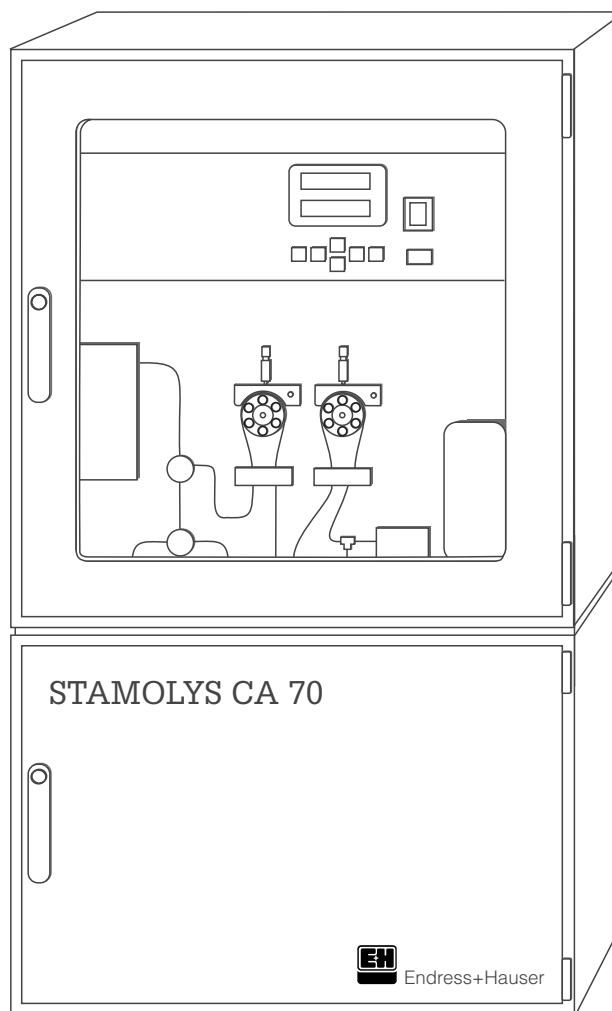


StamoLys CA 70 ***AL/CR/CU/FE/HA/MN/SI***

Analyzer for Photometric Measurement

Operating Instructions



Quality made by
Endress+Hauser



ISO 9001

Endress + Hauser

The Power of Know How



Table of contents

1	Safety instructions	4	10	Technical data	38
1.1	Designated use	4	10.1	Input	38
1.2	Installation, commissioning and operation	4	10.2	Output	38
1.3	Operational safety	4	10.3	Power supply	39
1.4	Return	5	10.4	Performance characteristics	40
1.5	Notes on safety conventions and icons	5	10.5	Operating conditions (environment)	40
2	Identification	6	10.6	Operating conditions (process)	40
2.1	Device designation	6	10.7	Mechanical construction	41
2.2	Scope of delivery	7	11	Appendix	42
2.3	Certificates and approvals	7	11.1	Operating matrix	42
3	Installation	8	11.2	Specifications overview	46
3.1	Incoming acceptance, transport, storage	8		Index	53
3.2	Installation conditions	8			
3.3	Installation instructions	10			
3.4	Post-installation check	10			
4	Wiring	11			
4.1	Quick wiring guide	11			
4.2	Signal connections	13			
4.3	Switching contacts	13			
4.4	Post-connection check	14			
5	Operation	15			
5.1	Operation and commissioning	15			
5.2	Display and operating elements	15			
5.3	Local operation	15			
5.4	Calibration	23			
6	Commissioning	26			
6.1	Function check	26			
6.2	Switching on the measuring device	26			
7	Maintenance	28			
7.1	Maintenance schedule	28			
7.2	Replacement of the reagents	29			
7.3	Replacement of the pump hoses	29			
7.4	Placing out of service	30			
8	Accessories	31			
8.1	Installation accessories	31			
8.2	Reagents and standard solutions	31			
9	Trouble-shooting	32			
9.1	Trouble-shooting instructions	32			
9.2	Spare parts	35			

1 Safety instructions

1.1 Designated use

The analyzer CA 70 is a compact analysis system for photometric measurement. It is especially designed for the monitoring of aluminium, chromate, copper, iron, total hardness, manganese or silicate in industrial water and waste water.

Any other use than the one described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

Please note the following items:

- Installation, electrical connection, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel. The technical personnel must be authorised for the specified activities by the system operator.
- Technical personnel must have read and understood these Operating Instructions and must adhere to them.
- Before commissioning the entire measuring point, check all the connections for correctness. Ensure that electrical cables and hose connections are not damaged.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- Measuring point faults may only be rectified by authorised and specially trained personnel.
- If faults can not be rectified, the products must be taken out of service and secured against unintentional commissioning.
- Repairs not described in these Operating Instructions may only be carried out at the manufacturer's or by the Endress+Hauser service organisation.

1.3 Operational safety

The analyzer has been designed and tested according to the state of the art and left the factory in perfect functioning order.

Relevant regulations and European standards have been met.

As the user, you are responsible for complying with the following safety conditions:

- Installation instructions
- Local prevailing standards and regulations.

1.4 Return

If the analyzer has to be repaired, please return it *cleaned* to the Endress+Hauser sales centre responsible.

Please use the original packaging, if possible.

Please enclose the completed Dangerous Goods sheet (copy the second last page of these Operating instructions) with the packaging and also the shipping documents.

1.5 Notes on safety conventions and icons



Warning!

This symbol alerts you to hazards. They can cause serious damage to the instrument or to persons if ignored.



Caution!

This symbol alerts you to possible faults which could arise from incorrect operation. They could cause damage to the instrument if ignored.



Note!

This symbol indicates important items of information.

2 Identification

2.1 Device designation

2.1.1 Nameplate

Compare the order code on the nameplate (at the analyzer) with the product structure (see below) and your order.



 ENDRESS + HAUSER STAMOLYS CA70			
order code / Best.Nr.:		CA70CR-A10B2A1	
serial no. / Ser.-Nr.:		3B0003C3RN1	
measuring range / Messbereich:		0.1-1mg/L CR	
output 1 / Ausgang 1:		0/4-20mA, RS 232C	
output 2 / Ausgang 2:		-	
mains / Netz:		230V AC, 50Hz, 200VA	
prot. class / Schutzart:		IP 43	
ambient temp. / Umgebungstemp.:		+5°C...+40°C	

Fig. 1: Example nameplate for CA 70

2.1.2 Product structure

CA 70 AL/CA/CR/CU/FE/HA/MN/S

Measuring range						
A	Depending on parameter, see Technical Information					
B	Depending on parameter, see Technical Information					
C	Depending on parameter, see Technical Information					
Y	Special version acc. to customers specification					
Sample transfer						
1	Sample transfer from one measuring point					
2	Alternating sample transfer from two measuring points					
9	Special version acc. to customers specification					
Power supply						
0	Power supply 230 V AC					
1	Power supply 115 V AC					
9	Special version acc. to customers specification					
Sample conditioning						
A	CA 70 is feeding sample itself					
B	Sample in CA 70 is not subjected to pressure					
Y	Special version acc. to customers specification					
Equipment						
1	Without reagent cooling device					
2	With reagent cooling device					
9	Special version acc. to customers specification					
Communication						
A	RS 232 + 0/4 ... 20 mA					
Y	Special version acc. to customers specification					
Additional equipment						
1	Quality certificate					
9	Special version acc. to customers specification					
CA 70 XX-						complete order code

CA 70 SI

		Measuring range			
	A	Measuring range: 1 ... 200 µg/l			
	B	Measuring range: 0.1 ... 5.0 mg/l			
		Sample transfer			
	1	Sample transfer from one measuring point			
	2	Alternating sample transfer from two measuring points			
		Power supply			
	0	Power supply 230 V AC			
	1	Power supply 115 V AC			
		Sample conditioning			
	A	No sample pressure and no cooling system			
	B	With sample pressure reduction and no cooling system			
	C	With cooling system and no sample pressure reduction			
	D	With sample pressure reduction and with cooling system			
		Equipment			
	1	Without reagent cooling device			
	2	With reagent cooling device			
		Communication			
	A	RS 232 + 0/4 ... 20 mA			
		Additional equipment			
	1	Quality certificate			
CA 70 SI-					complete order code

2.2 Scope of delivery

The scope of delivery comprises:

- an analyzer
- a cleaning injector
- a tin of silicone spray
- a hose ID 1.6 mm
- a hose ID 6.4 mm
- a quality certificate
- an Operating Instructions BA 341C/07/en

If you have any questions, please contact your supplier or your Endress+Hauser sales centre responsible (see back page of these Operating Instructions).

2.3 Certificates and approvals

Declaration of conformity

The product meets the legal requirements of the harmonised European standards. Endress+Hauser confirms compliance with the standards by affixing the **CE** symbol.

Quality certificate

Depending on the order code you receive a quality certificate. With the certificate Endress+Hauser confirms compliance with all technical regulations and the successful testing individually for your product.

3 Installation

3.1 Incoming acceptance, transport, storage

- Make sure the packaging is undamaged!
Inform the supplier about damage to the packaging.
Keep the damaged packaging until the matter has been settled.
- Make sure the contents are undamaged!
Inform the supplier about damage to the delivery contents.
Keep the damaged products until the matter has been settled.
- Check that the scope of delivery is complete and agrees with your order and the shipping documents.
- The packaging material used to store or to transport the product must provide shock protection and humidity protection. The original packaging offers the best protection. Also, keep to the approved ambient conditions (see "Technical data").
- If you have any questions, please contact your supplier or your Endress+Hauser sales centre responsible (see back page of these Betriebsanleitung).

3.2 Installation conditions

3.2.1 Dimensions

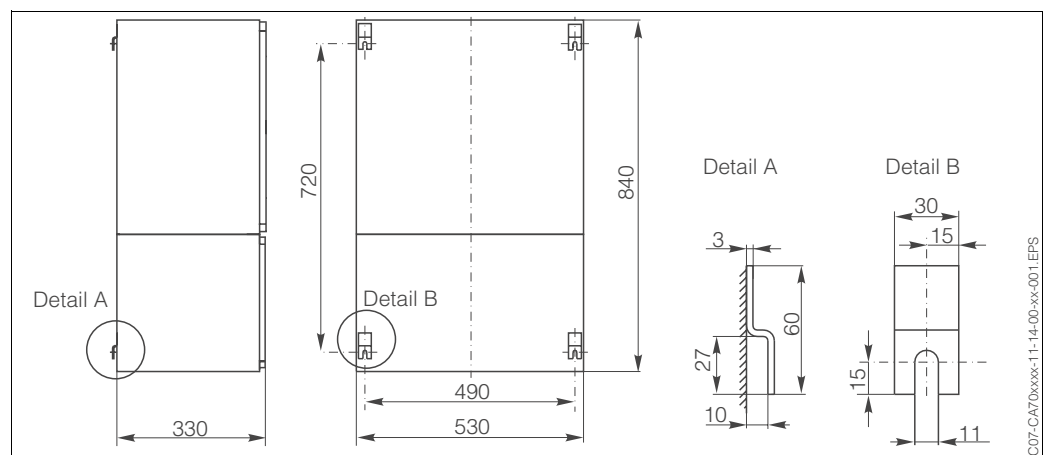


Fig. 2: Analyzer dimensions

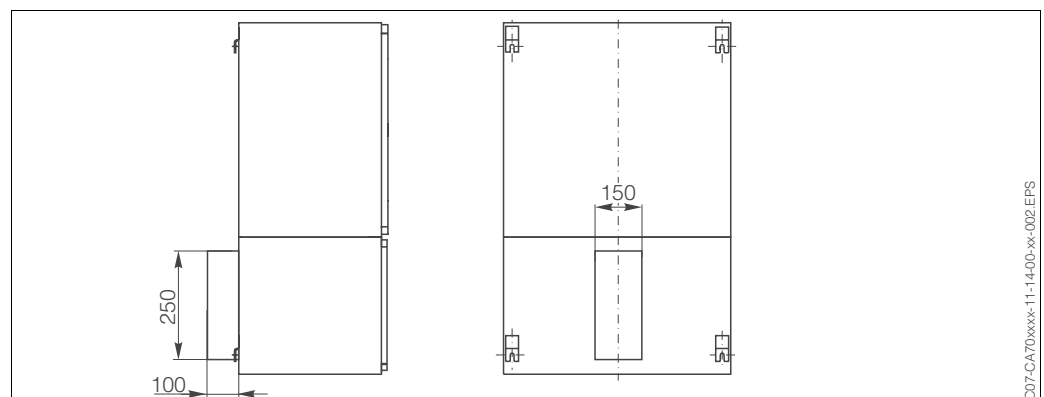


Fig. 3: Cooling device dimensions

3.2.2 Wall mounting

Either mount the analyzer directly on a wall using screws or use the wall mounting set available as an accessory (→ Chap. 8.1, P. 31).

