TESTOMAT®

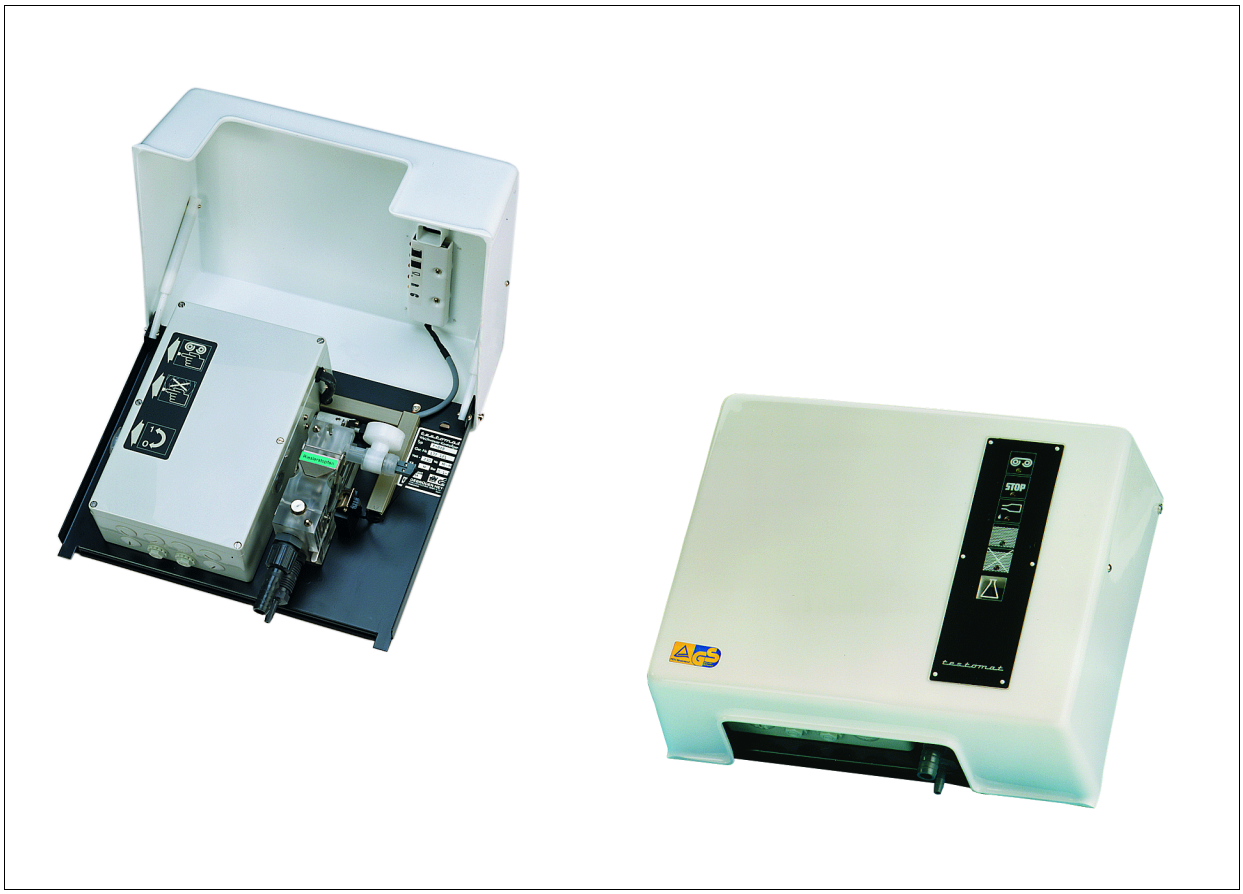
GB

F-BOB

C-BOB

M-BOB

Analysis and Control Units for Automatic Monitoring of Water Quality



Operating Instructions

CONTENTS

GENERAL NOTES

TESTOMAT®units are designed for automatic monitoring of maximum permissible residual hardness (F-BOB), maximum permissible residual carbonate hardness (C-BOB) and maximum permissible minus-m value (M-BOB). Using reagents that are prepared for a fixed limit, analyses are carried out at regular intervals and the results evaluated. If the limit value is reached, a colour change occurs in the measuring chamber which is indicated visually and evaluated electronically. The relays actuated during this process can be used to operate a control circuit, a valve or an alarm device.
Analysis intervals of 5, 10, 20 and 30 minutes can be set and interrupted externally. An analysis can be triggered manually or by means of an external triggering device.
If the reagent level is low, a display warning lamp and an alarm (not provided) signal are triggered.
Furthermore, the unit is provided with a current interface (0 - 20 mA) and an output to trigger the SA / SAV flush controller.

POSSIBLE APPLICATIONS FOR TESTOMAT® UNITS

Three different unit types cover the following monitoring requirements. The table gives a summary of the different possibilities:

Unit type	Monitoring field	Chemical indication (measuring chamber content)	Display, unit cover (good / poor lamps)	Test result (statement on water quality)
F-BOB	Residual hardness 0.02 - 3.0°dH 0.36 - 54 ppm	green	"GOOD" green	Residual hardness < reagent limit
		red	"POOR" red	Residual hardness > reagent limit
C-BOB	Carbonate hardness 1.0 - 4.0°dH 18 - 72 ppm	yellow	"GOOD" green	Carbonate hardness < reagent limit
		violet	"POOR" red	Carbonate hardness > reagent limit
M-BOB	minus-m value 0.1 - 0.5 mmol/l	turquoise	"GOOD" green	minus-m value < reagent limit
		orange	"POOR" red	minus-m value > reagent limit

Reagents with a range of limit values to suit the respective operating requirements are available for use in the TESTOMAT® units (see TESTOMAT® reagents on Page 10).

A consistently reliable result can be guaranteed by the TESTOMAT® only with the use of original HEYL TESTOMAT® reagents !

In the case of Type F-BOB TESTOMAT® unit for monitoring total hardness, larger quantities of heavy-metal ions in the softened water can affect the colour reaction, especially iron above 0.5 mg/l, copper above 0.1 mg/l and aluminium above 0.1 mg/l (brownish-red colour indication).
At a concentration of more than 20 mg/l of CO_2 (carbon dioxide) in the water, the excess carbon dioxide must be removed by installing a Type R aerator in the feed water line to the F-BOB TESTOMAT® unit.
The concentrations of interfering ingredients can be determined by means of our TESTOVAL® colorimetric test comparators.

