

AUTOMATIC BLOWDOWN

Boiler Blowdown

Why is it necessary to blowdown in steam boilers?

Many industries use boilers to generate steam for their energy needs. The water used to feed the boilers contains varying levels of impurities:

- Dissolved solids - Scale forming substances
- Suspended solids - Sludge forming substances
- Dissolved gasses - Corrosive gasses such as oxygen and carbon dioxide.

Boiler feedwater could contain a high level of dissolved salts and minerals, even if there is a feedwater treatment. When steam evaporates, the concentration of the salt and minerals in the boiler water increases. This causes TDS increase in the boiler water and high TDS may cause;

- Carryover of the boiler water
- Formation of sludge
- Scaling of the boiler tubes

Carryover of the water in steam lines may cause water hammer, corrosion, and deposits. Deposits on the heat transfer surfaces decrease the efficiency and cause control valves and steam traps to malfunction.



Water Carryover

Suspended solids accumulate at the bottom of the boiler and if they are not removed those solids prevent heat transfer from the boiler fire tube which will overheat and may even fail. Sludge formation can lead to malfunction of level control devices.

Scaling on the heating surfaces in the boiler will increase fuel cost, reduce heat transfer, and efficiency. 1 mm calcium carbonate scale increases %3 or 1mm Silicate scale increases %8 in fuel cost.

Why Automatic Blowdown?

The blowdown rate can be controlled manually or automatically.

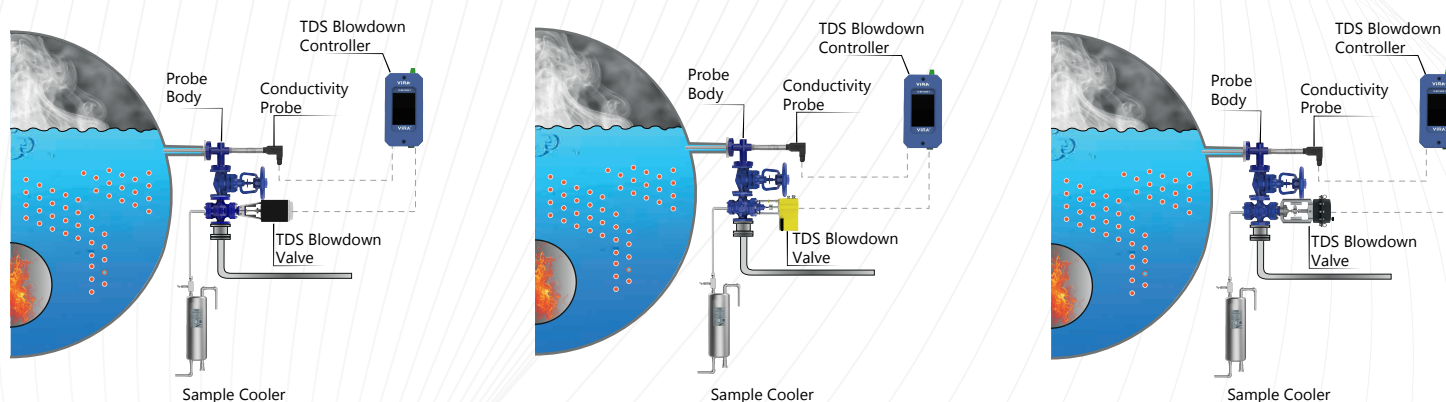
With manual blowdown control, if the level of TDS is higher than the allowed level, it may cause loss of water, heat and chemicals from the boiler. Boiler blowdown automation helps to reduce fuel, water, chemical and manpower costs.

Automatic blowdown system ensures a maximum of dissolved solids and suspended solids are removed with a minimal loss of water and heat from the boiler.

Automatic Surface Blowdown (TDS) Control

As water in the boiler drum turns into steam, the concentration of dissolved solids in the boiler water rises. These dissolved substances are carried into the system with the steam and water, causing malfunctions and leading to deposits on the heat transfer surfaces. Such deposits reduce efficiency by impairing heat transfer. Since blowdown alone cannot prevent scaling, dosing and degassing of boiler feedwater are also essential to maintain the boiler water at the desired TDS level.

The conductivity probe where located in the boiler shell continuously monitors the conductivity of the boiler water. The measured conductivity value is compared with the "Set Point" in the controller. If the water conductivity is higher than the set value the blowdown valve will be continuously working until the conductivity value drops below the set value by hysteresis value. If it is lower than the set point the blowdown valve will remain its closed position.



Vira offers two advanced surface blowdown solutions: the BS4 system and the BS4-T system. While both systems are designed for precise TDS (Total Dissolved Solids) control, the BS4-T provides an additional advantage with its integrated temperature compensation feature. This ensures reliable measurement accuracy even under fluctuating boiler conditions, whereas the standard BS4 system operates without this feature.