Mounting with wall mounting set for analyzer with cooling device (optional)

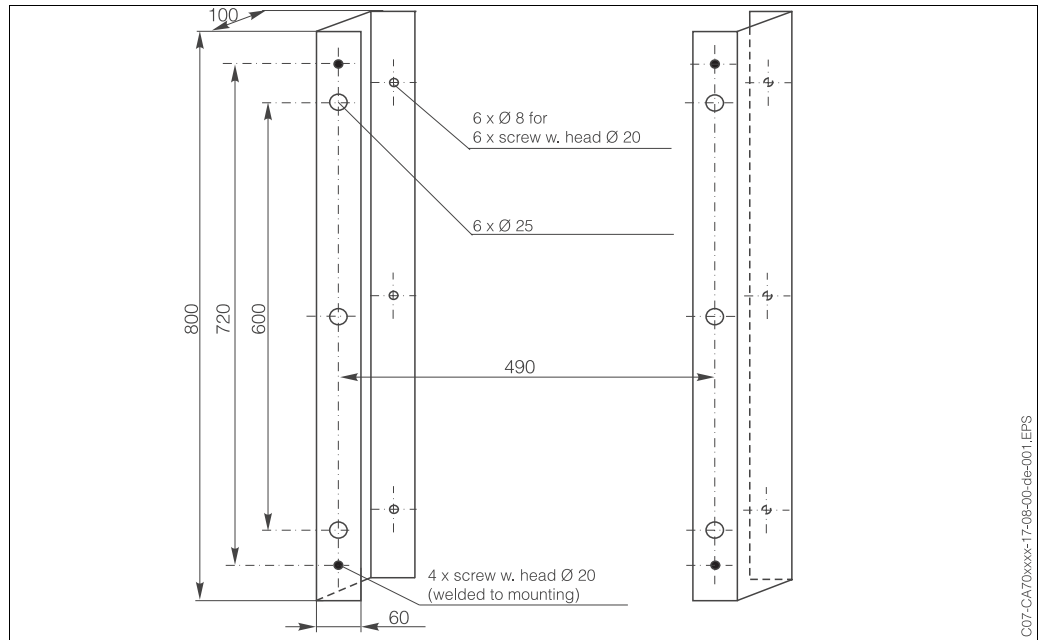


Fig. 4: Wall mounting set for analyzer with cooling device

Mounting with wall mounting set for analyzer without cooling device (optional)

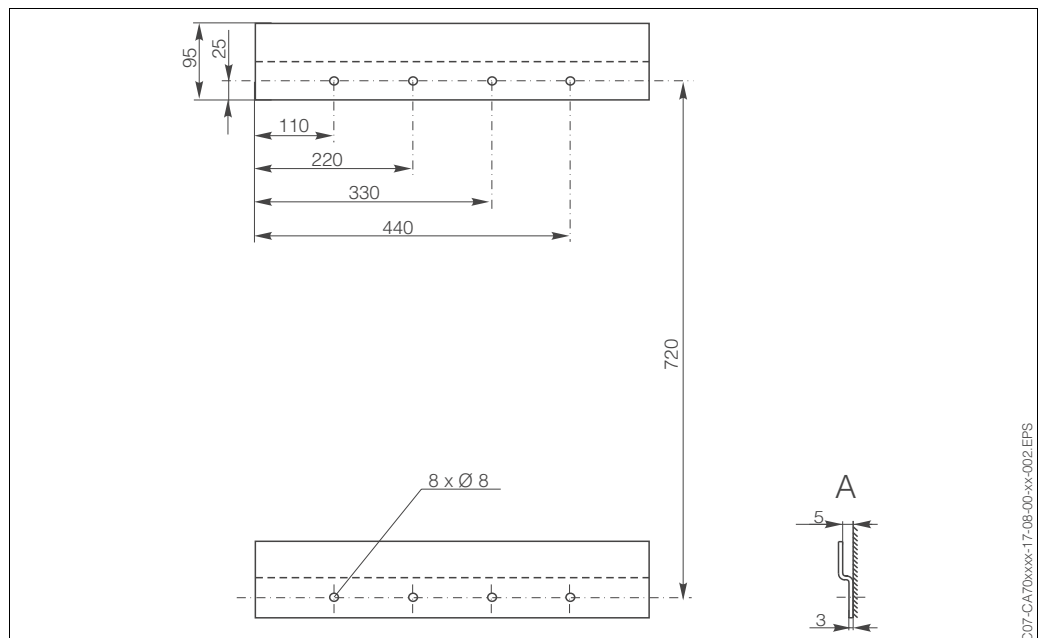


Fig. 5: Wall mounting set for analyzer without cooling device

A Side view

3.3 Installation instructions

To install the analyzer at the intended location, proceed as follows:

1. Place the analyzer in position and secure it. For the installation dimensions, please see chapter 3.2.



Note!

A wall bracket is available as an option for mounting the analyzer (→ Chap. 8 “Accessories”).

2. Lay the drain pipe for the reaction products. Where possible, use fixed pipes (PVC or PE, internal diameter $\frac{3}{4}$ " with 3% incline).
3. Connect the sample transfer.



Note!

The sample can be obtained as follows:

- Directly or after a reversible flow filter or a cross current filter by means of a small pump (rating approx. 300 ml/min), suitable for clear media, e.g. in the discharge channel of a sewage treatment plant
- From a sedimentation tank or after microfiltration; this is practical for media containing flocculants, e.g. in an activated sludge basin
- Sample conditioning using ultrafiltration for heavily soiled media, e.g. from the primary settling tank.

For questions regarding sample conditioning and its automation, please contact Endress+Hauser Service or the Endress+Hauser Sales Centre responsible for your region.

4. Connect the tubes from canisters containing reagents, standard and cleaning agents to the following nozzles:

Canister	Tube
Sample	P
Reagent 1	AL1, CR1, CU1, FE1, HA1, MN1, SI1
Reagent 2	AL2, CR2, CU2, HA2, MN2, SI2
Reagent 3	AL3, MN3, SI3
Standard	S
Cleaning agent	R

5. Tighten the pump hoses onto the sample pump and onto the reagent pump.
6. Set the pressure at the hose bed throttle valve (→ Fig. 9, P. 35, item D) such that sample and reagent are fed in without bubbles.

This completes the installation process. Now carry out the installation check and proceed according to chapters 4 (“Wiring”), 5 (“Operation”) and 6 (“Commissioning”).

3.4 Post-installation check

- After mounting, check that all connections are secure and leak-tight.
- Ensure that the hoses can not be removed without effort.
- Check all hoses for damage.

4 Wiring

4.1 Quick wiring guide



Warning!

- Electrical connection must only be carried out by authorised skilled personnel.
- Skilled personnel must have read and understood these Operating Instructions and must adhere to them.
- Ensure **before beginning** the connection work that the power cable is not under voltage.
- Ensure **before connection** that the mains voltage corresponds with the voltage specified on the nameplate.

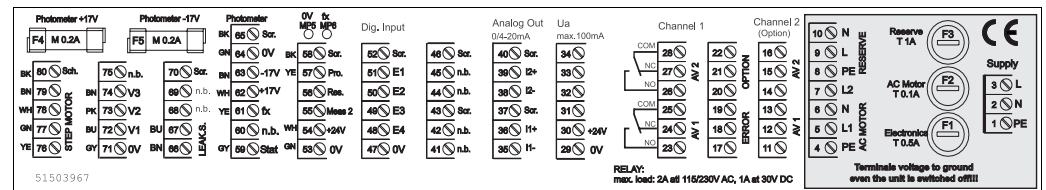


Fig. 6: CA 70 connection sticker

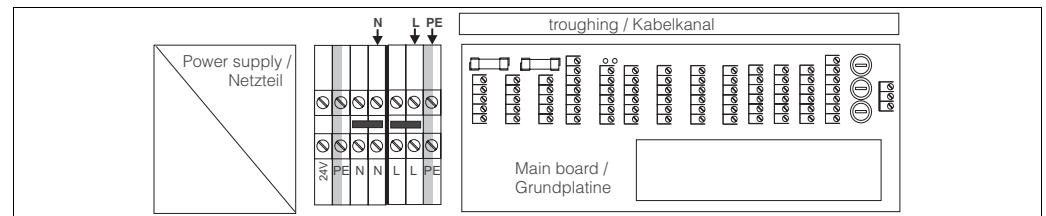


Fig. 7: Power supply for cooling device

Terminal assignment for one-channel version

Function	Designation	Terminal without cooling device	Terminal with cooling device
Mains	L	3	L
	N	2	N
	PE	1	PE
Alarm value 1	COM	25	25
	NC	24	24
	NO	23	23
Alarm value 2	COM	28	28
	NC	27	27
	NO	26	26
Fault	COM	19	19
	NC	18	18
	NO	17	17
Reserve (unassigned terminals)	COM	22	22
	NC	21	21
	NO	20	20
Analog output 1 0/4 ... 20 mA	+	36	36
	-	35	35
	Screen	37	37
Analog output 2 0/4 ... 20 mA	+	39	39
	-	38	38
	Screen	40	40
Sample conditioning remote control	Input	57	57
	0 V	53	53

Terminal assignment for two-channel version

Function	Designation	Terminal without cooling device	Terminal with cooling device
Mains	L	3	L
	N	2	N
	PE	1	PE
Alarm value 1, channel 1	COM	25	25
	NC	24	24
	NO	23	23
Alarm value 2, channel 1	COM	28	28
	NC	27	27
	NO	26	26
Alarm value 1, channel 2	COM	13	13
	NC	12	12
	NO	11	11
Alarm value 2, channel 2	COM	16	16
	NC	15	15
	NO	14	14
Fault	COM	19	19
	NC	18	18
	NO	17	17
Reserve (unassigned terminals)	COM	22	22
	NC	21	21
	NO	20	20
Analog output 1 0/4 ... 20 mA	+	36	36
	–	35	35
	Screen	37	37
Analog output 2 0/4 ... 20 mA	+	39	39
	–	38	38
	Screen	40	40
Sample conditioning remote control	Input	57	57
	0 V	53	53
Channel switch-over	+	55	55
	0 V	58	58

**Note!**

- The terminal block for mains connection (terminals L, N, PE) is situated on the left of the main board on the cooled version.
- Alarm values 1 and 2 do not need to be connected if the PLC sets its own alarm values at the analog output.
- When using a sample conditioning system:
Connect terminals 57 and 53 on the CA 70 to the corresponding terminals on the sample conditioning system. For the allocation of these terminals, please see the sample conditioning system operating instructions.
- If there is a 24 V voltage at terminal 57, the analyzer will not begin measurement (sample not ready). To start measurement, the voltage must stay at 0 V for at least 5 seconds.
- The power supply line can be connected directly to the analyzer or via a main switch to the sample conditioning system.

4.2 Signal connections

Connection	Designation	Function
Signal inputs	Leak	Liquid has collected in housing base
	No sample	No sample available, measurement is not started, display flashes
Signal outputs	AV 1	Alarm value 1 exceeded or undershot
	AV 2	Alarm value 2 exceeded or undershot
	Fault	Retrieves error message using operation menu
Analog output	I-1	0 or 4 mA = measuring range start 20 mA = measuring range end
Channel selection	Meas. 2	0 V = channel 1 24 V = channel 2

4.3 Switching contacts

One-channel version

Connection	Terminal connection for condition fulfilled	Terminal connection for condition not fulfilled	Terminal connection for power off
AV 1	A: 25 - 23 R: 25 - 24	A: 25 - 24 R: 25 - 23	25 - 24
AV 2	A: 28 - 26 R: 28 - 27	A: 28 - 27 R: 28 - 26	28 - 27
Fault	A: 19 - 17 R: 19 - 18	A: 19 - 18 R: 19 - 17	19 - 18
Unassigned	22 - 20 16 - 14 13 - 11	22 - 21 16 - 15 13 - 12	22 - 21 16 - 15 13 - 12

Two-channel version

Connection	Terminal connection for condition fulfilled	Terminal connection for condition not fulfilled	Terminal connection for power off
AV 1 - 1	A: 25 - 23 R: 25 - 24	A: 25 - 24 R: 25 - 23	25 - 24
AV 1 - 2	A: 13 - 11 R: 13 - 12	A: 13 - 12 R: 13 - 11	13 - 12
AV 2 - 1	A: 28 - 26 R: 28 - 27	A: 28 - 27 R: 28 - 26	28 - 27
AV 2 - 2	A: 16 - 14 R: 16 - 15	A: 16 - 15 R: 16 - 14	16 - 15
Fault	A: 19 - 17 R: 19 - 18	A: 19 - 18 R: 19 - 17	19 - 18
Channel ½ measurement end	A: 22 - 20 R: 22 - 21	A: 22 - 21 R: 22 - 20	22 - 21

A = NO current configured
R = NC current configured

**Note!**

Condition fulfilled means:

- AV 1: concentration > Alarm value 1
- AV 2: concentration > Alarm value 2
- Fault: error occurred

Contacts AV 1, AV 2 and fault are only affected during automatic operation.