INSTALLATION AND COMMISSIONING

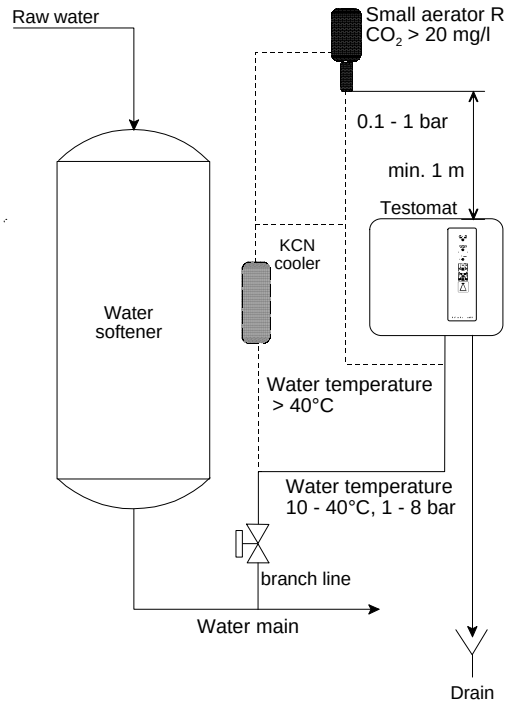
Installation and commissioning must be undertaken only by authorised technicians!

To guarantee fault-free operation of the unit, make sure the following points are observed:

INSTALLATION

The temperature of the sample water must be between 10°C and 40°C. Higher water temperatures can lead to irreparable damage to the measuring chamber. In the event of higher temperatures, the Type KCN cooler must be installed in the branch line of the TESTOMAT®.

The TESTOMAT® must always be connected to a separate branch line that can be shut off by means of a hand-operated valve, in order to isolate the water supply to the unit for maintenance of the measuring chamber when required.
The unit should be fixed vertically to the wall and at eye level. The inlet and outlet flexible hoses to and from the measuring chamber of the TESTOMAT® must be run so that the measuring chamber can be drawn forwards on the guide pins.



FEED WATER

The TESTOMAT® unit must be connected to a branch line taken from the main soft water line, by using the quick-action coupling of the unit. **The branch line to the TESTOMAT® with a hand-operated shut-off valve must be kept as short as possible.** The branch line should be positioned as close as possible to the outlet from the water softening plant and should consist of a pressure-resistant hose that is impervious to light (to prevent algae formation) with an internal diameter of 6 mm (secure the hose to the quick-action coupling with a hose-clip).
It is important that the branch line connection is taken vertically from the top of the main soft water line in order to prevent dirt particles from entering into the measuring chamber.
There are two unit types available for the pressure ranges 0.1 to 1.0 bar and 1 to 8 bar (8 bar = maximum).

Operation with small aerator
If the sample water to the TESTOMAT® F-BOB contains more than 20 mg/l of CO_2, it will be necessary to install a Type R small aerator. The aerator must be installed at least 1 m above the TESTOMAT® unit. When operating with the small aerator, install a TESTOMAT® unit with a pressure range of 0.1 - 1 bar or use an appropriately adapted measuring chamber.

WATER TO DRAIN

The feed water flows through the measuring chamber then, via the outlet pipe, to the drain (hose connection internal diameter 14 mm). Make sure, by using a funnel for example, that the water can run freely to drain and cannot back-up into the measuring chamber. A hose impervious to light should also be used for the drain pipe (to discourage algae formation).

ELECTRICAL CONNECTION

Check supply voltage on the rating plate!

To carry out the electrical connections (see Page 11), remove the amplifier case cover by undoing 6 screws. Replace the cover upon completion.

COMMISSIONING

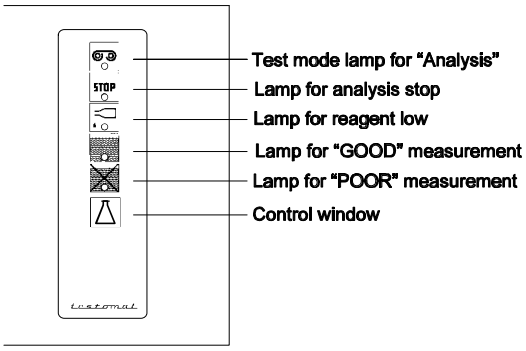
Never put the unit into operation without reagent!

Before commissioning, screw a full bottle of reagent into the plastic swivel ring of the metering insert. To do this, operate the catch lever by pushing outwards while simultaneously pulling the measuring chamber forwards on its guide pins until it engages. Then twist the plastic swivel ring downwards, screw in the bottle of reagent until hand-tight and twist the plastic swivel ring with bottle upwards to the vertical position.
While operating the catch lever, simultaneously push the measuring chamber backwards on its guide pins until it re-engages.

When the bottle of reagent is vertical, the reagent solution is fed **automatically** to the metering insert.
Do not squeeze the flexible bottle by hand.
Meter the reagent 4 times manually by raising the metering piston. Flush the branch line by pressing the flushing button (when the metering piston is raised).
When switching on the unit, an alarm signal may be initiated. A reliable analysis is given after the first analysis interval.

LAMPS AND CONTROLS

DISPLAY LAMPS ON UNIT COVER



LAMP FOR "ANALYSIS MODE"
The yellow "Analysis" lamp lights up when the unit is performing an analysis.
If the "Analysis" lamp is 'off', the unit is at an interval between analyses.

ANALYSIS STOP
The red lamp "analysis stop" lights up when the unit is switched to stand-by either due to a "POOR" measurement or via input terminals 27/28.

REAGENT LOW
The red lamp blinks when the reagent bottle is nearly empty. Also check whether the electrical plug for monitoring the reagent level is plugged into the metering insert.

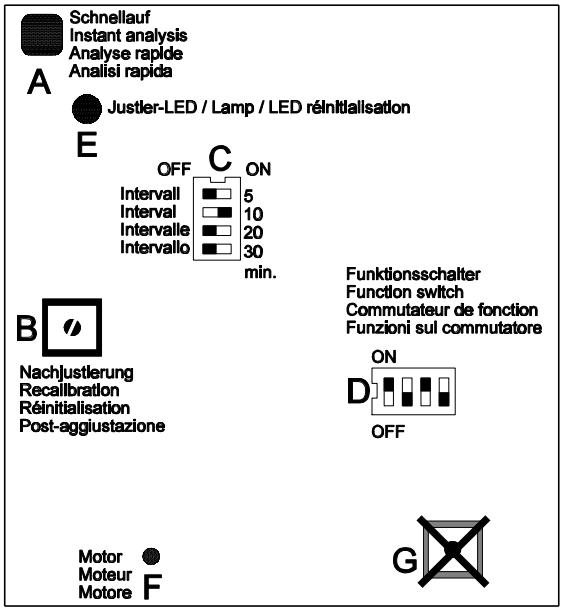
"GOOD" MEASUREMENT
The green lamp for a "GOOD" measurement lights up if the result of the last analysis fell below the reagent limit value.

