ABB MEASUREMENT & ANALYTICS | DATA SHEET

Testomat AW101

Water hardness monitor

Measurement made easy

A unique water hardness monitoring system with superior performance

Automatic on-line monitoring of residual / total water hardness
- ideal for water softening and potable water plants

Menu-driven, programmable functions with clear LCD text display
- simple operation

Programmable hardness units
- °dH, °f, ppm $CaCO_3$ and mmol l^{-1}

Configurable initiation of analysis
- automatic intervals (programmable 0 to 99 minutes)
- from external flow signal (turbine meter)
- external stop/start

Remote diagnostic alarm
- dirty measuring chamber
- low reagent level

500 ml (1 pint) reagent storage bottle
- extended operation period

Analog output 0 to 20mA and 4 to 20mA
- enables the use of process recorders for data recording

Two fully adjustable limit contacts
- enables separate ranges of hardness levels to be monitored

General

The AW100 has been developed as a simple device to monitor the quality of water from softeners. Applications include laundries, utility boiler plants, soft drinks factories, brewing, food processing and potable water plants. It provides an alarm for high hardness that starts an automatic regeneration of the ion exchange beds used most commonly in these applications.

The AW100 uses one of four reagents that changes from green to red at a predetermined water hardness level. The reagent is added to a known volume of sample via a small pump until a color change takes place. The volume of reagent required to bring about this reaction (monitored photo-electrically) indicates the level of hardness of the water sample. The AW100 also provides an analog signal, the range of which is determined by the choice of one of the four reagents available.

The digital display on the front of the monitor and the analog output show the value of the last analysis cycle.

Three alarm outputs are provided – two concentration alarms for control purposes and one alarm to drive an audible signal device. There are also inputs for a flow device and suspension of the flow cycle.

Secure operation without supervision – low-level reagent alarm

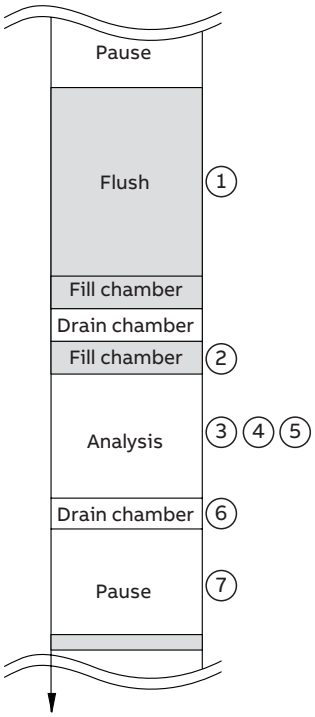
In certain steam boiler installations, the possibility of an unsupervised boiler operating with a depleted supply of reagent would have safety implications; allowing untested sample to flow through the boiler system. To overcome this problem, the AW101 employs a programmable low-level reagent alarm operation function. This monitors the reagent constantly and an alarm is triggered if the available reagent quantity falls below the quantity required for 72 hours usage.

Stop function

The active analysis cycle can be interrupted by pressing the STOP / Standby key on the display pad. The cycle can be interrupted remotely / automatically using the stop relay.

Mode of operation

Analysis cycle



(1) The flow cell is flushed thoroughly to ensure that an uncontaminated sample is analyzed. The flush time is programmable to suit the process sample and conditions.

(2) The measuring chamber is filled with a known sample volume.

(3) The sample is checked optically to ensure it is clean.

(4) A quantity of reagent is titrated and the end-point (color change) is reached.

(5) The result is evaluated and displayed. If the hardness value is outside the range determined by the reagent used, an alarm state is triggered. (3), (4) and (5) are known as the analysis period.

(6) The chamber is drained.