4.4 Post-connection check

Carry out the following checks after electrical connection:

Device status and specifications	Note
Is the analyzer or cable externally undamaged?	Visual inspection

Electrical connection	Note
Does the supply voltage correspond to the data on the nameplate?	230 V AC 115 V AC
Is current/resistor input screened and connected?	
Are the mounted cables relieved of tension?	
Cable type properly disconnected?	Guide power supply and signal lines separate over the entire travel distance. Separate cable channels are ideal.
Cable routing without scuffing or cross-overs?	
Are power supply and signal lines connected correctly according to wiring diagram?	→ Chap. 4.2
Are all screw terminals tightened?	
Are all cable entries mounted, tightened and leak-resistant?	

5 Operation

5.1 Operation and commissioning

The following chapters provide you with information on the analyzer's operating elements and explain how to make settings.

In chapter 6, "Commissioning", you will find the procedure for initial start-up and for daily analyzer operation.

5.2 Display and operating elements

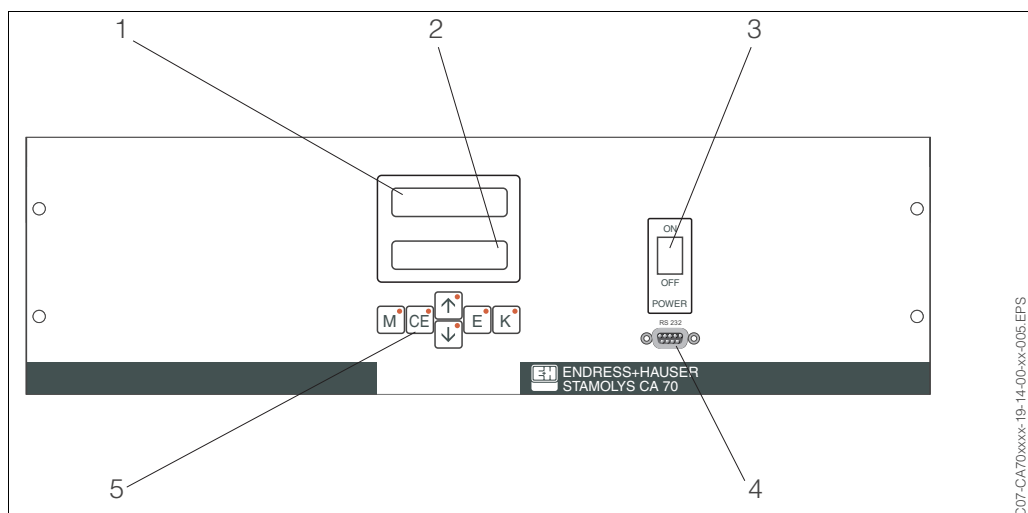


Fig. 8: CA 70 display and control panel


- 1 LED display (measured value)
- 2 LC display (measured value + status)
- 3 Toggle switch on/off
- 4 RS 232 serial interface
- 5 Operating keys with indicator LEDs

5.3 Local operation

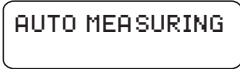
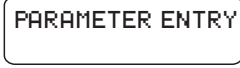

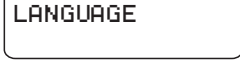
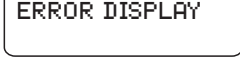
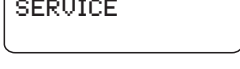
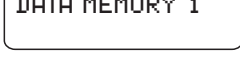
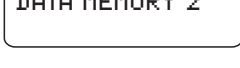
The operating keys and the integrated indicator LEDs have the following functions:

Key	Key function	Indicator LED function
	<ul style="list-style-type: none"> – "Auto measuring" option – back to the main menu from all sub-menus 	Alarm value 1 exceeded
	<ul style="list-style-type: none"> – backwards in the sub-menu (horizontal, see Appendix, page 42) 	Alarm value 2 exceeded
	<ul style="list-style-type: none"> – backwards in the main menu (vertical, page 42) – Increase value 	Measuring range exceeded
	<ul style="list-style-type: none"> – forwards in the main menu (vertical, page 42) – Reduce value 	Measuring range undershot
	<ul style="list-style-type: none"> – Select option Adopt value, forwards in the sub-menu (horizontal, page 42) 	Retrieve error message
	<ul style="list-style-type: none"> – Selection in the sub-menu 	unassigned

5.3.1 Main menu

Access the main menu by holding down the  key until "AUTO MEASURING" is displayed.

For the main menu options and information about them, please see the following table.

Selection	Display	Info
AUTO MEASURING		Calibration, measurement, flushing time-controlled actions
PARAMETER ENTRY		Default settings for measuring ranges, alarm values, calibration, flushing
CONFIGURATION		Basic settings such as parameters, measuring units, arrangement of analog outputs and alarm values (NO, NC), date, time, offset values
LANGUAGE		Selecting menu language
ERROR DISPLAY		Displaying error messages
SERVICE		Manually switching valves and pumps
DATA MEMORY 1		Last 340 data entries
DATA MEMORY 2 (Two channel version only)		Other 340 data entries

5.3.2 Menu "AUTO MEASURING"

The actions "calibration", "measuring" and "flushing" are triggered by time-control. The settings for these actions are made in the "PARAMETER ENTRY" menu.

The respective action is displayed in the LC display. The most recently registered concentration value is displayed until the end of the next measurement.

Otherwise, "wait" is displayed when







- the time of the first measurement has not yet been reached or
- the measuring interval has not yet expired.

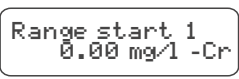
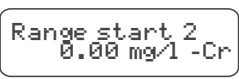
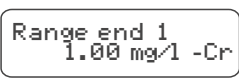
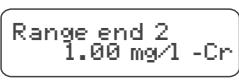
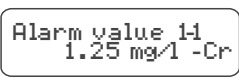
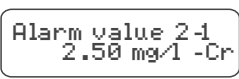
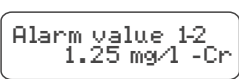
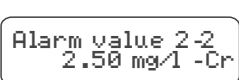
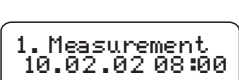
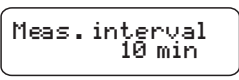
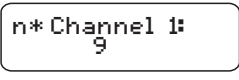
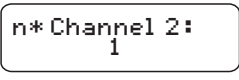


Note!

"Measuring" flashes when the analyzer is ready for the next measurement but has not yet received the enable signal from the sample collector or the sample conditioning unit.

5.3.3 Menu "PARAMETER ENTRY"

Navigate through the main menu with the  key to the "PARAMETER ENTRY" option and press the  key, to move forward within this sub-menu and the  key, to return to the previous option. The settings can be changed within the individual options with the  or  keys. With the  key, you can return to the main menu at any time.

Option	Range of adjustment (factory settings in bold)	Display	Info
Measuring range Start 1	Dependent on the parameters. All of the following values apply for the example chromate-Cr, CR-A: 0.00 ... 2.50 mg/l -Cr 0.00 mg/l -Cr		The specified concentration is allocated a value of 0 or 4 mA at analog output 1.
Measuring range Start 2			Two channel version only! The specified concentration is allocated a value of 0 or 4 mA at analog output 2.
Measuring range End 1	0.00 ... 2.50 mg/l -Cr 2.50 mg/l -Cr		The specified concentration is allocated a value of 20 mA at analog output 1.
Measuring range End 2			Two channel version only! The specified concentration is allocated a value of 20 mA at analog output 2.
Alarm value AV 1 - 1	0.00 ... 2.50 mg/l -Cr 1.25 mg/l -Cr		Concentration threshold value limit relay 1, channel 1 (differential hysteresis 2% of alarm value).
Alarm value AV 2 - 1	0.00 ... 2.50 mg/l -Cr 2.50 mg/l -Cr		Concentration threshold value limit relay 2, channel 1 (differential hysteresis 2% of alarm value).
Alarm value AV 1 - 2	0.00 ... 2.50 mg/l -Cr 1.25 mg/l -Cr		Two channel version only! Concentration threshold value limit relay 1, channel 2 (differential hysteresis 2% of alarm value).
Alarm value AV 2 - 2	0.00 ... 2.50 mg/l -Cr 2.50 mg/l -Cr		Two channel version only! Concentration threshold value limit relay 2, channel 2 (differential hysteresis 2% of alarm value).
Time 1st measurement	01.01.96 00:00... 31.12.95 23:59		Date format DD.MM.YY, time hh.mm. After each change the instrument does not wait for the measuring interval. If the measurement is to start immediately, set the time in the past.
Measuring interval	6 ... 120 min 10		Time between two measurements. If the setting is 2 minutes, the measurements take place without any pauses. When using a StamoLys CA 50 sedimentation unit, the measuring interval is set at 2 minutes and controlled by CA 50 ("sample ready")
Frequency of measurement Channel 1	1 ... 9 9		Two channel version only! Number of measurements at channel 1 before switching to channel 2.
Frequency of measurement Channel 2	1 ... 9 1		Two channel version only! Number of measurements at channel 2 before switching to channel 1.

Option	Range of adjustment (factory settings in bold)	Display	Info
Date of the 1st Calibration	01.01.96 00:00... 31.12.95 23:59	1. Calibration 01.01.02 08:00	Time of 1st calibration (DD.MM.YY, time hh.mm). After each change the instrument does not wait for the calibration interval. If the calibration is to start immediately, set the time in the past. Analyzers are delivered pre-calibrated. – Start 1st calibration 48 hours after the initial start-up at the earliest (warm-up phase) – Set the time to 8:00 to reproduce impacts on calibration in the curve. – If you have started a calibration manually, you should re-define the time of the 1st calibration because the interval is dependent on the last calibration.
Calibration interval	0 ... 720 h 48 h	Calib.interval 48 h	Time between two calibrations. The "0 h" setting stops calibration. Recommended: calibration interval of 48 ... 72 h.
Calibration solution	0.00 ... 2.50 mg/l -Cr 1.00 mg/l -Cr	Calib. solution 1.00 mg/l -Cr	Concentration of the calibration standard. Select a standard, whose concentration is in the upper third of the measuring range.
Date of the 1st flushing	01.01.96 00:00... 31.12.95 23:59	1. Flushing 01.01.02 08:10	Time of 1st flushing (DD.MM.YY, time hh.mm). After each change the instrument does not wait for the calibration interval. If the flushing is to start immediately, set the time in the past. – Set the time to 8:00 to reproduce impacts on flushing in the curve. – If you have started flushing manually, you should re-define the time of the 1st flushing because the interval is dependent on the last flushing.
Flushing interval	0 ... 720 h 48 h	Flush.interval 48 h	Time between two flushings. The "0 h" setting stops cleaning. Recommended flushing intervals → Chap. 11.2.
Flushing hold on	0 ... 60 s 60 s	Flushing hold on 60 s	Dwell time of flushing solution in the pump-mixer-photometer line. Recommended: 30 ... 60 s.



Note!

- Always synchronise calibration and flushing time.
- Carry out flushing with standard cleaning solution approx. 3-4 hours **before** the next calibration.

Flushing with special cleaning solution (e.g. hydrochloric acid) has a lasting effect on calibration. Therefore, carry out this cleaning **after** calibration.

5.3.4 Menu "CONFIGURATION"





Note!





Some settings that can be made in this menu affect the defaults in the "PARAMETER ENTRY" menu. In view of this, complete the "CONFIGURATION" menu first during initial start-up.

Navigate through the main menu with the key to the "CONFIGURATION" option and press the key, to move forward within this sub-menu and the key, to return to the previous option. The settings can be changed within the individual options with the and keys. With the key, you can return to the main menu at any time.

Option	Range of adjustment (factory settings in bold)	Display	Info
Code number	96	Code-No. ? 0	Input 96. If an incorrect code is entered the program exits the sub-menu.
Photometer	Depending on specification, e.g. CR-A	Photometer CR-A	This setting displays the parameter that is being measured (e.g. CR-A). This is defined by the product specification and set in this option at the factory. Do not change the value. Otherwise, you will receive an "Incorrect photometer" error message.
Default settings	yes / no	default setup y: ↑ ↓ n: E	When "yes" is selected, all previously changed settings are reset to the factory settings. In addition, the date for the 1st calibration and for the 1st flushing are set to the day after commissioning.
Measuring unit	mg/l -Cr / mg/l mg/l -Cr	Unit of measure mg/l -Cr	Measuring unit selection is dependent on the type of photometer. You can also select whether you want the concentration of the ion (e.g. chromate) or the concentration in reference to the element (chromium in this case) to be displayed. This setting also affects the scope of the measuring range.
Calibration factor	0.20 ... 5.00 1.00	Calibr. factor 1.00	The calibration factor is the ratio of the measured concentration of the calibration standard to the pre-defined concentration of the standard (see "PARAMETER ENTRY", calibration solution). The deviation results from factors such as reagent ageing, ageing of constructive components, etc. The calibration factor compensates for these effects. CA 70 checks the registered calibration factor logically. If the factor lies outside of the error tolerance, the calibration is automatically repeated. If the repeat also lies outside, an error message appears and the analyzer continues to work with the most recently registered, logically correct factor. The last 10 calibration factors are filed in the memory with the date and time and can be retrieved by pressing the key. The calibration factor can be changed manually.
Concentration offset	0.00 ... 50.0 mg/l -Cr 0.00 mg/l -Cr	c-Offset + 0.00 mg/l -Cr	The offset specifies the zero shift of the calibration function. (Change the sign with the key.)