"POOR" MEASUREMENT
The red lamp for "POOR" measurement lights up if the result of the last analysis exeeded the reagent limit value.

CONTROL WINDOW
The quality of water in the measuring chamber can be determined by the visible coloration (see table on Page 1).

LAMPS ON TOP CIRCUIT BOARD

Lamps and Controls on the top circuit board



MOTOR LAMP
The red "F" lamp lights up when either the motor is raising the metering piston and at the same time flushing the measuring chamber or when metering is taking place.

CALIBRATION LAMP
The yellow "E" lamp is used by the service technician to carry out a recalibration (procedure see Page 8).

CONTROLS ON TOP CIRCUIT BOARD

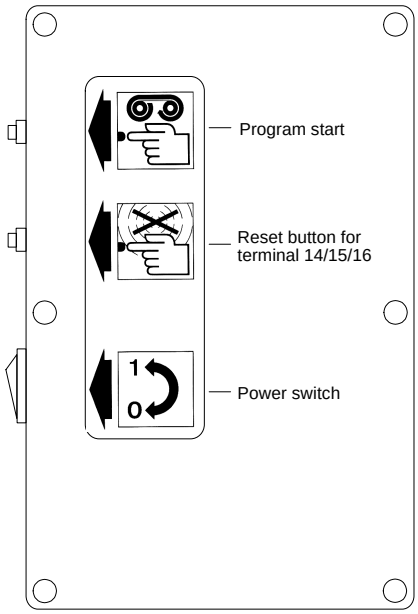
INSTANT ANALYSIS BUTTON
Pressing and holding down button "A" accelerates the programme cycle.

INTERVAL SWITCH
The "C" switch is used to set a test interval of 5, 10, 20 or 30 minutes (see Page 4).

FUNCTION SWITCH
The "D" function switch is used to set 5 different switching functions (see Page 5).

RECALIBRATION
Potentiometer "B" is used to recalibrate the unit when required (see Page 8).

CONTROLS ON AMPLIFIER CASE



PROGRAM START
The black "PROGRAM START" button can be used to start an independent test cycle manually during the interval between analyses, provided the yellow lamp on the hinged cover is **not** on and the interval is set either to 10, 20 or 30 minutes.

RESET BUTTON
Pressing the red "RESET BUTTON" causes the "poor" signal at terminals 14/15/16 to be reset and/or interval cycle to be restarted if in the "ANALYSIS STOP" mode.

POWER SWITCH
The unit is switched 'on' or 'off' by means of this switch. When the unit is switched off, the connections **n and l** are de-energised.

SETTINGS, FUNCTIONS AND CONNECTION OPTIONS

The settings of the unit can be made after opening the amplifier case:

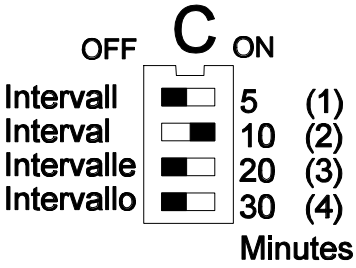
Warning!
The sealed potentiometer "G" at the bottom right-hand corner of the top circuit board must not be adjusted!

CYCLE OF AN ANALYSIS

The analyses are performed automatically in accordance with the set interval time. The chemical colour reaction in the measuring chamber is evaluated by means of a photoelectric sensor.
At the beginning of an analysis, the measuring chamber is flushed for approximately 1 minute.
The metering piston injects reagent into the measuring chamber and this is mixed with the incoming water. After a reaction time of approximately 2 minutes, electronic evaluation takes place and the result is indicated by means of the appropriate lamp in the cover of the unit.
For the remainder of the analysis interval, the result of the analysis (colour indication) remains visible in the control window.
In the event of a "poor" analysis, the terminals of the unit are switched as determined by the position of function switch "D".
At the end of the set interval time, a new analysis begins.

INTERVAL TIME

Set the required interval time of 5, 10, 20 or 30 minutes by means of switch "C".

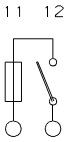


Interval setting	Analysis time in minutes	Analysis pause in minutes	Analyses per 24 hours
5 minutes	5	--	288
10 minutes	5	5	144
20 minutes	5	15	72
30 minutes	5	25	48

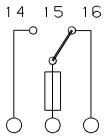
Example: 10-minute interval

The required interval is set by operating the toggle switch. If each switch is in the "OFF" position, a 5-minute interval is automatically selected.

POOR RESULT (terminals 11/12 and 14/15/16)



The terminal is closed for 1 minute (volt-free "normally open" contact) each time the limit value is exceeded.



If the limit value is exceeded, the terminal is switched in accordance with the switching function "D" that has been set:

14/15 º reagent limit value exceeded ("POOR" measurement)
15/16 º result falls below the reagent limit value ("GOOD" measurement)

SWITCHING FUNCTIONS (function switch "D")

Switch position 1: In the event of a "POOR" analysis result, the lower red lamp on the hinged cover lights up. A permanent contact is supplied at terminal 14/15 until the next "GOOD" analysis result, when it is then automatically reset. The permanent contact can also be cancelled by pressing the reset button on the left side of the amplifier case or by means of a 'normally closed' contact at terminal 17/18 (external reset).

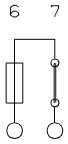
Switch position 2: Provides a permanent contact at terminal 14/15 after two consecutive "POOR" analysis results. Otherwise as position 1.

Switch position 3: In the event of a "POOR" analysis result, a permanent contact at terminal 14/15 occurs and the unit changes to stand-by (the control lamp "Analysis stop" lights up). Analyses are continued as soon as the reset button is pressed or an external reset is triggered.

Switch position 4: Provides a permanent contact at terminal 14/15 after two consecutive "POOR" analysis results. Otherwise as position 3.