In steam boilers, an increase in water temperature leads to a corresponding rise in conductivity — approximately 2% for every 1 °C. If not compensated, this variation can result in inaccurate readings, improper blowdown cycles, and reduced boiler efficiency.

Building on this proven technology, Vira now introduces the new generation D-BS4 and D-BS4-T systems. These systems incorporate the latest D-Series controllers, offering enhanced user interfaces, improved diagnostics, and more compact designs.

D-BS4 system consists of 4 main components: the D-BK 5000-T Controller, BD 5400 Conductivity Probe, and BKV 5400 Continuous Blowdown Valve, and DG 5400 Probe Body.

D-BS4-T system consists of 4 main components: the D-BK 5000-T Controller, BD 5600-T Conductivity Probe (with integrated temperature compensation), BKV 5400 Continuous Blowdown Valve, and DG 5400 Probe Body.

With din rail and panel type application, touch screen, user friendly interface, and advanced monitoring functions, the new D-Series systems deliver higher reliability, reduced commissioning effort, and long-term operational savings.

Advantages of Automatic TDS Blowdown:

- Reduced maintenance and repair costs (minimized carryover and deposits)
- Cleaner and more efficient steam
- Energy saving
- Reduced operating cost (less feedwater consumption; chemical treatment and higher heating efficiency)
- Potential savings from a blowdown heat recovery system (where installed).
- The labor-saving advantages of automation.

D-BS2-T Automatic TDS Blowdown Control System for Coil Type Steam Generators



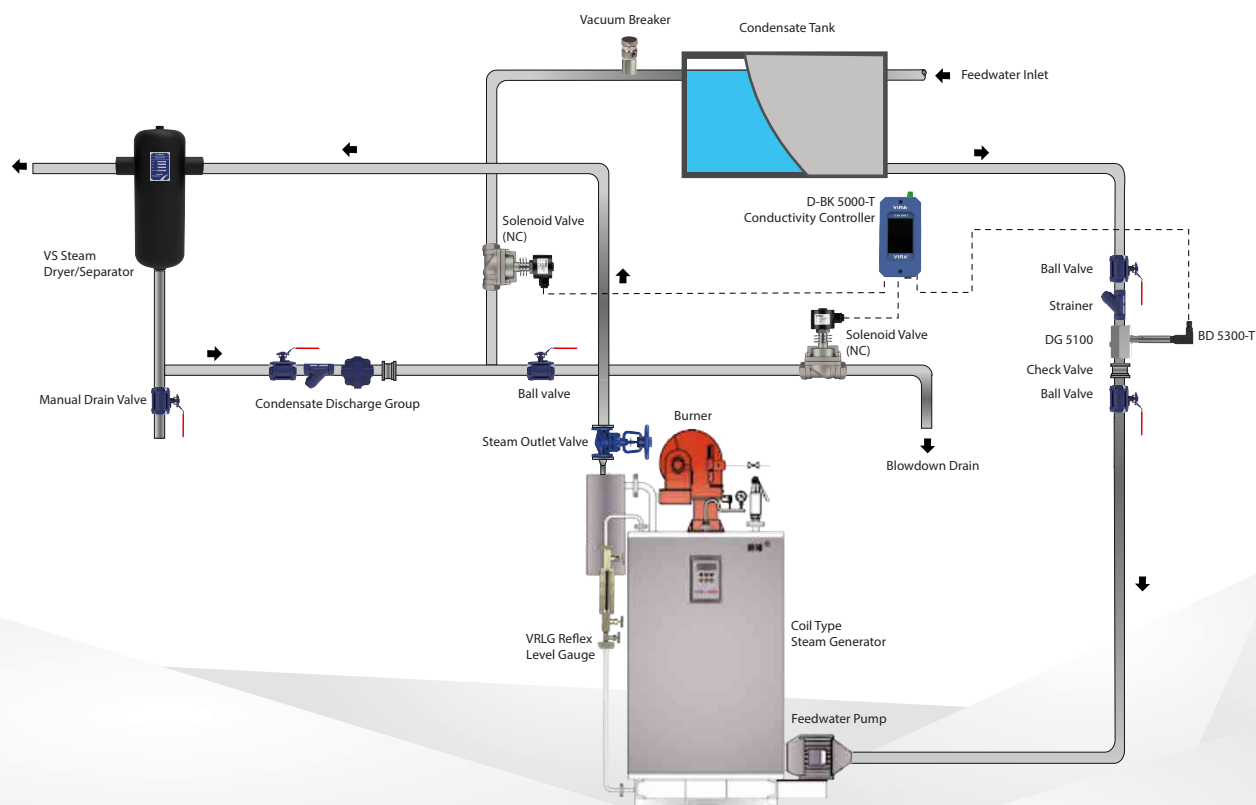
Temp. Comp. Type Conductivity Controller