Option	Range of adjustment (factory settings in bold)	Display	Info
Dilution	0.10 ... 1.00 1.00	Dilution 1.00	If the sample is to be diluted between taking the sample and the analyzer, the dilution factor has to be entered here.
Delay to sample	20 ... 300 s 80 s	Delay to sample 80 s	Dosing time for sample or standard (20 ... 120 s). During this time, the entire system is flushed with sample or standard, so when the reagent is added there is definitely only fresh sample in the mixer. If there is sufficient sample available, select the highest possible value.
Analog output1	0 ... 20 mA / 4 ... 20 mA 4 ... 20 mA	Analog output 1 4-20 mA	Selection for the scope of channel 1 measuring range. If the concentration measuring range is 0 ... 5 mg/l, this corresponds to 0 mg/l either 4 mA or 0 mA. The end of the measuring range is the same in both cases at 20 mA, so that for every model there is a different gradient (calibration factor).
Analog output 2		Analog output 2 4-20 mA	Two channel version only! Selecting scope of channel 2 measuring range. The scopes of the measuring range are independent of each other for channel 1 and channel 2 and are determined by the start of measuring range (channel 1 / channel 2) or end of measuring range (channel 1 / channel 2) setting in the "PARAMETER ENTRY" menu.
Alarm value AV 1-1	NO current NC current  Note! Changes will only be activated after a Reset (Power off/on)!	Alarm val. 1-1 norm. closed	Setting for whether contact for alarm value 1, channel 1 works as NO current or NC current contact.
Alarm value AV 2-1		Alarm val. 2-1 norm. closed	Setting for whether contact for alarm value 2, channel 1 works as NO current or NC current contact.
Alarm value AV 1-2		Alarm val. 1-2 norm. closed	Two channel version only! Setting for whether contact for alarm value 1, channel 2 works as NO current or NC current contact.
Alarm value AV 2-2		Alarm val. 2-2 norm. closed	Two channel version only! Setting for whether contact for alarm value 2, channel 2 works as NO current or NC current contact.
Error contact		Error contact norm. closed	Setting for whether error contact works as NO current or NC current contact
Current date/time	01.01.96 00:00... 31.12.95 23:59	act. Date/Time 25.01.02 15:45	Setting the system clock. Format DD.MM.YY hh:mm.
Calibrate offset	yes / no	Calibrate offs yes: K no: E	Frequency offset Pressing the  key starts a blind value measurement for compensating the reagent's inherent colour (→ Chap. 6.2.1, P. 26).
Frequency offset	-2000 ... +2000 0	f-Offset [Hz] 0	Manually changing the frequency offset (→ Chap. 11.2, P. 46).




5.3.5 Menu "LANGUAGE"


Navigate through the main menu with the  key to the "LANGUAGE" option and press the  key to select your desired language. Pressing  accepts the desired language. With the  key, you can return to the main menu at any time.

The following languages are available:

- Deutsch
- English
- Français
- Nederlands
- Suomi
- Magyar
- Polski
- Italiano.

5.3.6 Menu "ERROR DISPLAY"

Navigate through the main menu with the  key to the "ERROR DISPLAY" option and press the  key to move forwards within this sub-menu and the  key to return to the previous error message.







With the  key you can return to the main menu at any time.

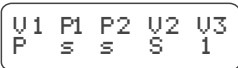
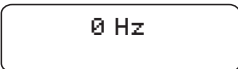
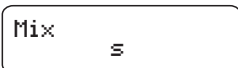


Note!




- This menu is a "Read-Only-Menu".
- You can find the individual error messages, their meaning and solutions to problems in chapter 9.1 on P. 32.
- If there is at least one error message, the signal output is set to "fault".
- Causes of faults are requested for every measurement. If an error which occurred previously no longer exists, it is automatically cancelled. If this should not happen automatically, error messages can be deleted by quickly switching the CA 70 off and back on again.


5.3.7 Menu "SERVICE"

Navigate through the main menu with the  key to the "SERVICE" option and press the  key to move forward within this sub-menu and the  key to return to the previous option. The settings can be changed within the individual options with the  or . With the  key, you can return to the main menu at any time.

Selection	Display	Info
Pumps and valves		<p>"Virtual switching board"</p> <p>Various valve and pump combinations can be selected.</p> <p>The setting options are:</p> <ul style="list-style-type: none"> – Valve 1: P (sample) or S (standard) – Pump 1 and pump 2: s (stop) or g (go) – Valve 2: S (standard) or C (cleaning agent) – Valve 3 (Two channel version only): 1 (channel 1) or 2 (channel 2) <p>The following valve combinations are possible: (applies to one channel and two channel version, whereby where the latter is concerned selection is made by positioning valve 3 between channel 1 and 2)</p> <ul style="list-style-type: none"> – V1: P, V2: S Passage for the sample. This combination is automatically reset on leaving the service menu. – V1: S, V2: S Passage for standard solution – V1: S, V2: R Passage for cleaning agent
Signal frequency		Signal frequency of the photometer
Mixture		<p>The reagent and sample pumps can be switched on together, so that they run in the same ratio as for filling the sample-reagent mixture in measurement mode.</p> <p>Selection between s (stop) and g (go).</p>

5.3.8 Menu(s) "DATA STORAGE (1/2)"

Navigate through the main menu with the  key to the "DATA MEMORY (1/2)" option and press the  key to move forward within this sub-menu and the  key to return to the previous option.

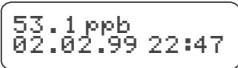


With the  key you can return to the main menu at any time.



Note!

Two menus, "DATA MEMORY 1" and "DATA MEMORY 2", are only **for the two channel version**.

In the one channel version there is only one menu "DATA MEMORY".

Selection	Display	Info
Measuring values		<p>The data memory contains the last 340 concentration measured values with date and time. If there are no values available, "Empty set" appears.</p> <p>Browse through the data sets by pressing the  and  keys</p>

Selection	Display	Info
Serial output	Serial output yes: K no: E	You can output all data sets (in ASCII-format) via the serial interface. For this, the receiving end (PC) must be configured like this: 9600, N, 8, 1. To send data, the receiving end (PC) must send the ASCII character 81 ("Shift", "Q").
Clear data	Clear data y: ↑+↓ n: E	This deletes all data sets.

5.4 Calibration

The following table provides an overview of the standard calibration data (frequency-offset = 0).

Compare the data with the data that you have registered (→ Chap. 11.2, page 46 ff.).

	Measuring range	Concentration [mg/l]	Frequency [Hz]
Aluminium, lower measuring range AL-A	1 ... 300 µg/l	0.00 0.10 0.20 0.30	0 71 150 219
Aluminium, upper measuring range AL-B	0.00 ... 1.00 mg/l	0.0 0.10 0.20 0.30 0.40 0.50 0.60 0.70 0.80 1.00	0 71 150 219 287 350 414 478 536 657
Chromate, lower measuring range CR-A	0.00 ... 2.50 mg/l	0.00 0.25 1.00 1.75 2.50	0 168 650 1080 1476
Chromate, upper measuring range CR-B	0.00 ... 5.00 mg/l	0.00 0.25 1.00 1.75 2.50 5.00	0 168 650 1080 1476 2796
Copper, lower measuring range CU-A	0.00 ... 2.00 mg/l	0.00 0.50 1.00 2.00	0 86 166 300
Copper, upper measuring range CU-B	0.00 ... 5.00 mg/l	0.00 0.50 1.00 2.00 3.50 5.00	0 86 166 300 492 668
Iron, lower measuring range FE-A	0.00 ... 0.50 mg/l	0.00 0.20 0.40	0 98 198

	Measuring range	Concentration [mg/l]	Frequency [Hz]
Iron, medium measuring range FE-B	0.00 ... 2.00 mg/l	0.00	0
		0.50	255
		1.00	508
		1.50	758
		2.00	1020
Iron, upper measuring range FE-C	0.00 ... 5.00 mg/l	0.00	0
		0.50	255
		1.00	508
		1.50	758
		2.00	1020
		2.50	1244
		3.00	1482
		3.50	1714
		4.00	1935
		5.00	2327
Hardness, lower measuring range HA-A	0.0 ... 10.0 mg/l	0.0	0
		1.0	93
		2.0	151
		3.0	227
		4.0	266
		5.0	308
		6.0	405
		7.0	461
		8.0	489
		10.0	593
Hardness, upper measuring range HA-B	0 ... 100 mg/l	0	0
		10	53
		20	108
		30	148
		40	178
		50	201
		60	234
		70	250
		80	264
		100	279
Manganese MN-A	1 ... 160 µg/l	0.00	0
		0.01	66
		0.02	136
		0.04	325
		0.06	520
		0.08	824
		0.10	1147
		0.12	1497
		0.14	2009
		0.16	2399
Silicate, lower measuring range SI-A	1 ... 200 µg/l	0.00	0
		0.02	67
		0.04	122
		0.06	185
		0.08	261
		0.10	336
		0.12	410
		0.14	478
		0.16	551
		0.20	687

	Measuring range	Concentration [mg/l]	Frequency [Hz]
Silicate, upper measuring range SI-B	0.00 ... 5.00 mg/l	0.00	0
		0.10	20
		0.50	113
		1.00	223
		1.50	324
		2.00	441
		2.50	521
		3.00	618
		4.00	791
		5.00	966

6 Commissioning

6.1 Function check



Warning!

- Check that all connections have been made correctly. Check, in particular, that all hose connections are secure, so that no leaks occur.
- Ensure that the mains voltage corresponds to the voltage specified on the nameplate.

6.2 Switching on the measuring device

6.2.1 Commissioning dry



Note!

- If possible, let the analyzer warm up in standby mode before commissioning ("Auto measuring" display). The time can be defined via the "1st measurement" option in the "PARAMETER ENTRY" menu.
- At the start of measurement with a cold analyzer, the first measuring results will be errored. The reaction is temperature-dependent and if the temperature is too low the pre-defined reaction time is insufficient for a complete reaction.
For this reason, never carry out calibration with a cold analyzer. Wait at least two hours before carrying out calibration.

When the analyzer has been programmed and calibrated, the measuring cycle starts automatically once switched on. Entering parameters is no longer necessary.

To perform initial start-up or to readjust the device parameters, proceed as follows:











1. Switch the toggle switch (→ Fig. 8, P. 15, position 3) "on" and hold down the **[M]** key until "AUTO MEASURING" appears on the display (position 2).
2. Select the "CONFIGURATION" menu (→ Chap. 5.3.4, P. 19) and program the individual options up to and including the "Current date/time". With **[M]** you can return to the main menu.
3. Now complete the "PARAMETER ENTRY" (→ Chap. 5.3.3, P. 17) and "SERVICE" menus (→ Chap. 5.3.7, P. 21).
With **[M]** you can return to the main menu.
4. Select "CONFIGURATION" again and use **[E]** to go to the "Calibrate offset" option.
Connect a vessel containing distilled water to the "Sample" connection and start the frequency offset (**[K]** key). The registered value is displayed and saved.
Then reconnect the sampling line.
With **[M]** you can return to the main menu.
5. The analyzer starts the "Calibration", "Measurement", and "Flushing" procedures automatically (triggered by control signal or integrated timer) in accordance with the device parameters that you have set (1st calibration, 1st measurement, 1st flushing times and the respective intervals control the temporal procedure).
The following summary presents procedures carried out in the device and the intervals you have programmed:

	Function	Duration [s]	Range of adjustment
Measurement	Flushing (sample) Delay to sample Stabilisation 1st measurement Flushing (reag. line) Fill mixture Reaction 2nd measurement Flushing (sample)	3 x 15 20 ... 300 4 2 10 ... 15 → Chap. 11.2 30	"CONFIGURATION"/ "Delay to sample" "SERVICE" / "Mixture"
Calibration	Flushing (standard) Delay to standard Stabilisation 1st measurement Flushing (reag. line) Fill mixture Reaction 2nd measurement Flushing (sample)	3 x 15 20 ... 300 4 2 10 ... 15 → Chap. 11.2 30	"CONFIGURATION"/ "Delay to sample" "SERVICE" / "Mixture"
Flushing	Pump cleaning solution Allow to react Pump cleaning solution	Flushing period : 2 5 Flushing period : 2	"PARAMETER ENTRY"/"Flush. hold on"

6.2.2 Commissioning wet

This is different to the dry commissioning in that, for wet commissioning the reagent lines are filled before the automatic measurement, calibration and flushing cycle is started.