Switch position 5: Provides an impulse contact of 1 minute duration at terminal 14/15 for every "POOR" analysis result.

REAGENT LOW (terminal 6/7)

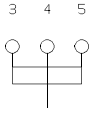


The TESTOMAT ® is equipped with an automatic reagent level monitor. If the centre red lamp on the cover blinks (reagent low), a new reagent bottle must be inserted in the unit. For safety reasons, there is still enough reagent left in the metering insert for approximately 25 analyses at the time the "reagent low" signal is given.

A volt-free "normally closed" contact is provided to initiate an external fault signal.

In the event of a reagent low signal or power supply failure, the contact is closed.

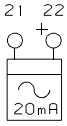
AUTOMATIC FLUSH CONTROLLER (terminal 3/4/5)



If required, the SA/SAV automatic flush and shut-off controller can be controlled via terminal 3/4/5.
The SA or SAV automatic flush controller is used to regulate the analysis water demand and to extend the flushing function of the TESTOMAT ® unit.
Especially for small installations or when the flow demand to service is not continuous, (during long idle periods) it is benificial to shut off the water supply to the TESTOMAT ® in order to **save water**.

In very large installations, the analysis water demand of the TESTOMAT ® unit (approximately 12 l/h) may not be sufficient to ensure a constant supply of freshly softened water at the measuring point.
The use of the automatic flush controller makes it possible to adjust the analysis water and flushing water demand to the individual plant configuration or operating requirements.

CURRENT INTERFACE (terminal 21/22)



The analysis results or the operating state can be recorded via the output of the 0 - 20 mA current interface.

4 - 20 mA current interface on request

The data given here may vary by ± 10%.

The current interface **is not** galvanically isolated !

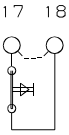
Operating state	Current interface	
	0 - 20 mA	**4 - 20 mA**
Operation	3.5 mA	6.8 mA
"GOOD" measurement *	7.5 mA	10.0 mA
"POOR" measurement*	12.5 mA	13.6 mA
Reagent low	16.5 mA	16.8 mA

*approximately 1 minute impulse

EXTERNAL TRIGGERING

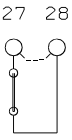
When operating the unit without external triggering, a bridge (factory installed) must be retained across the respective input.

EXTERNAL RESET (terminal 17/18)



A "poor" signal at terminal 14/15 is reset via the external reset 17/18. The terminal consists of a volt-free 'normally closed' contact.
If an external reset is not provided, a bridge must be fitted across the input.

FLOW CONTROLLER / REMOTE SWITCH (terminal 27/28)



Terminal 27/28 is fitted with a bridge at the factory (volt-free 'normally closed' contact) which when removed can be used for the following applications:

1. Water draw-off is monitored by fitting a flow controller to the system. If no water is drawn off (contact open), the analysis intervals are interrupted and the unit switches to stand-by (analysis stop).
   The next analysis takes place as soon as the contact remains closed for a minimum of 1 minute.

2. Individual analyses are triggered by means of an external switch.
   In this case, it is important that the intervals between analyses are greater than the set interval time.
   To start an analysis, terminal 27/28 must remain closed for at least 1 minute. In addition, an input signal will add up shorter contact times so that, for example, an analysis will take place after three 20-second impulses (e.g. in conjunction with the MMP 81 controller).

If the contact remains closed, analyses are continuously performed in accordance with the set interval time.

MAINTENANCE

Regular maintenance is necessary in order to ensure trouble-free operation of the unit!

When inserting a new reagent bottle, check the measuring chamber sight-glass windows for dirt, clean if necessary. Observe the metering, mixing of the reagent and the colouring in the measuring chamber.

The measuring chamber should be cleaned at regular intervals (approximately every 6 months) and all seals replaced. If it is not possible to carry out maintenance on site, exchange the complete measuring chamber and send it in for maintenance.

It may be necessary to perform cleaning more frequently or sooner if the water has a high iron-content.

CLEANING THE SIGHT-GLASS WINDOWS

1. Close the hand-operated valve on the branch line to the TESTOMAT ®.
2. Draw the measuring chamber body forwards on the guide pins while simultaneously operating the catch lever, until it engages.
3. Carefully raise the metering piston so that the measuring chamber contents can run to drain.
4. Pivot the securing flap upwards and remove and clean the sight-glass windows.
5. After cleaning, replace the sight-glass windows (do not forget the window seals and check for correct seating in the recess). Press the securing flap downwards and while operating the catch lever, simultaneously push the measuring chamber back on its guide pins until it is engaged.
6. Make sure the lower lever fits correctly into the metering piston guide.

If the unit is operated for a long period with "POOR" water, a coloured coating can form on the sight-glass windows. This stubborn coating can be easily removed with alcohol.

CLEANING THE MEASURING CHAMBER AND METERING INSERT

Never use organic solvents to clean the measuring chamber housing!

1. Close the hand-operated valve on the branch line to the TESTOMAT ®.
2. Empty the measuring chamber by raising the metering piston slightly.
3. Pivot the reagent bottle downwards, wait a moment and then unscrew.
4. Undo the hose connections to the measuring chamber.
5. Remove the electrical cable plug from the metering insert.
6. Remove the measuring chamber completely by pulling the assembly forwards while operating the catch lever.
7. Extract the retaining pin and withdraw the complete metering insert upwards.
8. Extract the retaining pin and withdraw the flow regulator plug and finally remove the valve body.
9. Extract the retaining pin and withdraw the valve plunger (flush button), the spring and splash guard.
10. Unscrew inlet pipe, remove sealing ring, spring and filter strainer and clean.
11. **See "cleaning the sight-glass windows".**

Clean the measuring chamber with 10% hydrochloric acid. Then rinse well and re-install the dismantled parts in the reverse order.

RECALIBRATING THE UNIT (necessary if the mirror holder or the top circuit board are replaced)

The TESTOMAT ® unit is supplied calibrated ex works. It is therefore unnecessary to calibrate the unit during commissioning.

Recalibration is performed as follows:

1. Clean the measuring chamber and the sight-glass windows thoroughly. Replace into position **without reagent** and turn on water supply.
2. Remove amplifier cover and set the **5-minute interval**.
3. Switch 'ON' the unit.
4. Make sure the metering piston shuts-off the outlet of the measuring chamber and that this is filled with water to at least 5 mm below the brim.
   Start recalibration after approximately 1 minute.
5. Turn potentiometer "B" on the top circuit board anti-clockwise until control lamp "E" goes out. Then turn clockwise until the lamp begins to flicker. The unit is recalibrated.
6. Refit the amplifier cover, draw the measuring chamber forwards by operating the catch lever, twist the swivel ring downwards, screw in the reagent bottle and return the measuring chamber to the operating position until the catch lever is engaged. Swivel the reagent bottle vertically.