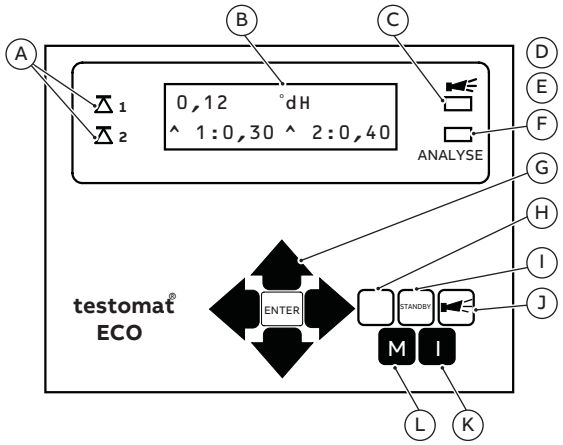
(7) There is a pause period (programmable) until the next analysis cycle is started.

Reagents available for AW101

	Units	Parameter / type of reagent			
		Water hardness AW101901	**Water hardness AW101902**	**Water hardness AW101903**	**Water hardness AW101904**
Range	°dH German (10 mg / CaO per 1000 ml water)	0.05 to 0.5 (0.1)	0.25 to 2.5 (0.05)	1.0 to 10.0 (0.2)	2.5 to 25.0 (0.2)
	°f French (10 mg / $CaCO_3$ per 1000 ml water)	0.09 to 0.89 (0.02)	0.45 to 4.48 (0.1)	1.79 to 17.9 (0.4)	4.48 to 44.8 (0.4)
	ppm $CaCO_3$ North America and UK (1 mg $CaCO_3$ per 1000 ml water)	0.89 to 8.93 (0.2)	4.47 to 44.7 (0.9)	17.9 to 179 (3.8)	44.7 to 447 (3.8)
	mmol/l Internationally recommended units (100 mg $CaCO_3$ per 1000 ml water)	0.01 to 0.09 (0.01)	0.04 to 0.45 (0.01)	0.18 to 1.79 (0.04)	0.45 1 4.48 (0.04)

Note. Figures in brackets show measurement resolution

Display



Ⓐ **Status of limit value displays**
Displays the status of the limit values LV1 and LV2.

Ⓑ **Text display**
Displays the current analysis, all important status results and programming data in a 2-line LCD.

Ⓒ **Alarm**
Displays a function fault.

Ⓓ **Power switch**
The on / off switch is located on the right-hand side panel.

Ⓔ **Unit fuse (inside the unit)**
Protects outputs against overload and short circuit.

Ⓕ **Analysis message**
Displays current analysis.

Ⓖ **Programming keys (cursorblock with ENTER)**
These keys are used to enter all values and programming data.

Function keys

Ⓗ ‘Manual’ – manual start of an analysis.

Ⓘ ‘STANDBY’ – manual analysis stop / standby.

Ⓙ ‘Alarm’ – cancels alarm message.

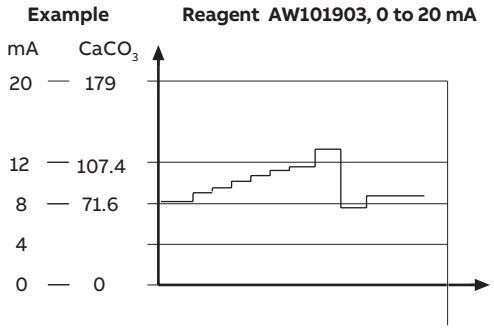
Ⓚ **I-Key**
Access all unit information.

Ⓛ **M-key**
Access the programming menu.

Analog output

Another possibility for monitoring the analysis is the connection to a process recorder or supervisory system. For this purpose the unit is equipped with a programmable current output.

Output values of 0 to 20mA and 4 to 20mA can be selected for retransmission of the measured value.