Proceed as follows:

1. Switch the toggle switch (→ Fig. 8, P. 15, position 3) "on" and hold down the  key until "AUTO MEASURING" appears on the display (position 2).
2. Select the "SERVICE" menu (→ Chap. 5.3.7, P. 21).
3. Switch the P2 reagent pump "on" (with  select P2 and with  set to "e") and leave it running until you can tell that there are reagents at the mixer. After this, switch P2 "off" (a) again with .
4. Now switch the valves to passage for standard (select V1: S, V2: S; with  or K switch to "S" with ) and then switch the P1 sample pump "on". Leave the pump running until you can tell that there is standard at the mixer. Switch P1 back "off".
5. Now switch the valves to passage for cleaning agent (select V1: S, V2: R; with  or K switch to "R" or "S" with ) and then switch the P1 sample pump "on". Leave the pump running until you can tell that there is cleaning agent at the mixer. Switch P1 back "off".
6. Now switch the valves to passage for sample (select V1: P, V2: S; with  or K switch to "P" or "S" with ) and then switch the P1 sample pump "on". Leave the pump running until you can tell that there is sample at the mixer. Switch P1 back "off".



Note!

For the two channel version, valve V3 must be set additionally for switch-over between channel 1 and channel 2.

7. Now proceed as with dry commissioning (from step 2).

7 Maintenance




Caution!

You must not carry out any measures **not** listed in the following chapters yourself. This work must only be carried out by the E+H Service.

7.1 Maintenance schedule

All maintenance duties that have to be carried out during normal operation of the CA 70 are explained below.

If you are using a sample conditioning unit, e.g. CA 50 or CAT 430, coordinate the maintenance work required for it with that of the CA 70. For this, read the maintenance chapter in the respective operating instructions.

Period of time	Duty	Note
weekly	Check and note calibration factor	"CONFIGURATION", P. 19
every 2 weeks	<ul style="list-style-type: none"> – Check concentration of the calibration standard in the laboratory – Flush sample tubing system with pressurised water (disposable syringe) 	<ul style="list-style-type: none"> – adjust if necessary ("PARAMETER ENTRY" P. 17) or new standard – Remove clips from sample pump when doing this.
monthly	<ul style="list-style-type: none"> – Replace reagents – Flush the sample tubing system with 12.5% bleaching lye (sodium hypochloride) and reflush thoroughly with water <p> Warning! Corrosive. Wear protective gloves and goggles. Beware of reagent splashing.</p> <ul style="list-style-type: none"> – Spray pump hoses with silicone spray – Check sample collector for fouling and clean it if necessary 	<ul style="list-style-type: none"> – s. Chap. 7.2, P. 29 – "SERVICE", P. 21 V1: S, P1: g, P2: s, V2: S Add solution to sampling connection.
every 3 months	<ul style="list-style-type: none"> – Replace pump hoses – Cleaning drain lines 	– s. Chap. 7.3, P. 29



Note!

Whenever working on the reagent hoses, the hoses must be disconnected from the canisters, in order to prevent contamination of the reagents.

7.2 Replacement of the reagents



Warning!

- There is a danger of crushing limbs at doors, inserts and pump heads.
- Refer to the warning instructions in the safety data sheets when handling reagents. Wear protective clothing, gloves and goggles.
- Make sure the workplace is well ventilated when you work with chlorine bleach. If you feel unwell, consult a physician immediately.
- If reagents come into contact with the skin or eyes, carefully rinse with copious amounts of water and consult a physician immediately.
- Never add water to reagents. Reagents containing acids may splash and heat may build up.

If you store the reagents correctly (in the dark, not over 20 °C) they will keep for min. 6 weeks from the date of manufacture (batch number). When this period of time has expired, the reagents must be replaced. Shelf life can be prolonged by keeping the reagents in a dark, cool storage place.

The reagents absolutely must be replaced when

- the reagents have been contaminated by sample (for verification → Chap. 9.1, P. 32)
- the reagents are too old (for verification → Chap. 9.1)
- the reagents have been spoilt by incorrect storage conditions or environmental influences (for verification → Chap. 9.1).

To replace the reagents proceed as follows:

1. Carefully remove the hoses from the canisters and wipe them with a dry (paper) cloth. Wear protective gloves when doing this.
2. Switch on the reagent pump for about 5 seconds.
3. Flush the reagent hose with plenty of distilled water ("SERVICE" operation, → Chap. 5.3.7, P. 21).
4. Replace the reagent canister and feed the hoses into the new canister.
5. Fill the reagent hose with the new reagents ("SERVICE" operation)
6. Determine the reagent blind value ("CONFIGURATION" / "Frequency offset", → Chap. 5.3.4, P. 19).
7. Then carry out a calibration ("PARAMETER ENTRY", → Chap. 5.3.3, P. 17).

7.3 Replacement of the pump hoses



Warning!

When removing hoses from the hose nozzles, beware of reagent splashing. For this reason, wear protective gloves and goggles.

The peristaltic pumps used for the CA 70 convey the medium in a combination of vacuum and displacement pump. The pump rate is dependent on the elasticity of the pump hoses. Elasticity decreases as mechanical stress increases and the pump rate drops. Wear depends on mechanical stress (measuring interval, pump starting pressure). Up to a certain degree, the wear-effect can be compensated by calibration. If the impairment in elasticity is too great, the pump rate is no longer reproducible and this leads to incorrect measurements. This is why it is necessary to replace the hoses.

To replace the hoses proceed as follows:

1. Flush the old hoses with water first and then empty them ("SERVICE", P. 21).
2. Remove the reagent hoses from the reagent canisters, in order to prevent contamination of the reagents.
3. Remove the hoses from the connecting nipples on the pump(s).

4. Loosen the hose safety plate and open the pump clips.
Now you can remove the hoses.
5. Replace the new pump hoses in the reverse sequence of operations. Do not forget to reconnect the reagent hoses to the canister.
6. After installation, refill the hoses with sample, standard or cleaning agent ("SERVICE" menu). Before filling, be sure to close the clips on the reagent pump to prevent contaminating the reagents.
7. Carry out a calibration ("PARAMETER ENTRY" menu, P. 17).



Caution!

Ensure that you connect the new pump hoses to the correct connections at the mixer.

7.4 Placing out of service



Caution!

Before placing the instrument out of service, thoroughly rinse all the lines of the measuring system with clean water.

To place the analyzer out of service, proceed as follows:

1. Remove the reagent and standard hoses from the canisters and immerse them in a tank containing clean water.
2. Switch valve 1 to "Standard" and switch pumps 1 and 2 on for one minute ("SERVICE" menu, P. 21).
3. Remove hoses from the water and allow the pumps to run until the hoses are completely dry.
4. If you are using a continuous sample supply, disconnect sampling line.
5. Flush sampling hoses with clean water.
6. Slacken hose clips and remove pump hoses from the contact rollers.

8 Accessories

8.1 Installation accessories

- Wall bracket for non-cooled version; Order No. 51503061
- Wall bracket for cooled version; Order No. 51503063
- GFR cabinet for 1 CA 70 and 1 CA 50 Sedimentation Unit ; Order No. 51503066
- GFR cabinet for 2 CA 70s and 1 CA 50 Sedimentation Unit ; Order No. 51503067

8.2 Reagents and standard solutions

CA 70 AL (aluminium)

- Reagent set, 1 l reagents AL1+AL2+AL3; Order No. CAY940-V10AAE
- Reagent set, inactive, 1 l reagents AL1+AL2+AL3; Order No. CAY940-V10AAH
- Standard 0.10 mg/l Al; Order No. CAY942-V10C10AAE
- Standard 0.25 mg/l Al; Order No. CAY942-V10C25AAE
- Standard 0.50 mg/l Al; Order No. CAY942-V10C50AAE

CA 70 CR (chromate)

- Reagent set, 1 l reagents CR1+CR2; Order No. CAY846-V10AAE
- Standard 1 mg/l Cr (VI); Order No. CAY848-V10C10AAE
- Standard 2 mg/l Cr (VI); Order No. CAY848-V10C20AAE

CA 70 CU (copper)

- Reagent set, 1 l reagents CU1+CU2; Order No. CAY850-V10AAE
- Standard 1 mg/l Cu; Order No. CAY852-V10C10AAE
- Standard 2 mg/l Cu; Order No. CAY852-V10C20AAE

CA 70 FE (iron)

- Reagent, 1 l reagent FE1; Order No. CAY840-V10AAE
- Standard 0.5 mg/l Fe; Order No. CAY842-V10C05AAE
- Standard 2.0 mg/l Fe; Order No. CAY842-V10C20AAE

CA 70 HA (total hardness)

- Reagent set, 1 l reagents HA1+HA2; Order No. CAY743-V10AAE
- Standard 10 mg/l CaCO₃; Order No. CAY745-V10C10AAE
- Standard 20 mg/l CaCO₃; Order No. CAY745-V10C20AAE

CA 70 MN (manganese)

- Reagent set, 1 l reagents MN1+MN2+MN3; Order No. CAY843-V10AAE
- Reagent set, inactive, 1 l MN1+MN2+MN3; Order No. CAY843-V10AAH
- Cleaning agent, 1 l; Order No. CAY844-V10AAE
- Standard 0.1 mg/l Mn; Order No. CAY845-V10C10AAE
- Standard 0.5 mg/l Mn; Order No. CAY845-V10C50AAE

CA 70 SI (silicate)

- Reagent set, 1 l reagents SI1+SI2+SI3; Order No. CAY640-V10AAE
- Reagent set, inactive, 1 l SI1+SI2+SI3; Order No. CAY640-V10AAH
- Cleaning agent, 1 l; Order No. CAY641-V10AAE
- Standard 0.5 mg/l SiO₂- Si; Order No. CAY642-V10AAE

9 Trouble-shooting

9.1 Trouble-shooting instructions

Although the CA 70 analyzer is not very prone to faults due to its simple assembly, problems can, of course, not be completely ruled out. Possible errors, their causes and their possible remedies are listed below.

9.1.1 Error messages

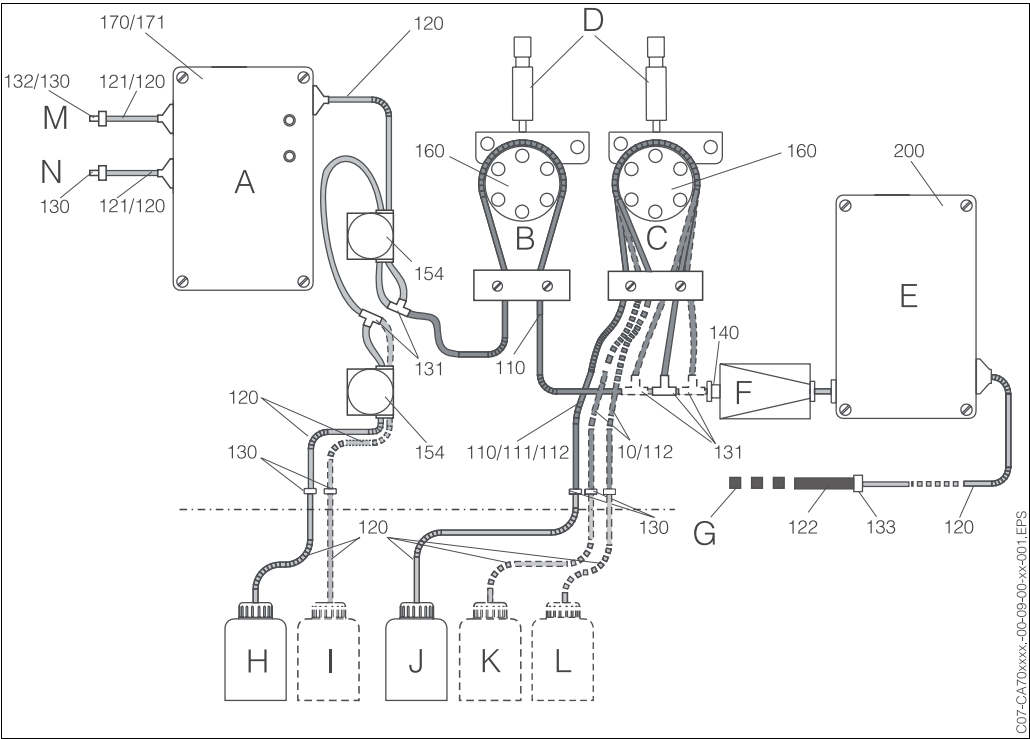
Error message	Possible cause	Tests and / or corrective measures
Calibration failed		If a calibration fails, you can enter a new calibration factor manually ("CONFIGURATION" menu, "Calibration factor"). Cancel the error message by switching the CA 70 off and on briefly. If the error occurs frequently, you will have to search for the cause.
	Air bubbles in system	Start calibration manually ("PARAMETER ENTRY", "1st calibration", change the date accordingly, start measurement) or enter a new calibration factor.
	Incorrect concentration of standard	Check the concentration in the laboratory. Adjust the standard accordingly ("PARAMETER ENTRY", "Calibration solution") or replace the standard.
	Reagents contaminated or aged	Simple check: Add about 20 ml of standard solution with about 1 ml of reagent in a beaker. If it does not change colour after max. 10 min, replace the reagents (→ Chap. 7.2, P. 29).
	Standard dosing defective	Check the valves for contamination, obstructions (visual inspection)
	Wrong measuring cell	Check the setting in the "CONFIGURATION" menu
Measuring cell dirty	Not enough light intensity sent to receiver, e.g. due to sedimented particles	<ul style="list-style-type: none"> – Flush with 12.5% bleaching lye (→ Chap. 7.1, P. 28: monthly maintenance) – When using a CA 50: Check whether the sedimentation time is long enough
Wrong measuring cell	Wrong measuring cell	Check the setting in the "CONFIGURATION" menu, "Photometer"
No sample	No sample	Establish sample transfer
	Level measurement defective	Check level measurement on sample collector
Spillage error	Leak at canisters or hoses	Replace defective components and clean and dry the CA 70 or those components affected by the leak
	Leak on photometer	Inform E+H Service
No measuring signal	Leak on photometer	Inform E+H Service
	Photometer defective	Inform E+H Service
	Electrical connection	Check all electrical connections
	Fuse defective	Replace fuse F4 or F5 (medium time-lag 0.2 A, → Fig. 7, P. 11)