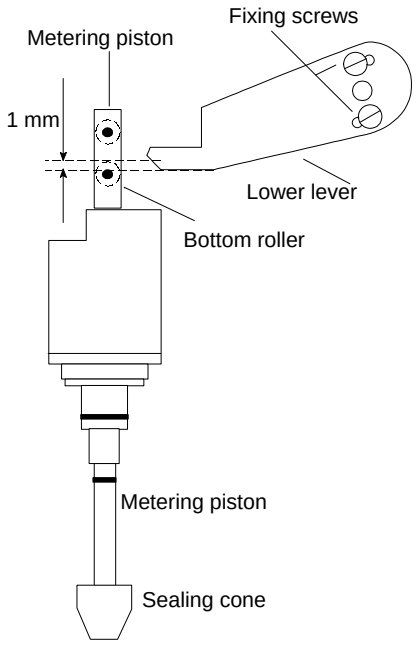
Effect metering 4 times by hand by raising the metering piston. Flush the branch line by pressing the flush button (ensure the metering piston is raised). A reliable evaluation is made after the first analysis interval.

ADJUSTING THE LOWER LEVER

Adjustment is only possible after a metering cycle is completed.

1. Switch 'off' unit.
2. Operate the catch lever on the measuring chamber and draw it slightly forwards.
3. Loosen the two side fastening screws on the lower lever.
4. Adjust the lower lever so that the bottom horizontal surface of the lower lever is approximately 1 mm below the top of the bottom roller.
   Re-tighten the screws.
5. Push the measuring chamber back until the catch lever is engaged.
6. Check that the lower lever has uniform lateral play in the receiving slot of the metering piston. If necessary, adjust by loosening the Allen screw locking the lower lever to the motor drive spindle. Re-tighten.

   CAUTION !
   Do not over-tighten as this may damage the assembly.



CUSTOMER SERVICE NOTES

Leaking reagent can cause damage to the unit!

Caution!
Should it be necessary to transport the unit:
- **remove reagent bottle**
- **clean measuring chamber and metering insert**

The same applies if either the measuring chamber or metering insert are sent off separately.

If the unit needs to be serviced or repaired, please enclose with it a brief description of the fault!

The TESTOMAT® unit can be serviced by either the customer service department of the installer or by the customer service department of Gebrüder Heyl GmbH & Co KG, Germany (Tel.: +49 5121 7609 0).

TROUBLESHOOTING AND REMEDIES

Unit / lamps / operation		
Fault	**Possible causes**	**Remedies**
”POOR” measurement despite ”green” measuring chamber content	• Sight-glass windows dirty • Reagent kept too long, shelf life exceeded • Carbon dioxide > 20 mg/l • Use of third-party reagent	Clean sight-glass windows Clean measuring chamber and metering insert, replace reagent Install small aerator and replace the regulator plug Clean measuring chamber and metering insert, only use **HEYL TESTOMAT® reagent**
”POOR” measurement with ”light green” measuring chamber content	• Valve collar damaged or dirty • Lower lever incorrectly adjusted, water leakage from measuring chamber after metering • Spindle attached to lower lever cracked • Water flow rate too low • Water too cold, reagent collecting at bottom of measuring chamber	Replace valve collar and reagent Readjust lower lever Replace spindle and lower lever complete Check inlet (filter strainer, flow regulator valve) Check water temperature (> 10°C)
Lower lever does not move, motor not running	• Fuse E8 (200 mA) defective • Faulty microswitch	Replace fuse Replace microswitch
No permanent contact at terminal 14/15 despite ”poor” indication	• Fuse E3 (M2A) defective • Terminal 17/18 not bridged	Replace fuse Bridge on terminal 17/18 must be closed, check remote switch for function
Analysis interval cannot be set	• Toggle switch "C" is not fully engaged	Check position of toggle switch "C" (replace if necessary)
Unit cannot be calibrated During calibration, the yellow lamp ”E” does not go out when the potentiometer is turned to the left stop	• Electrical connection to mirror holder faulty • Plug contacts on mirror holder oxidised • Measuring chamber dirty (sight-glass windows coated with deposits)	Check plug for correct seating Clean contacts or replace mirror holder Clean sight-glass windows in accordance with instructions. **Tip:** Shorten maintenance intervals or test intervals to avoid deposition
Unit switches to ”Analysis stop” state despite ”GOOD” measurement	• Terminal 27/28 not bridged	Check bridge on terminal 27/28 Check external device for function
Display on unit cover not working	• Fuse E7 (315 mA) defective	Replace fuse

Measuring chamber and metering insert		
Water leakage from top fixing hole of measuring chamber	• Inlet pressure too high or too low! • Incorrect or faulty flow regulator	Install pressure regulator or pressure reducer before TESTOMAT® Examine flow regulator plug, replace if necessary Replace flow regulator valve
Measuring chamber fills partially or not at all	• Filter strainer dirty or inserted upside down • Vent hole of measuring chamber blocked • Air bubbles forming in inlet	Clean filter strainer, (insert point downwards) Clean vent hole Check feed water inlet pipe
Measuring chamber leaking	• Water connections not tight or seals dirty • Sight-glass window seals defective or installed askew	Check seals, **carefully** tighten screw joint Replace seals, make sure correctly seated when installing
Reagent flowing continuously from metering insert into the measuring chamber	• Valve collar defective • Square section ring defective or missing	Replace valve collar Replace or install ring
Reagent leakage from vent hole of metering insert	• Reagent bottle not screwed in tightly enough • Reagent bottle drawing air through dirt in the screw coupling	Tighten hand-tight Clean bottle neck and screw coupling, replace bottle if necessary
Reagent sprays out from the top of the metering piston	• Defective metering piston • Excessive ambient temperature	Insert new metering piston Reduce temperature or relocate the unit