Typical recorder output

Specification

Display

Ranges

Determined by reagent (see table on page 5)

Alarms

- Three relay outputs – limit values (LV1, LV2) and one fault alarm
- Resistive load 4 A

Alarm displays

The following faults are shown on the display and also activate the alarm output:

- Low water pressure
- Function fault optics
- Measuring fault analysis
- Function fault dosing pump
- Function fault outlet to drain
- Reagent low level
- Measuring fault dirtiness
- Measuring fault turbine meter
- Measuring range exceeded

Front panel indicators

- Programme in operation
- Analysis stopped
- Lack of reagent
- Satisfactory result
- Unsatisfactory result
- Viewing window

Outputs

Current output

0 to 20 mA or 4 to 20 mA
Max. load 500 Ω

EMC

Conformity

EN50081-1, EN5008-2, EN61010-1

Power supply

Voltage

115, 230 or 24 V AC ±10 %, 50 / 60 Hz

Power consumption

30 VA

Unit protection

115 V, 230 V: T 0.1 A
24 V: T 1.0 A

Environmental data

Sample pressure

0.1 to 3 bar (1.5 to 45.5 psi)

Sample temperature

10 to 40 °C (41 to 104 °F) max.

Ambient temperature

10 to 45 °C (41 to 124 °F)

Mechanical data

Ingress protection

IP65

Dimensions

380 x 459 x 280 mm (15 x 18.8 x 11 in.)

Weight

9 kg (19.8 lbs.)

