Function

All boiler water contains some dissolved solids. These impurities are constantly concentrated due to the evaporation process, i. e. the total dissolved solids (TDS) level increases. If the TDS level were to exceed the permissible maximum stipulated by the boiler manufacturer, foaming and carry-over would take place, leading to contamination of the steam distribution system. As a result, the operational reliability of the plant will be impaired, and the boiler and steam system can be badly damaged.
Effective blowdown can be provided by use of blowdown controller in conjunction with conductivity electrode and continuous blowdown valve BAE 46-211/ball valve 510.

Deposits of fine suspended solids forming scale on the heating surfaces and settling at the bottom of the boiler are the result of residual hardness or an excessive phosphate content within the boiler water. These scale formations form a heat insulating layer, which means that the heat transfer surfaces are now subject to design pressure, but at elevated temperature, which in turn can cause deformation and even an explosion.
The answer to this problem is the use of continuous blowdown controller TA 5 / 6 / 7, solenoid valve 340 and intermittent blowdown valve MPA 46 / MPA 47 / MPA 110.

Application

Steam boilers	Boiler water, feedwater and condensate monitoring acc. to TRD
District-heating plants	Condensate monitoring
Paper industry	Condensate monitoring
Pulp industry	Condensate monitoring
Catering kitchens	Condensate monitoring
Water-treatment plants	Conductivity monitoring
Dyeworks	Dyebath monitoring
Filling/bottling plants	Detection of different products
Electric boilers	Maintaining defined conductivity
Cooling towers	Continuous blowdown control
Pickling baths	Quality monitoring

Principles of Measurement

Conductivity measurement, 2-electrode system
An alternating voltage is applied to two electrode tips (polarization). The current flow is directly proportional to the specific conductivity of the fluid.
Particularly suitable for pure fluids applications up to 500 µS/cm (e.g. steam regenerators, condensate/feedwater tanks, steam generating units > PN 40 etc.).

Conductivity measurement, 4-electrode system
The 4-electrode method is used in order to improve the quality of the measuring result and to avoid polarisation. This measuring method separates the current-carrying from the voltage-carrying measuring electrodes, which means that the measurement is performed without current and therefore free of polarisation and that dirt deposits can be compensated to a large extent.
Particularly well suited for boiler water with high conductivities (e.g. industrial steam boilers up to PN 40).

Temperature compensation (T° Comp)
In plants with temperatures above 25 °C the influence of temperatures on conductivity is an important factor to be considered. Due to electrolytic dissociation (desintegration of a compound in a solution) conductivity increases considerably:

Degree of dissociation $\alpha \approx 3 - 5\,\%/°C$.

Manual temperature compensation is suitable for plants with steady service temperatures. The actual conductivity is obtained by carrying out a comparison measurement (calibration) to offset thermal errors.

Automatic temperature compensation (ATC) is ideal for plants with varying service temperatures in order to make conductivity values independent of changes in ambient temperatures. The measured and the indicated values always refer to 25 °C and are constantly compensated for changes in pressure and temperature.

Technical Data of Conductivity Electrodes

Type	PN	Connection	Max. service pressure [bar]/ saturation temperature	Integrated temp. sensor	Max. admissible ambient temp. at terminal box	Lengths supplied [mm]	TÜV approval	EC
LRGT 16-1	40	1"	32 / 238 °C	●	70 °C	200 – 1000	●	●
LRGT 16-2	40	1"	32 / 238 °C	●	70 °C	180 – 1000	●	●
LRGT 17-1	63	1"	60 / 275 °C	●	70 °C	200 – 1000	●	●
LRG 16-40	40	1"	32 / 238 °C	●	70 °C	200 – 1000	●	●
LRG 16-41	40	1"	32 / 238 °C	●	70 °C	180 – 1000	●	●
LRG 17-40	63	1"	60 / 275 °C	●	70 °C	200 – 1000	●	●
LRG 16-4	40	$^3/_8$"	32 / 238 °C	–	70 °C	100 – 1200	–	–
LRG 12-1	10	1¼"	10 / 183 °C	●	60 °C	56	–	–
LRG 12-2	10	½"	10 / 183 °C	–	60 °C	24	–	–
LRG 17-1	63	DN 50	60 / 275 °C	–	70 °C	250	–	–
LRG 19-1	160	DN 50	60 / 275 °C	–	70 °C	250	–	–

Designs
a = Field case
b = Plug-in unit in plastic case
c = 19" slide-in unit
e = Case for panel mounting

Technical Data of Electronic Control Units

Type	Outputs		Main supply	Protection	Design				Measuring range (recommended)	TÜV approval	EC
	switchpoints	0/4 – 20 mA	Standard		a	b	c	e			
LRR 1-40 / LRG 16-40 / LRGT 17-40	3	●	230 V	IP 40	–	●	–	–	0.5 to 10000 µS/cm (0.5 to 500 µS/cm)	●	●
LRR 1-40 / LRG 16-41	3	●	230 V	IP 40	–	●	–	–	100 to 10000 µS/cm	●	●
LRS 1-5	1	–	230 V	IP 40	–	●	–		40 to 10000 µS/cm	–	–
LRS 1-6	1	–	230 V	IP 40	–	●	–	–	0.4 to 100 µS/cm	–	–
LRR 1-5	1	●	230 V	IP 40	–	●	–	–	40 to 10000 µS/cm	–	–
LRR 1-6	1	●	230 V	IP 40	–	●	–	–	0.4 to 100 µS/cm	–	–
LRT 1-5	–	●	230 V	IP 40	–	●	–	–	40 to 10000 µS/cm	–	–
LRT 1-6	–	●	230 V	IP 40	–	●	–	–	0.4 to 100 µS/cm	–	–
KS 90 / LRGT 16-1 / LRGT 17-1	2	●	230 V	IP 54 / IP 20	–	–	–	●	20.5 to 10000 µS/cm (0.5 to 500 µS/cm)	●	●
KS 90 / LRGT 16-2	2	●	230 V	IP 54 / IP 20	–	–	–	●	100 to 10000 µS/cm	●	●