9.1.2 System errors / process errors

Error message	Possible cause	Tests and / or corrective measures
Measured values always the same	Reagents contaminated or aged	Simple check: Add about 20 ml of standard solution with about 1 ml of reagent in a beaker. If it does not change colour after max. 10 min, replace the reagents (→ Chap. 7.2, P. 29).
	No sample, no reagents	Make sure sample and reagents are supplied, check level monitor and clean if necessary
	System blocked	Flush with 12.5% bleaching lye (→ Chap. 7.1, P. 28: monthly maintenance)
Measured values inaccurate	Incorrect concentration of standard	Check the concentration in the laboratory. Adjust the standard accordingly ("PARAMETER ENTRY", "Calibration solution") or replace the standard.
	Reagents contaminated or aged	Simple check: Add about 20 ml of standard solution with about 1 ml of reagent in a beaker. If it does not change colour after max. 10 min, replace the reagents (→ Chap. 7.2, P. 29).
	Reagent blind value too high	After replacing the reagents, carry out an offset calibration and then a calibration ("CONFIGURATION", "Offset calibration")
	Wrong dimension	Check the setting in the "CONFIGURATION" menu, "Measuring unit", e.g. NO ₃ instead of NO ₃ - N
	Wrong measuring cell	Check the setting in the "CONFIGURATION" menu, "Photometer"
	Sample suction time too short	Increase the suction time ("CONFIGURATION", "Delay to sample")
	Matrix effects (substances that interfere with the photometric methods)	Detect interfering substances (see CA 70 XX Technical Information, "Measuring principle"), possibly use sample conditioning
	Standard is dosed to the sample	Check the valves and valve settings
	Filter life too long	Take counter sample at analyzer inlet and check the concentration in the laboratory. If the CA 70 measured values have no deviations, clean ultrafiltration modules or backflush filters more frequently.
	Sedimentation time too short	When using a CA 50 sedimentation unit: Only start the CA 50 with the flushing operation when you have finished filling the sample to the CA 50 (CA 70 display: "Measurement").
	System block or contaminated	Flush with 12.5% bleaching lye (→ Chap. 7.1, P. 28: monthly maintenance)
	Dosing	Replace pump hoses (→ Chap. 7.3, P. 29).
Counter sample in the laboratory delivers deviating measured values	Sample ageing	Shorten time between sampling and analysis.

Error message	Possible cause	Tests and / or corrective measures
Measured value transfer errored	Wrong size of analog output	Check the setting ("CONFIGURATION", "Analog output 1" " 2").
	Incorrect measuring range	Adjust measuring range ("PARAMETER ENTRY", "Measuring range")
	Background noise	Check line for interference from strong sources of induction
Analyzer will not switch on	No power	Check the electrical connection and ensure power supply.
	Fuse	Replace fuse F1 (time-lag 0.5 A)
Analyzer is running but display reading is garbled or off	Initialisation failed	Switch the analyzer off and after approx. 30 seconds back on.
Pumps fail to run	Leak	See "Spillage error" error message, → Chap. 9.1.1
	Leak sensor bypassed	Interrupt contact between two leak sensors (→ Fig. 7, pins 67-66)
	Fuse	Check all fuses and replace if necessary.
	Pump defective	Replace the pump.
Measurement does not start	Leak on Photometer	E+H Service
"Measurement" display flashes	Time of 1st measurement not reached	The date must be between 01.01.1996 and the current date.
	Interval not expired	Change parameters.
Calibration does not start	Time of 1st calibration not reached	The date must be between 01.01.1996 and the current date.
	Interval not expired or 0 h	Change parameters.
	Leak on Photometer	E+H Service
Flushing does not start	Time of 1st flushing not reached	The date must be between 01.01.1996 and the current date.
	Interval not expired or 0 h	Change parameters.
Leak on Photometer	Device or discharge blocked	Remove blockage. E+H Service
Blockage, deposits in device	Water hardness	Lime deposits can be flushed with 5% hydrochloric acid . If necessary, dose EDTA in sample stream to prevent sedimentation.
	Not enough sample conditioning	Shorten cleaning intervals of sample conditioning.

9.2 Spare parts



Item	Spare part	Order number
133	Hose adapter, 3.2 mm x 6.4 mm	51506492
140	Mixer insert	51504254
154	Hose squeeze valve	51508622
170	Complete sample collector: housing with sample collecting vessel, electronics, all connecting hoses	51502909
171	Sample collector housing	51503996
160	Pump head, complete	51502911

9.2.2 Spare parts for CA 70 AL (aluminium)

Spare part	Order number
Maintenance kit CAV740-1: – 1 set of pump hoses yellow/blue (12 hoses 51506434) – 1 set of pump hoses black/black (12 hoses 51506437) – Each with one pack of hose adapters, items 130, 131, 132, 133	CAV740-1A
Photometer aluminium, complete (200)	on request

9.2.3 Spare parts for CA 70 CR (chromate)

Spare part	Order number
Maintenance kit CAV740-1: – 1 set of pump hoses yellow/blue (12 hoses 51506434) – 1 set of pump hoses black/black (12 hoses 51506437) – Each with one pack of hose adapters, items 130, 131, 132, 133	CAV740-1A
Photometer chromate, complete (200)	on request

9.2.4 Spare parts for CA 70 CU (copper)

Spare part	Order number
Maintenance kit CAV740-1: – 1 set of pump hoses yellow/blue (12 hoses 51506434) – 1 set of pump hoses black/black (12 hoses 51506437) – Each with one pack of hose adapters, items 130, 131, 132, 133	CAV740-1A
Photometer copper, complete (200)	on request

9.2.5 Spare parts for CA 70 FE (iron)

Spare part	Order number
Maintenance kit CAV740-1: – 1 set of pump hoses yellow/blue (12 hoses 51506434) – 1 set of pump hoses black/black (12 hoses 51506437) – Each with one pack of hose adapters, items 130, 131, 132, 133	CAV740-1A
Photometer iron, complete (200)	on request

9.2.6 Spare parts for CA 70 HA (total hardness)

Spare part	Order number
Maintenance kit CAV740-2: – 2 sets of pump hoses yellow/blue (12 hoses 51506434) – Each with one pack of hose adapters, items 130, 131, 132, 133	CAV740-2
Photometer total hardness, complete (200)	on request

9.2.7 Spare parts for CA 70 MN (manganese)

Spare part	Order number
Maintenance kit CAV740-1: – 1 set of pump hoses yellow/blue (12 hoses 51506434) – 1 set of pump hoses black/black (12 hoses 51506437) – Each with one pack of hose adapters, items 130, 131, 132, 133	CAV740-1A
Photometer manganese, complete (200)	on request

9.2.8 Spare parts for CA 70 SI (Silicate)

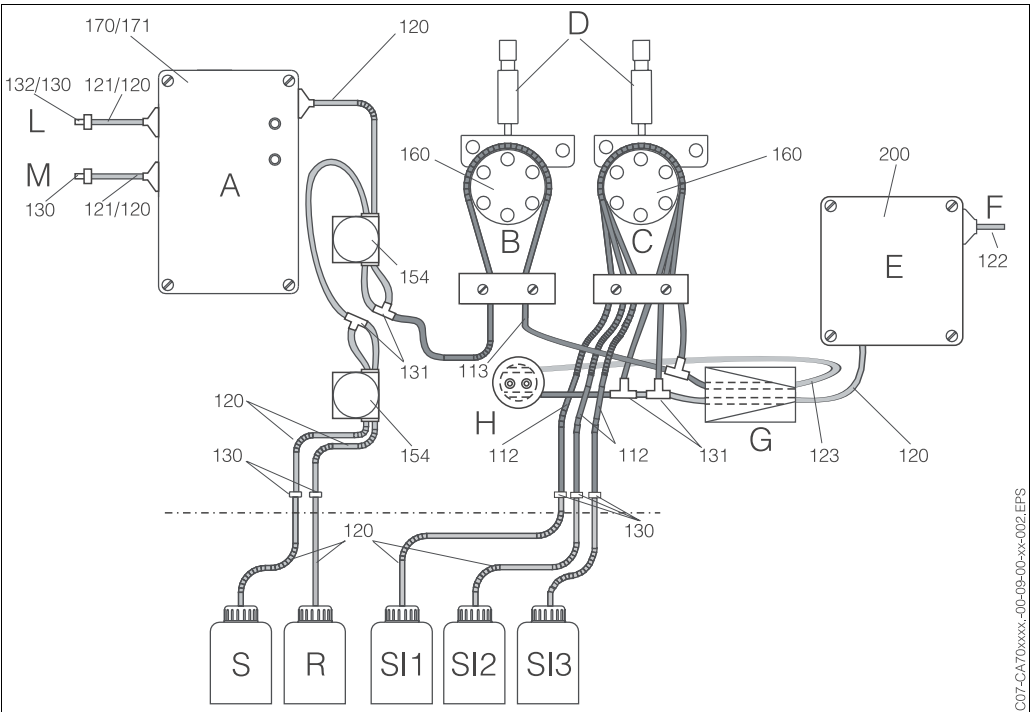


Fig. 10: Summary of components and spare parts of CA 70 SI

A	Sample collector or housing	R	Storage canister for cleaning agent
B	Sample pump	SI1	Storage canister for reagent 1
C	Reagent pump	SI2	Storage canister for reagent 2
D	Hose bed throttle valve	SI3	Storage canister for reagent 3
E	Photometer	M(120)	Permeate inlet (without sample collector) or Channel 1 inlet (Two channel version)
F	Outlet	M(121)	Permeate overflow (with sample collector)
G	Double mixer	N(120)	Channel 2 inlet (Two channel version)
H	Holder for dosing loop	N(121)	Permeate inlet (with sample collector)
S	Storage canister for standard		

Spare part	Order number
Maintenance kit CAV740-4: – 1 Set pump hoses violet/white (items 113, 12 hoses 51508945) – 1 Set pump hoses black/black (12 hoses 51506497) – Each with 1 pack hose adapters items 130, 131, 132, 133	CAV740-4A
Silicon hose for dosing loop (123)	51508626
Holder for dosing loop (H)	51508960
Photometer silicate, complete (200)	51508962

10 Technical data

10.1 Input

Measured value	Aluminium: Chromate: Copper: Iron: Hardness: Manganese: Silicate:	mg/l Al mg/l Cr (VI) mg/l Cu mg/l Fe mg/l CaCO ₃ mg/l Mn mg/l SiO ₂
Measuring range	Aluminium: Chromat: Copper: Iron: Hardness: Manganese: Silicate:	1 ... 300 µg/l / 0.05 ... 1.0 mg/l 0.1 ... 2.5 mg/l / 0.2 ... 5.0 mg/l 0.1 ... 2.0 mg/l / 0.2 ... 5.0 mg/l 0.01 ... 0.5 mg/l / 0.05 ... 2.0 mg/l / 0.1 ... 5.0 mg/l 0.2 ... 10 mg/l / 0.8 ... 80 mg/l 1 ... 160 µg/l 1 ... 200 µg/l / 0.1 ... 5.0 mg/l
Wavelength	Aluminium: Chromat: Copper: Iron: Hardness: Manganese: Silicate:	565 nm 565 nm 430 nm 565 nm 565 nm 565 nm 810 nm
Wavelength reference	Aluminium: Chromat: Copper: Iron: Hardness: Manganese: Silicate:	880 nm 880 nm 880 nm 880 nm 660 nm 660 nm -

10.2 Output

Output signal	0/4 ... 20 mA
Load	max. 500 Ω
Data interface	RS 232 C
Signal on alarm	2 limit contactors, 1 fault-signalling contact (per channel)
Load capacity	30 VA max. 48 V AC, 30 V DC at 0.5 A

10.3 Power supply

Supply voltage	230 V AC, 50/60 Hz 115 V AC, 50/60 Hz	
Power consumption	non-cooled:	40 VA
	cooled:	200 VA
Current consumption	non-cooled:	0.15 A
	cooled:	0.9 A
Fuse	medium time-lag 0.2 A time-lag 0.5 A	