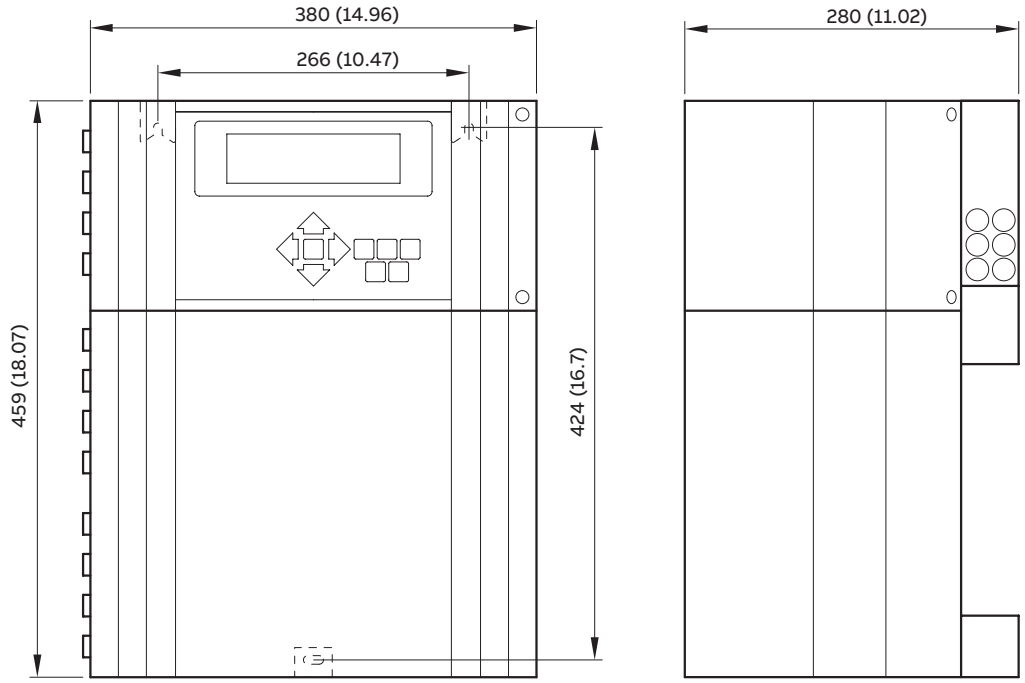
Consumables

Reagent consumption

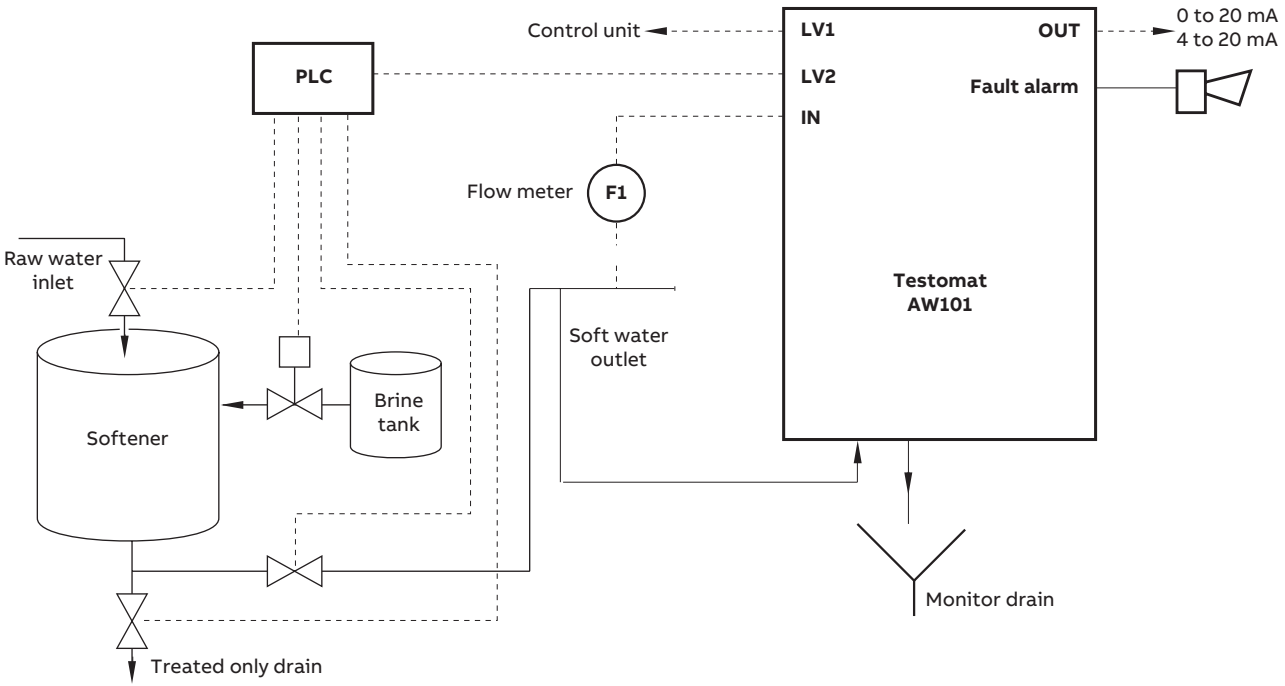
0.07 ml (0.000123 pint) per test

Overall dimensions

Dimensions in mm (in.)



