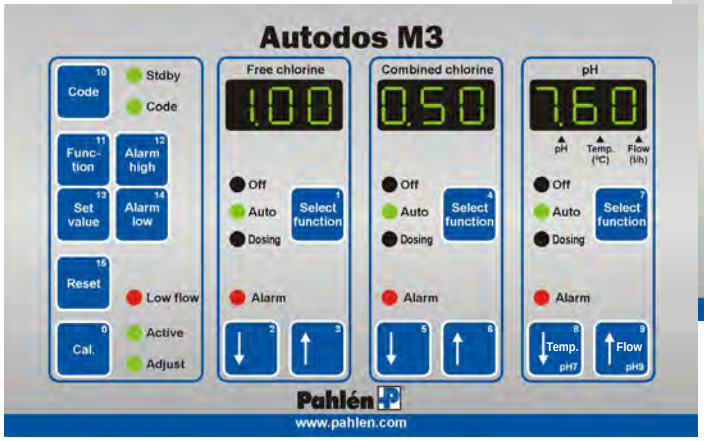
Error codes – see page 14.

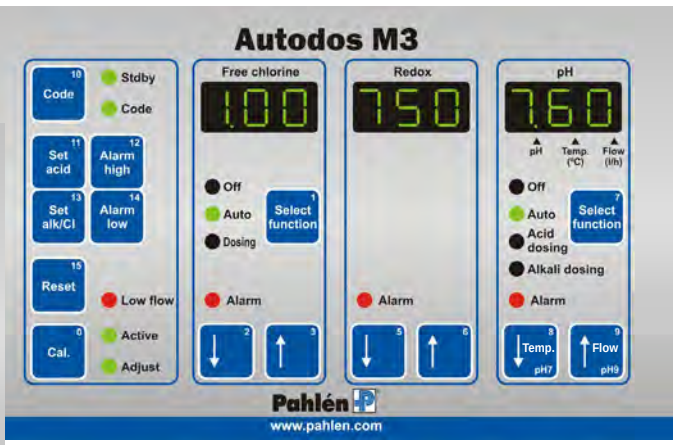
11. Model variants

See also page 5









12. Jesco free chlorine electrode (option)

Jesco free chlorine electrode is not marketed by Pahlén AB, but connection is possible if desired.
Note that Jesco uses a separate measuring cell and the corresponding electrode/cell on the Autodos unit must then be plugged.

Maintenance

Refer to the Jesco manual regarding service and maintenance.

Calibration of free chlorine (Jesco chlorine electrode)

NOTE: In order to obtain the correct chlorine value, the measuring cell must first have correct flow for 3 hours so that the glass balls have time to clean the electrodes. This is vital in order to prevent a zero point error.

1. Activate calibration mode by pressing and holding the **Cal.** button [0] until the "**Active**" LED illuminates.
2. Fill the measuring cell with chlorine-free water and then wait about 10 seconds.
3. Activate zero point calibration by pressing the ↓ button under display 1. Before calibration can continue, the electrode must be allowed to measure in the flow cell for about 2 minutes to obtain a correct value.
4. Access calibration mode Adjust by pressing and holding the **Cal.** button [0] until the "**Adjust**" LED illuminates. The meter stores the last measured electrode signal.
5. Take a water sample and determine the correct chlorine value with DPD1.
6. Set the correct chlorine value with the ↑ and ↓ buttons under display 1.
7. Exit calibration mode Adjust by pressing and holding the **Cal.** button [0] until the "**Adjust**" LED goes out.

Flow

Flow must be large enough that the glass balls rotate so forcefully that they reach the top of the measuring cell (but not too violently). If necessary, the copper plate can be replaced.

13. Autodos PC connection (expansion)

Simply installing an extra circuit board makes it possible to connect Autodos M to a PC.
The PC connection kit includes the following parts: Datalogger with real-time clock and communication module.
The circuit board is connected to the bottom card in Autodos M with a connector and plastic clips.
Externally, the circuit board is connected either to a communication module via a twin-cable connector or via an RJ45 connector to the serial port of a PC or modem. Program version 1.0 has no support for modem connection. Such support is planned for later versions.
Identification of a single Autodos M in the twin-cable loop is done through a unique, factory-programmed serial number for each delivered unit.
The communication program "Autodos Monitor" is used to monitor Autodos M and modify parameters.
The program is described in a separate document.

Datalogger	32 kB EEPROM
	Real-time clock
	24 kB (3 days) with minute average values for 4 channels
	8 kB events (255 events); an event can be e.g. an alarm or a calibration
Communication module	RS232 PC communication, cables included
	Twin-cable connection with Autodos
	With recommended cable FKAR-PG 0.5 mm^2, up to 200 m and 5 units can be connected to the twin-cable loop.
	External 9 VAC transformer included

14. Autodos PLC connection (expansion)

Simply installing an extra circuit board makes it possible to connect Autodos M to a PLC.
The PLC connection kit includes the following parts: Datalogger with real-time clock and Modbus RTU.
The circuit board is connected to the bottom card in Autodos with a connector and plastic clips. Externally, the circuit board is connected to the RS422 interface via a 5-pin screw terminal.

Datalogger	32kB EEPROM
	Real-time clock
	24 kB (3 days) with minute average values for 4 channels
	8 kB events (255 events); an event can be e.g. an alarm or a calibration

Modbus RTU interface in Autodos M3

Baudrate	9600 baud
Parity	None.

Modbus RTU communication in Autodos M3. Autodos only responds via a message:

Slave address	As per Autodos “common setup”
Function	03H, Read holding registers
Starting Address Hi	00H
Starting Address Lo	01H
No. of Points Hi	00H
No. of Points Lo	0BH
CRC	55H
CRC	CDH

With slave address 1, the message is: 01 03 00 01 00 0B 55 CD

Autodos responds with:

Ph	(16 bit, lsb = 0.01 pH)
Combined chlorine	(16 bit, lsb = 0.01 mg/l)
Free chlorine	(16 bit, lsb = 0.01 mg/l)
AD0	(16 bit, lsb = prog. dependent)
Redox	(16 bit, lsb = 1 mV)
Temp, NTC input	(16 bit, lsb = 0.1 °C)
Alarm Active	(16 bit)
Alarm Reset	(16 bit)
Setvalue pH	(16 bit, lsb = 0.01 pH)
Setvalue Comb.chlorine	(16 bit, lsb = 0.01 mg/l)
Setvalue Free chlorine	(16 bit, lsb = 0.01 mg/l)

Alarm Active (16 bit)

bit 0: Standby mode
bit 1: Flow
bit 2: High alarm pH
bit 3: High alarm Combined chlorine
bit 4: High alarm Free chlorine
bit 5: Low alarm pH
bit 6: Low alarm Combined chlorine
bit 7: Low alarm Free chlorine

Alarm Reset (16 bit)

bit 0: Standby mode
bit 1: Flow
bit 2: High alarm pH
bit 3: High alarm Combined chlorine
bit 4: High alarm Free chlorine
bit 5: Low alarm pH
bit 6: Low alarm Combined chlorine
bit 7: Low alarm Free chlorine