10.4 Performance characteristics

Measuring interval	2 ... 120 min	
Measuring time	Aluminium:	1 minute
	Chromat:	3 minutes
	Copper:	2 minutes
	Iron:	1 minute
	Hardness:	1 minute
	Manganese:	5 minutes
	Silicate:	5 minutes
Measuring deviation	3 % of scope of measuring range (all parameters)	
Sample requirement	15 ml / measurement (all parameters)	
Reagent requirement	Aluminium:	3 x 0.2 ml / measurement
	Chromat:	2 x 0.2 ml / measurement
	Copper:	2 x 0.2 ml / measurement
	Iron:	1 x 0.2 ml / measurement
	Hardness:	2 x 0.2 ml / measurement
	Manganese:	3 x 0.2 ml / measurement
	Silicate:	3 x 0.2 ml / measurement
Calibration interval	0 ... 72 h	
Flushing interval	0 ... 72 h	
Maintenance interval	3 months	
Servicing requirements	30 minutes / week	

10.5 Operating conditions (environment)

Ambient temperature	5 ... 40 °C
Protection class	IP 43

10.6 Operating conditions (process)

Specification for customer-supplied sample conditioning (no StamoLys CA 50) for 1 measuring point:		
Sample flow rate	min. 5 ml/min	
Sample requirements per measurement	20 ml	
Consistency of sample	low in solids (< 50 mg/l)	
Process connection	3.2 mm (for tubing ID 3.2 mm / OD 6.3 mm)	
Specification for customer-supplied sample conditioning (no StamoLys CA 50) for 2 measuring points:		
Sample stream switch-over	in CA 70 via software	
Sample flow rate	min. 5 ml/min	
Sample requirements per measurement	20 ml	
Consistency of sample	low in solids (< 50 mg/l)	
Process connection	3.2 mm (for tubing ID 3.2 mm / OD 6.3 mm)	
Sample receiver	outside of CA 70	

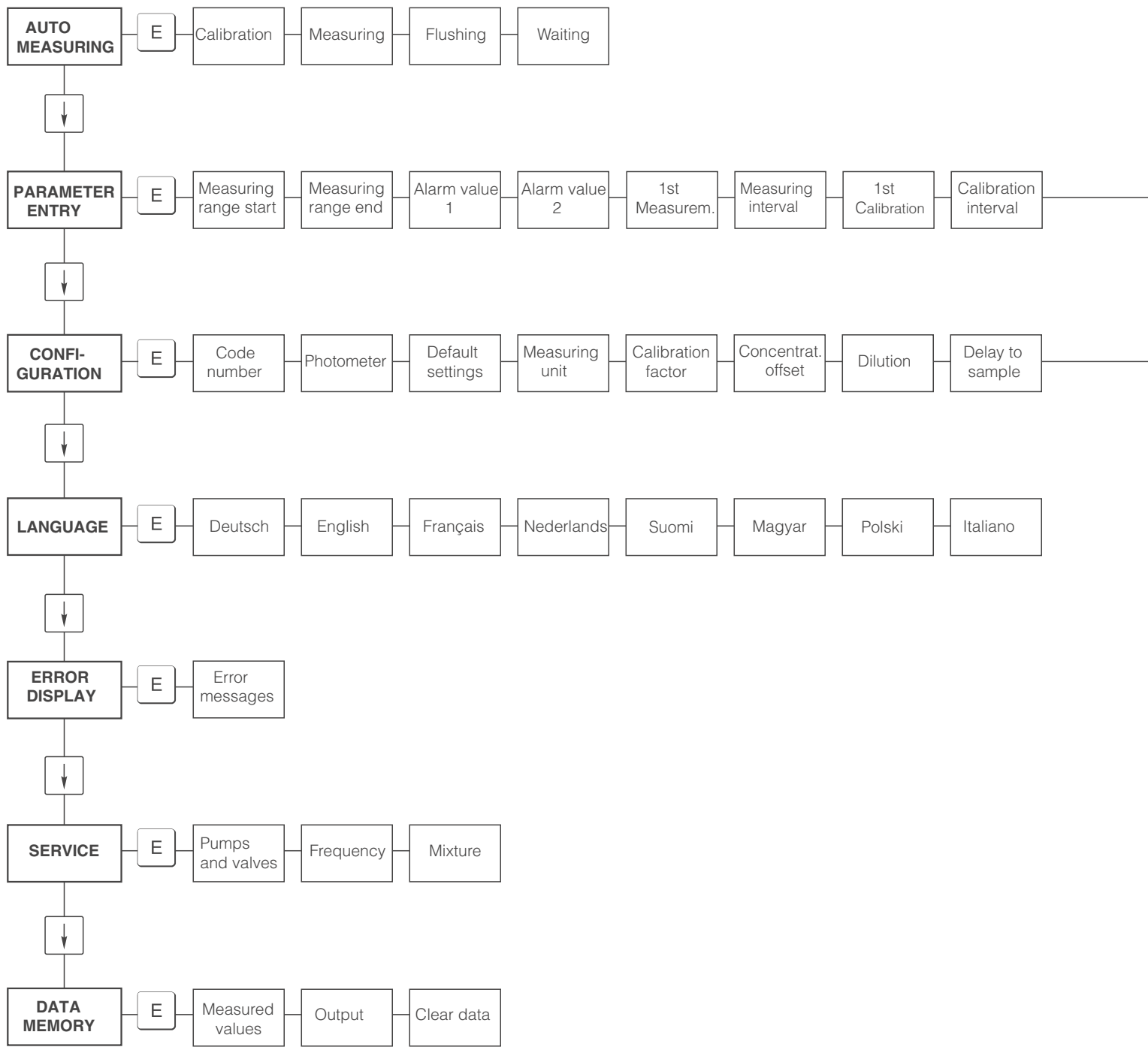
10.7 Mechanical construction

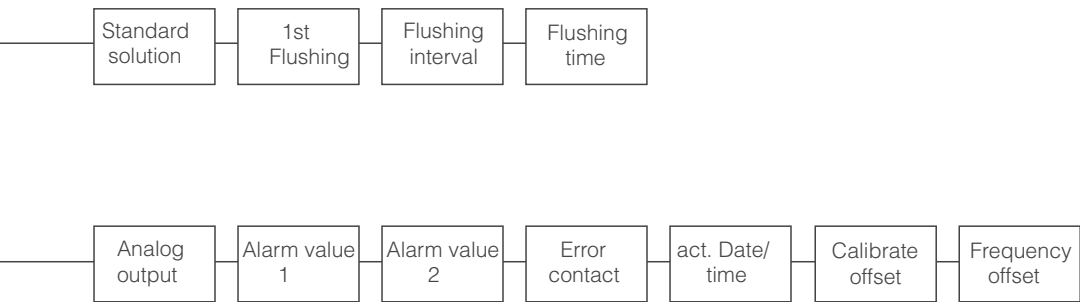
Design, dimensions	→ Chap. 3.2.1, P. 8	
Weight	without cooling device: with cooling device:	approx. 40 kg approx. 50 kg
Materials	Housing: Front window: Continuous tubing : Pump hoses:	Stainless steel 320 S 33 Plexiglas® Norprene®, C-Flex® Tygon®, Viton®

11 Appendix

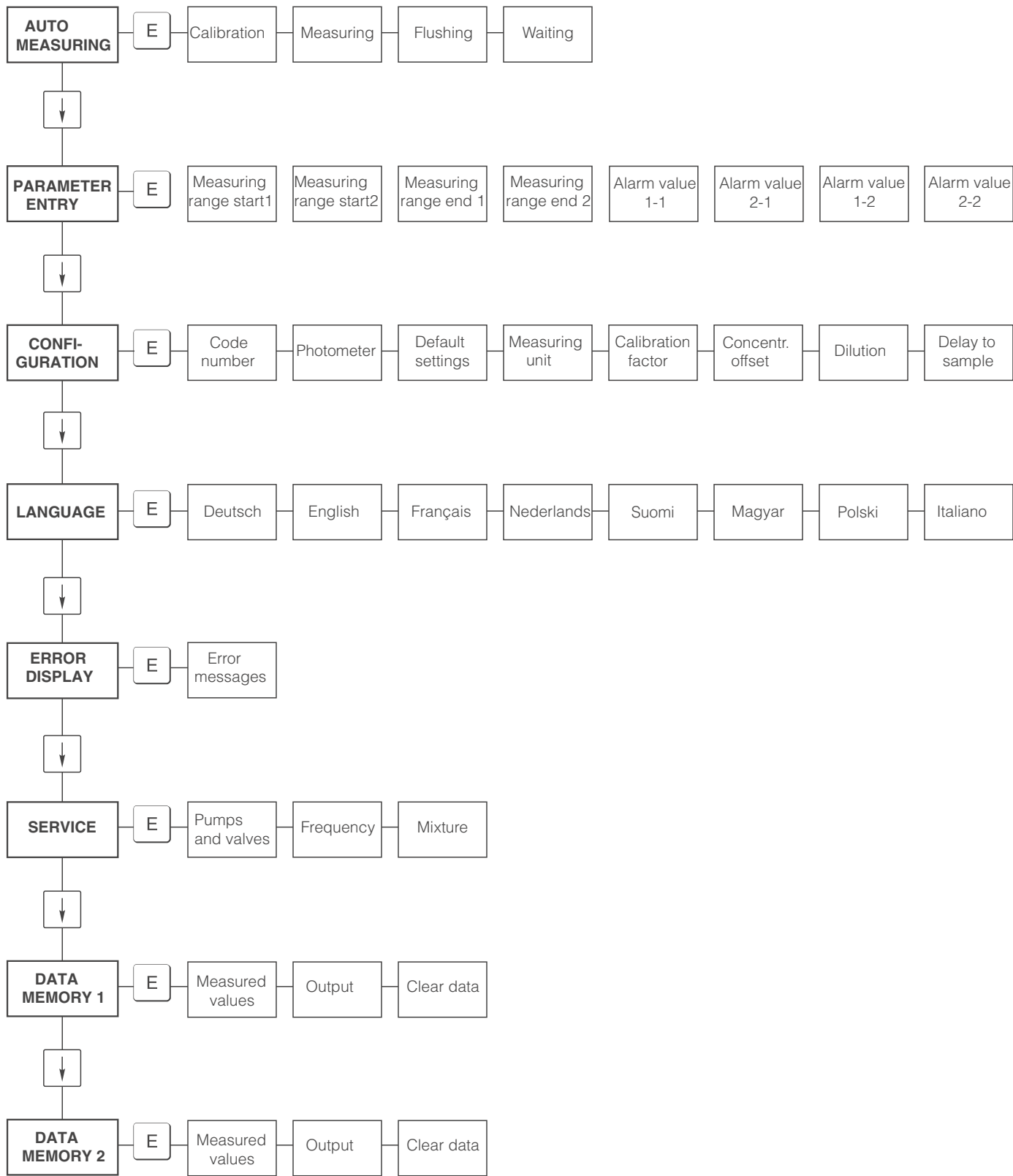
11.1 Operating matrix

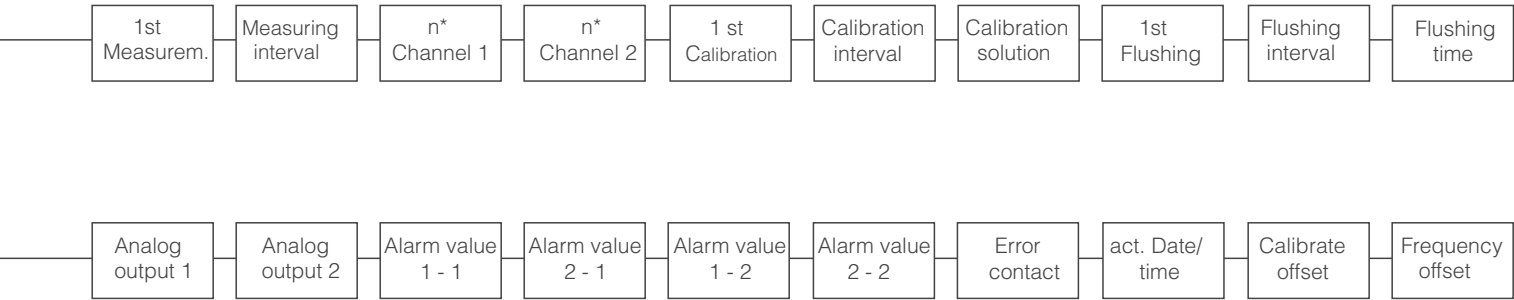
One-channel version





Two-channel version





11.2 Specifications overview

Aluminium

Serial No.	
Photometer No.	
Software version	

Sample pump	Step motor	60 Upm
Sample hose	Code: yellow/blue	Tygon ID 1.52 mm
Reagent pump	Synchronous motor	20 Upm fix
Reagent hose	Code: black/black	Tygon ID 0.76 mm
Measured variable	Al	
Display	mg/l	
Measuring ranges	1 ... 300 µg/l / 0.00 ... 1.00 mg/l	
Post-flush time	30 s	
Delay to sample (pre-flush)	80 s	
Fill mixture	14 s	
Reaction time	60 s	