TECHNICAL APPENDIX

TESTOMAT ® REAGENTS

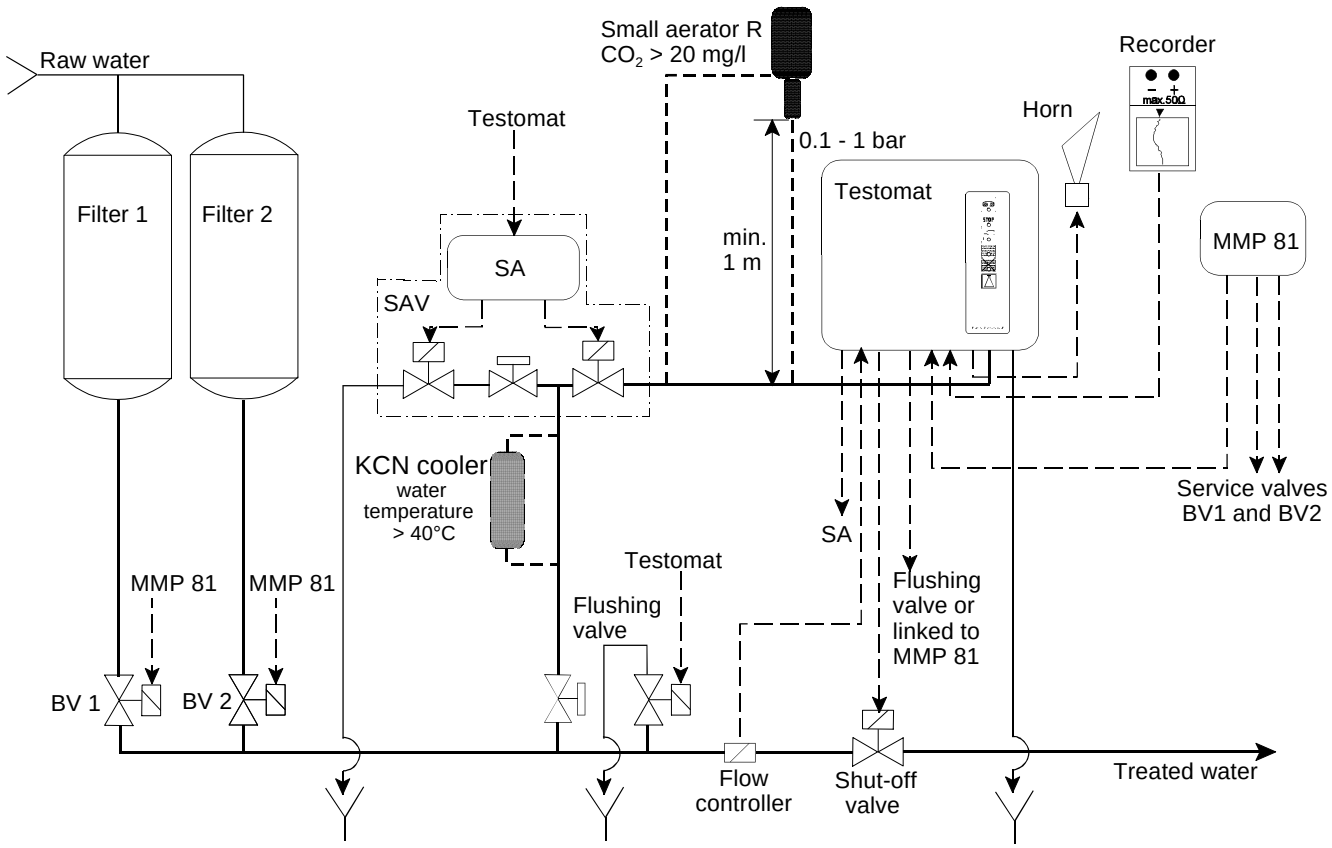
A consistently reliable result can be guaranteed by the TESTOMAT® only with the use of original HEYL TESTOMAT® reagents !

Unit	Type	Colour change at limit value
F-BOB	300	0.02°dH = 0.36 ppm $CaCO_3$ = 0.04°f residual hardness
	300 S	0.05°dH = 0.9 ppm $CaCO_3$ = 0.09°f residual hardness
	301	0.1°dH = 1.8 ppm $CaCO_3$ = 0.18°f residual hardness
	302	0.2°dH = 3.6 ppm $CaCO_3$ = 0.36°f residual hardness
	303	0.3°dH = 5.4 ppm $CaCO_3$ = 0.54°f residual hardness
	305	0.5°dH = 9 ppm $CaCO_3$ = 0.9°f residual hardness
	310	1°dH = 18 ppm $CaCO_3$ = 1.8°f residual hardness
	320	2°dH = 36 ppm $CaCO_3$ = 3.6°f residual hardness
	330	3°dH = 54 ppm $CaCO_3$ = 5.4°f residual hardness
C-BOB	C 10	1°dH = 1.8°f carbonate hardness = 0.3 mmol/l m-value
	C 15	1.5°dH = 2.7°f carbonate hardness = 0.5 mmol/l m-value
	C 20	2°dH = 3.6°f carbonate hardness = 0.7 mmol/l m-value
	C 30	3°dH = 5.4°f carbonate hardness = 1.1 mmol/l m-value
	C 40	4°dH = 7.2°f carbonate hardness = 1.4 mmol/l m-value
M-BOB	M 1	0.1 mmol/l minus m-value
	M 3	0.3 mmol/l minus m-value
	M 5	0.5 mmol/l minus m-value

When ordering, please state the required reagent type!

The reagents can be kept for at least two years if they are stored in a cool place (15 - 20 °C), sealed and kept away from direct light.
A bottle of 100 ml is sufficient for approx. 1300 analyses.
Please note the use-by date on the bottle label.