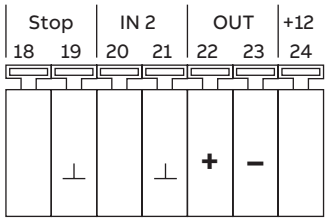
Typical installation diagram



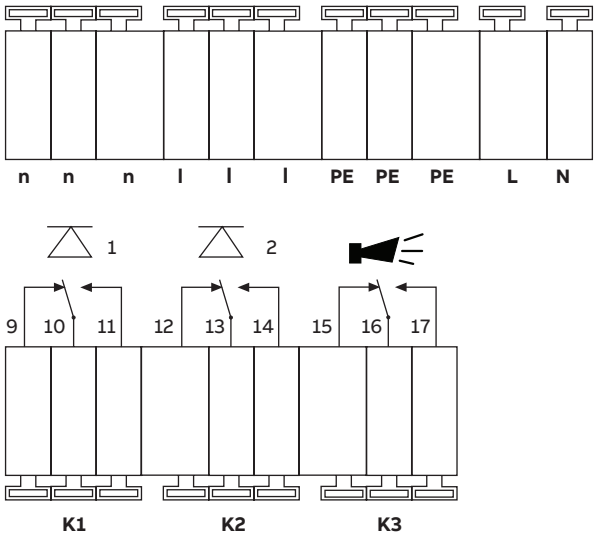
Terminal block identification

No.	Terminal	Type	Function	Note
–	PE	IN	Mains – protective earth (5x)	Earth / Ground
1 2	L N	IN	Mains, L = Live Mains, N = Neutral	Mains input 115 V, 230 V or 24 V AC
3 to 5 6 to 8	n l	OUT	Neutral, switched (8x) Live, switched (8x)	Mains voltage, max. 4 A
9 10 11	LV1	OUT	Limit value output 1 – normally closed Limit value output 1 – common Limit value output 1 – normally open	Volt-free relay output, max. load 240 V AC, 4 A
12 13 14	LV2	OUT	Limit value output 2 – normally closed Limit value output 2 – common Limit value output 2 – normally open	Volt-free relay output, max. load 240 V AC, 4 A
15 16 17	Alarm	OUT	Fault message – normally closed Fault message – common Fault message – normally open	Volt-free relay output, max. load 240 V AC, 4 A
18 19	Stop 2	IN	External analysis stop Common earth for inputs	Only for volt-free normally open/normally closed contact
20 21	IN 2	IN	Water meter input Common earth for inputs	Only for volt-free normally open/normally closed contact Note technical data of turbine
22 23	OUT + OUT –	OUT	0 or 4 to 20 mA	Current output 22 + (0 or 4 to 20 mA) 23 –
24	+	OUT	+12 V for hall-sensor (turbine)	Note technical data of turbine Max. power input of sensor must not exceed 20 mA

Terminal block for inputs
Stop, IN2 and output OUT



Terminal block for mains connection and relay outputs



Terminal block labels

Ordering information

Testomat water hardness monitor	AW101/	X	X	X
Version AW101				
Water hardness		1		
Mains supply				
115 V AC 50 / 60Hz			1	
230 V AC 50 / 60Hz			2	
24 V AC 50 / 60Hz			3	
Menu language				
English				1
German				2
French				3

Spares

Pressure regulator

AW101601	Regulator / filter housing
AW101602	Regulator plug T2000, kpl
AW101603	Flow regulator valve
AW101604	Retaining pin for regulator plug
AW101605	Inlet filter
AW101606	Spring for inlet filter
AW101607	Inlet connector
AW101608	Plug-in connector

Measuring chamber

AW101611	Sight-glass window 30 x 3 with seal
AW101612	Sight-glass window 30 x 3
AW101613	Sight-glass retaining disc
AW101614	Screw spindle M3 x 40
AW101615	Latch fastener TL 800-7-1
AW101616	Plastic plug
AW101617	Measuring chamber T2000

Holding block for measuring chamber

AW101622	Magnetic stirrer
AW101623	Plug-in connector – G⅜ in.
AW101624	Solenoid valve 2/2–way
AW101625	Rear guide bar for measuring chamber

Dosing Pump DOSIClip

AW101631	Jet pump complete
AW101632	Suction capillary
AW101633	Pressure capillary complete
AW101634	Base circuit board T1 complete
AW101635	Magnet (24 V DC)

Bottle connection / suction tube

AW101641	Screwed cap with bottle insert T2000
AW101642	Screwed cap GL32 only
AW101643	Bottle insert for screwed cap with push–fit suction

Electrical components

AW101651	Fuse M4A
AW101656	Cable sleeve 7 – 10
AW101657	Mains on / off switch
AW101658	Cover for mains on / off switch
AW101659	Multi-pin strap cable 10 pole with EMI filter clamp
AW101660	Multi-pin strap cable 26 pole with EMI filter clamp
AW101661	Cable loom 2 V complete (for valves)
AW101663	Cable loom for mains on / off switch complete
AW101664	Fuse T0.16A
AW101665	Fuse T1.0A

Spare parts for 2-3 years operation

AW101611	2 x sight-glass window 30 x 3 with seal
AW101605	1 x Inlet filter (optional)
AW101701	Gasket set T2000 Number required subject to maintenance regime (see manual)
AW101664	1 x fuse T0.16A
AW101665	1 x fuse T1.0A

Reagents

AW101901	TH2005 water hardness 0.89 to 8.93 ppm $CaCO_3$
AW101902	TH2025 water hardness 4.47 to 44.7 ppm $CaCO_3$
AW101903	TH2100 water hardness 17.9 to 179 ppm $CaCO_3$
AW101904	TH2250 water hardness 44.7 to 447 ppm $CaCO_3$

Service

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