Standard calibration data

AL-A		AL-B	
mg/l	Hz	mg/l	Hz
0.00	0	0.00	0
0.10	71	0.10	71
0.20	150	0.20	150
0.30	219	0.30	219
		0.40	287
		0.50	350
		0.60	414
		0.70	478
		0.80	536
		1.00	657
f-offset	0		0

Device spec. calibration data

mg/l	Hz
f-offset	

Reagent set	1 AL1+AL2+AL3	Order No. CAY940-V10AAE
Standard 0.10 mg/l Al		Order No. CAY942-V10C10AAE
Standard 0.25 mg/l Al		Order No. CAY942-V10C25AAE
Standard 0.50 mg/l Al		Order No. CAY942-V10C50AAE
Maintenance kit CAV740		Order No. CAV740-1A
Set pump hoses sample	12 hoses yellow/blue	Order No. 51506434
Set pump hoses reagent	12 hoses black/black	Order No. 51506437
Photometer		on request
Sample collector		Order No. 51502909
Valves set with connect. nipple		Order No. 51508622
Silicon hose for valve	5 m	Order No. 51508628
Pump head	complete	Order No. 51502911

Chromate

Serial No.	
Photometer No.	
Software version	

Sample pump	Step motor	60 Upm
Sample hose	Code: yellow/blue	Tygon ID 1.52 mm
Reagent pump	Synchronous motor	20 Upm fix
Reagent hose	Code: black/black	Viton ID 0.76 mm
Measured variable	Cr (VI)	
Display	mg/l or ppm	
Measuring ranges	0.00 ... 2.50 mg/l / 0.00 ... 5.00 mg/l	
Post-flush time	30 s	
Delay to sample (pre-flush)	80 s	
Fill mixture	12 s	
Reaction time	180 s	

Standard calibration data

CR-A		CR-B	
mg/l	Hz	mg/l	Hz
0.00	0	0.00	0
0.25	168	0.25	168
1.00	650	1.00	650
1.75	1080	1.75	1080
2.50	1476	2.50	1476
		5.00	2796
f-offset	0		0

Device spec. calibration data

mg/l	Hz
f-offset	

Reagent set	1 l CR1+CR2	Order No. CAY846-V10AAE
Reagent set, inaktiv		Order No. CAY846-V10AAH
Standard 1.0 mg/l Cr (VI)		Order No. CAY848-V10C10AAE
Standard 2.0 mg/l Cr (VI)		Order No. CAY848-V10C20AAE
Maintenance kit CAV740		Order No. CAV740-1A
Set pump hoses sample	12 hoses yellow/blue	Order No. 51506434
Set pump hoses reagent	12 hoses black/black	Order No. 51506437
Photometer		on request
Sample collector		Order No. 51502909
Valves set with connect. nipple		Order No. 51508622
Silicon hose for valve	5 m	Order No. 51508628
Pump head	complete	Order No. 51502911

Copper

Serial No.	
Photometer No.	
Software version	

Sample pump	Step motor	60 Upm
Sample hose	Code: yellow/blue	Tygon ID 1.52 mm
Reagent pump	Synchronous motor	20 Upm fix
Reagent hose	Code: black/black	Tygon ID 0.76 mm
Measured variable	Cu	
Display	mg/l	
Measuring ranges	0.00 ... 2.00 mg/l / 0.00 ... 5.00 mg/l	
Post-flush time	30 s	
Delay to sample (pre-flush)	100 s	
Fill mixture	12 s	
Reaction time	120 s	

Standard calibration data

CU-A		CU-B	
mg/l	Hz	mg/l	Hz
0.00	0	0.00	0
0.50	86	0.50	86
1.00	166	1.00	166
2.00	300	2.00	300
		3.50	492
		5.00	668
f-offset	0		0

Device spec. calibration data

mg/l	Hz
f-offset	

Reagent set	1 l CU1+CU2	Order No. CAY850-V10AAE
Standard 1.0 mg/l Cu		Order No. CAY852-V10C10AAE
Standard 2.0 mg/l Cu		Order No. CAY852-V10C20AAE
Maintenance kit CAV740		Order No. CAV740-1A
Set pump hoses sample	12 hoses yellow/blue	Order No. 51506434
Set pump hoses reagent	12 hoses black/black	Order No. 51506437
Photometer		on request
Sample collector		Order No. 51502909
Valves set with connect. nipple		Order No. 51508622
Silicon hose for valve	5 m	Order No. 51508628
Pump head	complete	Order No. 51502911

Serial No.	
Photometer No.	
Software version	

Standard calibration data

FE-A		FE-B		FE-C	
mg/l	Hz	mg/l	Hz	mg/l	Hz
0.00	0	0.00	0	0.00	0
0.20	98	0.50	255	0.50	255
0.40	198	1.00	508	1.00	508
		1.50	758	1.50	758
		2.00	1020	2.00	1020
				2.50	1244
				3.00	1482
				3.50	1714
				4.00	1935
				5.00	2327
f-offset	0		0		0

[illegible]

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Total Hardness

Serial No.	
Photometer No.	
Software version	

Sample pump	Step motor	60 Upm
Sample hose	Code: yellow/blue	Tygon ID 1.52 mm
Reagent pump	Synchronous motor	20 Upm fix
Reagent hose	Code: yellow/blue	Tygon ID 1.52 mm
Measured variable	CaCO ₃	
Display	mg/l	
Measuring ranges	0.0 ... 10.0 mg/l / 0.0 ... 100 mg/l	
Post-flush time	30 s	
Delay to sample (pre-flush)	80 s	
Fill mixture	14 s	
Reaction time	60 s	

Standard calibration data

HA-A		HA-B	
mg/l	Hz	mg/l	Hz
0.0	0	0.0	0
1.0	93	10	53
2.0	151	20	108
3.0	227	30	148
4.0	266	40	178
5.0	308	50	201
6.0	405	60	234
7.0	461	70	250
8.0	489	80	264
10.0	593	100	279
f-offset	0		0

Device spec. calibration data

mg/l	Hz
f-offset	

Reagent set	1 HA1+HA2	Order No. CAY940-V10AAE
Standard 0.10 mg/l Al		Order No. CAY942-V10C10AAE
Standard 0.25 mg/l Al		Order No. CAY942-V10C25AAE
Standard 0.50 mg/l Al		Order No. CAY942-V10C50AAE
Maintenance kit CAV740		Order No. CAV740-2A
Set pump hoses	12 hoses yellow/blue	Order No. 51506434
Photometer		on request
Sample collector		Order No. 51502909
Valves set with connect. nipple		Order No. 51508622
Silicon hose for valve	5 m	Order No. 51508628
Pump head	complete	Order No. 51502911

Manganese

Serial No.	
Photometer No.	
Software version	

Sample pump	Step motor	60 Upm
Sample hose	Code: yellow/blue	Tygon ID 1.52 mm
Reagent pump	Synchronous motor	24 Upm fix
Reagent hose	Code: black/black	Tygon ID 0.76 mm
Measured variable	Mn	
Display	mg/l	
Measuring ranges	1 ... 160 µg/l	
Post-flush time	30 s	
Delay to sample (pre-flush)	80 s	
Fill mixture	15 s	
Reaction time	300 s	

Standard calibration data

MN-A	
mg/l	Hz
0.00	0
0.01	66
0.02	136
0.04	325
0.06	520
0.08	824
0.10	1147
0.12	1497
0.14	2009
0.16	2399
f-offset	0

Device spec. calibration data

mg/l	Hz
f-offset	

Reagent set	1 MN1+MN2+MN3	Order No. CAY843-V10AAE
Reagent set, inaktiv	1 MN1+MN2+MN3	Order No. CAY843-V10AAH
Cleaning agent	1	Order No. CAY844-V10AAE
Standard 0.10 mg/l Mn		Order No. CAY845-V10C10AAE
Standard 0.50 mg/l Mn		Order No. CAY845-V10C50AAE
Maintenance kit CAV740		Order No. CAV740-1A
Set pump hoses sample	12 hoses yellow/blue	Order No. 51506434
Set pump hoses reagent	12 hoses black/black	Order No. 51506437
Photometer		on request
Sample collector		Order No. 51502909
Valves set with connect. nipple		Order No. 51508622
Silicon hose for valve	5 m	Order No. 51508628
Pump head	complete	Order No. 51502911

Silicate

Serial No.	
Photometer No.	
Software version	

Sample pump	Synchronous motor	60 Upm
Sample hose	Code: violet/white	Tygon ID 2.79 mm
Reagent pump	Step motor	30 Upm fix
Reagent hose	Code: black/black	Tygon ID 0.76 mm
Measured variable	SiO ₂	
Display	mg/l	
Measuring ranges	1 ... 200 µg/l / 0.00 ... 5.00 mg/l	
Post-flush time	30 s	
Delay to sample (pre-flush)	100 s	
Fill mixture	11 s	
Reaction time	240 s und 60 s	

Standard calibration data

SI-A		SI-B	
mg/l	Hz	mg/l	Hz
0.00	0	0.00	0
0.02	67	0.10	20
0.04	122	0.50	113
0.06	185	1.00	223
0.08	261	1.50	324
0.10	336	2.00	441
0.12	410	2.50	521
0.14	478	3.00	618
0.16	551	4.00	791
0.20	687	5.00	966
f-offset	0		0

Device spec. calibration data

mg/l	Hz
f-offset	

Reagent set	1 SI1+SI2+SI3	Order No. CAY640-V10AAE
Reagent set	1 SI1+SI2+SI3	Order No. CAY640-V10AAH
Cleaning agent	1	Order No. CAY641-V10AAE
Standard 0.50 mg/l SiO ₂		Order No. CAY642-V10C50AAE
Maintenance kit CAV740		Order No. CAV740-4A
Set pump hoses sample	12 hoses violet/white	Order No. 51508945
Set pump hoses reagent	12 hoses black/black	Order No. 51506437
Photometer		Order No. 51508962
Sample collector		Order No. 51502909
Valves set with connect. nipple		Order No. 51508622
Silicon hose f. dosing loop	15 m	Order No. 51508626
Holder for dosing loop	1 piece	Order No. 51508960
Pump head	complete	Order No. 51502911

Index

A

Accessories	31
Analysis methods	46
AUTO MEASURING	16

C

Calibration	23
Checks	
Connection	14
Function	26
Installation	10
Commissioning	4, 15, 26
Configuration	19
Connection	
Electrical	11, 39
Signals	13

D

DATA MEMORY	22
Declaration of conformity	7
Designated use	4
Dimensions	8, 41
Display and operating elements	15

E

Electrical connection	11, 39
Error display	21

I

Input	38
Installation	4, 8
Installation conditions	8
Installation instructions	10

K

Key functions	15
---------------------	----

L

Language	21
Local operation	15

M

Main menu	16
Maintenance	28
Maintenance schedule	28
Mechanical construction	41
Menu	
Auto Measuring	16
Configuration	19
Data memory	22
Error display	21
Language	21
Main menu	16
Parameter entry	17
Service	21

N

Nameplate	6
-----------------	---

O

Operating conditions	
Environment	40
Process	40
Operating matrix	42
Operation	4, 15
Operational safety	4
Ordering	6
Output	38

P

Parameter entry	17
Performance characteristics	40
Placing out of service	30
Product structure	6

Q

Quality certificate	7
---------------------------	---

R

Reagents	31
Replacement of the pump hoses	29
Replacement of the reagents	29
Return	5

S

Safety icons	5
Safety instructions	4
Scope of delivery	7–8
SERVICE	21
Signal connection	13
Spare parts	35–37
Specifications	46
Standard solutions	31
Switching contacts	13
Switching on	26

T

Technical data	38
Trouble-shooting	32

W

Wall mounting	9, 31
---------------------	-------

Declaration of contamination

Dear customer,

Because of legal determinations and for the safety of our employees and operating equipment we need this "Declaration of contamination" with your signature before your order can be handled. Please put the completely filled in declaration to the instrument and to the shipping documents in any case. Add also safety sheets and/or specific handling instructions if necessary.

type of instrument / sensor: _____ serial number: _____
medium / concentration: _____ temperature: _____ pressure: _____
cleaned with: _____ conductivity: _____ viscosity: _____

Warning hints for medium used:



radioactive



explosive



caustic



poisonous



harmful of
health



biological
hazardous



inflammable



safe

Please mark the appropriate warning hints.

Reason for return:

Company data:

company:	_____	contact person:	_____
	_____		_____
	_____	department:	_____
address:	_____	phone number:	_____
	_____	Fax/E-Mail:	_____
	_____	your order no.:	_____

I hereby certify that the returned equipment has been cleaned and decontaminated acc. to good industrial practices and is in compliance with all regulations. This equipment poses no health or safety risks due to contamination.

(Date)

(company stamp and legally binding signature)



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