INSTALLATION EXAMPLE



TECHNICAL DATA

Power supply:	230 - 240 V or 24 V ±10%, 50 - 60 HZ, fuse M2A
Unit protection:	230 - 240 V: T0.1A, 24 V: T0.5A
Power consumption:	approximately 10 VA
Degree of protection:	IP54
Protection class:	I
Conformity:	EN 50081-1, EN 50082-2, EN 61010-1, EN 60335-1*
Ambient temperature:	10 - 40°C

(*only F-BOB)

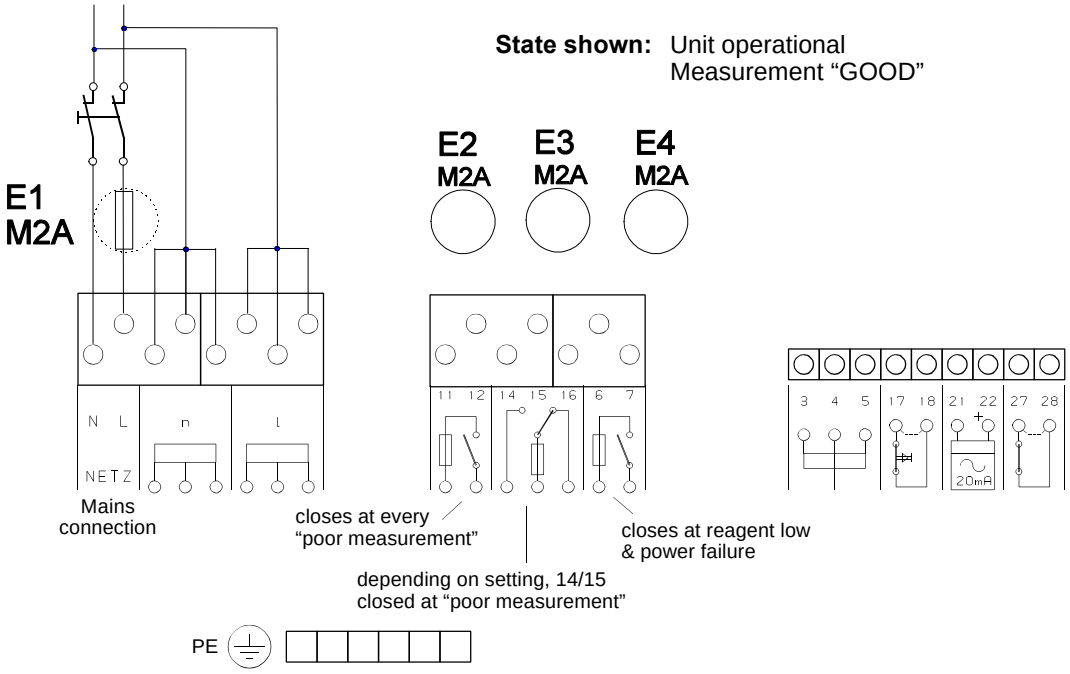
Water supply	
Operating pressure:	1 - 8 bar = 10^5 - 8 x 10^5 Pa or 0.1 - 1 bar = 10^4 - 10^5 Pa
Feed water pipe:	light-impermeable pressure hose with internal diameter 6 - 8 mm
Drain water pipe:	light-impermeable hose with internal diameter 14 mm
Flow rate:	approximately 12 l/h (depending on pressure)
Water temperature:	10 - 40°C

All parts coming into contact with water or reagent are made of corrosion-resistant material

Outputs (relays, volt-free):	Terminal 11/12:	'Normally open' contact (at each "poor" analysis approx. 1 minute alarm)
Contact rating		
250V/2A resistive load	Terminal 14/15/16:	2-way contact (programmable via switch positions) 15/16 **º** good 14/15 **º** poor
	Terminal 6/7:	'Normally closed' (reagent fill level monitor)
Outputs:	Terminal 21/22:	***Current interface 0 - 20 mA***, max. load 50 W (special model 4 - 20 mA) **Not** galvanically isolated.
	Terminal 3/4/5:	***SA/SAV*** Flush and shut-off controller to regulate the supply of water to the TESTOMAT® unit
Inputs:	Terminal 17/18:	External reset of "poor" signal at terminal 14/15
Contact rating 10 V/12 mA		
	Terminal 27/28:	Flow controller or external switch contact open **º** TESTOMAT® unit in stand-by state

Dimensions:	Height: 310 mm, Width 360 mm, Depth 130 mm
Weight:	approximately 5.3 kg

ELECTRICAL CONNECTIONS:



SPARE PARTS LIST

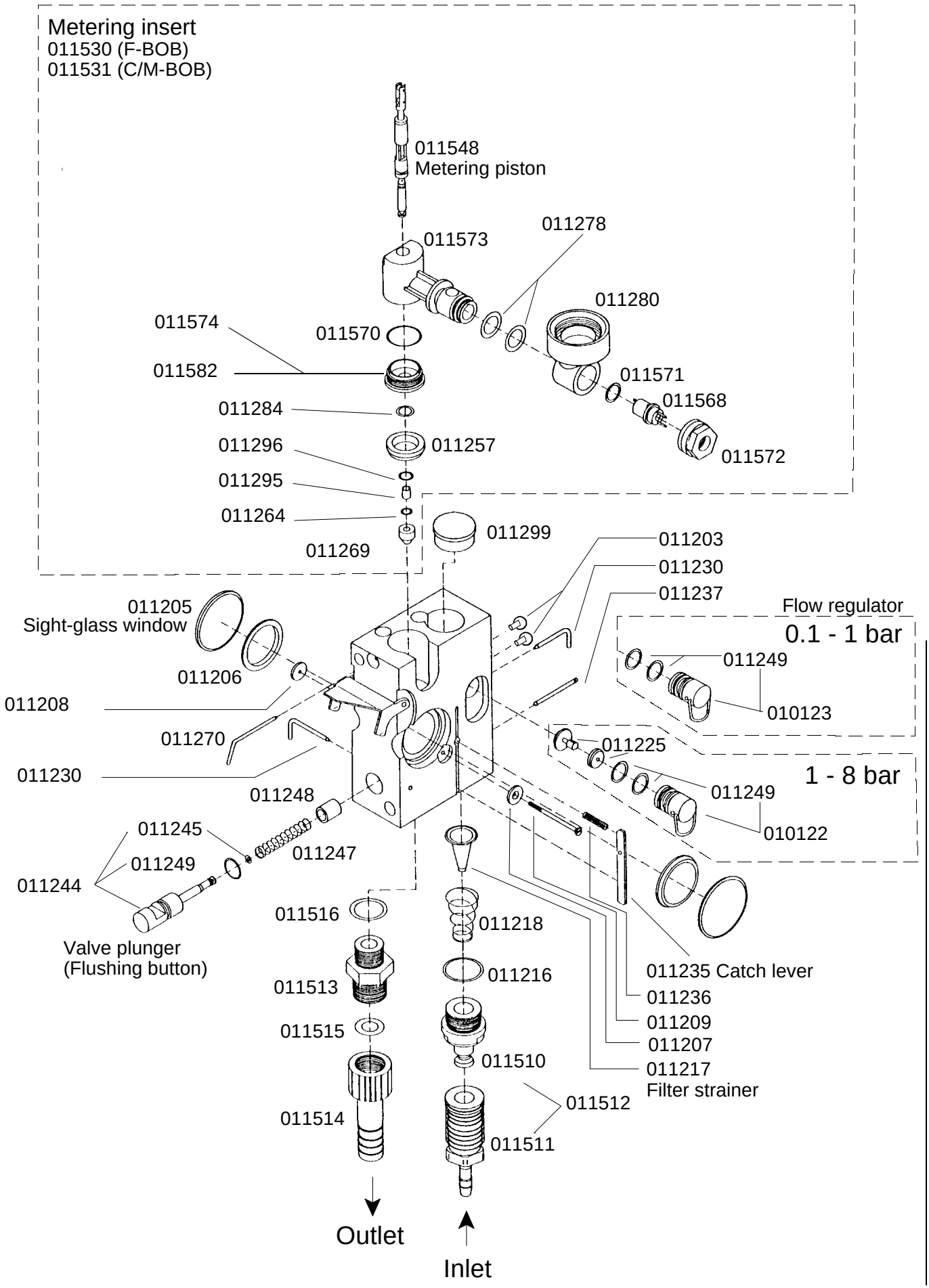
Item No.	Measuring chamber
010122	Regulator plug 1 - 8 bar
010123	Regulator plug 0.1 - 1 bar
011202	Measuring chamber housing with securing flap
011203	Plug 5.3 x 5
011205	Sight-glass window for chamber
011206	Sight-glass window seal 27 x 4
011207	Retaining disc 3.1/12d x 2
011208	Retaining disc M3/12d x 2
011209	Securing screw M3 x 42
011216	O-ring 22 x 2 for inlet screw connector
011217	Filter strainer for inlet
011218	Spring for inlet
011225	Flow regulator valve complete
011230	Retaining pin for regulator plug and valve plunger
011235	Catch lever
011236	Spring for catch lever
011237	Spindle for catch lever
011244	Valve spindle complete (flushing button)
011245	O-ring 1.78 x 1.78
011247	Pressure spring for valve plunger
011248	Splash guard
011249	O-ring 10.82 x 1.78
011270	Retaining pin for metering insert
011299	Sealing cap for measuring chamber
011510	Inlet screw connector
011511	Inlet quick-release coupling
011512	Inlet coupling with screw connector (compl.)
011513	Screwed nipple for outlet connector
011514	Screwed outlet connector complete
011515	Gasket for outlet connector
011516	O-ring for screwed nipple
	Metering insert
011257	Sealing ring with collar
011264	O-ring 4.5 x 1.5
011269	Sealing cone
011278	O-ring 12.37 x 2.62 for swivel ring
011280	Swivel holder for reagent bottle
011284	Square section ring 3.2/11.8d x 1.8
011295	Valve sleeve for metering piston
011296	O-ring 6 x 1.5
011548	Metering piston
011568	Electrode insert
011570	O-ring 20 x 1 for lower guide ring
011571	Gasket for electrode insert
011572	Locking nut
011573	Metering insert housing
011574	Lower guide ring for metering insert F-BOB
011582	Lower guide ring for metering insert C/M-BOB

Item No.	Measuring chamber and metering insert assemblies
011480	Gasket set for metering insert
011482	Gasket set for measuring chamber
011483	Gasket set for measuring chamber and metering insert
011530	Metering insert complete (F-BOB)
011531	Metering insert complete (C/M-BOB)
011535	Chamber complete for F-BOB (inc. 011530)
011536	Chamber complete for C/M-BOB (inc. 011531)
	Spares for unit
010843	Fuse M2A (E1, E2, E3, E4)
011500	Amplifier case complete (F-BOB)
011501	Amplifier case complete (C-BOB)
011502	Amplifier case complete (M-BOB)
011503	Bottom circuit board complete (C-BOB)
011504	Top circuit board (M-BOB)
011505	Top circuit board (F-BOB)
011506	Top circuit board (C-BOB)
011507	Bottom circuit board complete (F/M-BOB)
011508	Plug-in circuit board with lamp
011509	Mirror holder (F-BOB)
011519	Mirror holder (C/M-BOB)
011520	Mirror
011522	Lifting lever complete (upper / lower levers)
011523	Motor and gearbox complete
011524	Upper lever complete (in amplifier case)
011525	Tension spring (in amplifier case)
011528	Lower lever complete (outside amplifier case)
011550	Mains on/off switch
011551	Program start button (black) complete
011552	Reset button (red) complete
011555	Lamp assembly for unit cover complete
011560	Multi-pin plug and strap cable connector
011561	Cable loom complete
011575	Base plate complete
011585	Unit cover complete
011592	Cover for amplifier case
011602	Amplifier case pre-assembled
011607	Microswitch 1052 complete (motor control)
031585	Fuse T0.315A
031595	Fuse T0.1A
031596	Fuse T0.2A
031604	Fuse T0.5A
031607	Micro bulb for plug-in circuit board 011508

Replacement parts required for 2 - 3 years of operation

010843	Fuse M2A	4 x
011205	Sight-glass window	2 x
011295	Valve sleeve	3 x
011520	Mirror	1 x
011530	Metering insert complete (F-BOB) or	1 x
011531	Metering insert complete (C/M-BOB)	1 x
031607	Micro bulb for plug-in circuit board	1 x

EXPLODED VIEW OF MEASURING CHAMBER AND METERING INSERT



EC DECLARATION OF CONFORMITY

Herewith certified that the product named below

Testomat F/C/M-BOB

satisfies the essential protection requirements defined in the directive of the Council for Harmonisation of Statutory Provisions of Member States on electromagnetic compatibility (89/336/EEC) and electrical equipment for use within specified voltage limits (73/23/EEC).
This declaration applies to all examples manufactured in accordance with the attached engineering data that form part of this declaration.
To assess the product, the following standards were drawn on:

EN 50081-1 Electromagnetic Compatibility, Basic Specification for Emitted Interference
EN 50082-2 Electromagnetic Compatibility, Basic Specification for Immunity to Interference
EN 61010-1 Safety Requirements for Electrically Operated Measurement, Control, Closed-Loop Control and Laboratory Instruments

This declaration is made for and on behalf of the manufacturer

G E B R Ü D E R H E Y L
Analysentechnik GmbH & Co KG
Orleansstraße 75b
31135 Hildesheim

by

..... Hildesheim, 28.11.1996
Wolfgang Hamburger
General Manager

We reserve the right to make technical changes without notice in the interest of constantly improving our products !