Type	: D-BK 5000-T
Supply Voltage	: 24VDC
Enclosure	: Panel-mount and Din Rail Type
Functions	: Conductivity Measurement and Continuous Blowdown Control, Valve Control, High TDS Alarm, Adjustable Setpoints and Hysteresis, Touchscreen Display, Multi-Language User Interface, Alarm Reset
Outputs	: 1 Valve Control Relay, 1 High TDS Alarm Relay, 4–20 mA Analog Conductivity Output, RS485 Modbus Communication
Features	: Conductivity and Alarm Set Values, Valve & Alarm Relay Test Functions, Touchscreen Display, User-Friendly Parameter Setting, Temperature Compensation, Multi-Language Support
Compliance	: CE (EMC 2014/30/EU, LVD 2014/35/EU), Type Approval (Module B + D), EN 12952 & EN 12953

Temp. Compensation Type Conductivity Probe

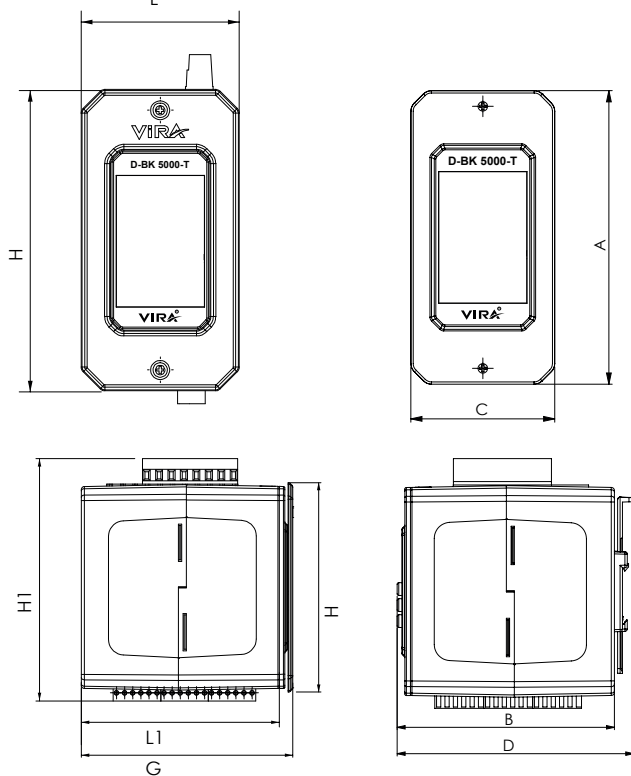
Type	: BD 5300-T
Nominal Pressure	: PN 40
Max. Operat. Temp.	: 239 °C
Max. Operat. Press.	: 32 Bar g
Connection	: 1/2" BSPT (Optional NPT)
Max. Ambient Temp.	: 75 °C
Compliance	: CE (PED 2014/68/EU), Type Approval (Module B + D), EN 12952 & EN 12953

D-BS2-T Typical Installation



TECHNICAL SPECIFICATION

D-BK 5000-T Conductivity Controller



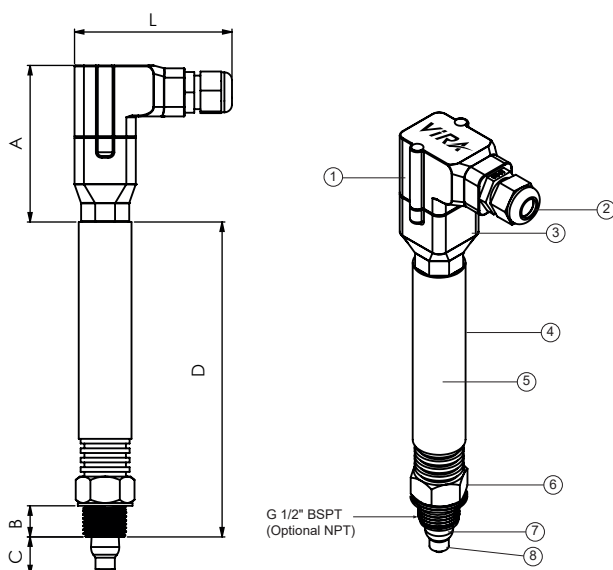
Technical Data

Controller	D-BK 5000-T
Supply Voltage	24VDC
Functions	Conductivity Measurement and Continuous Blowdown Valve Control, High TDS Alarm, Adjustable Setpoints and Hysteresis, Touchscreen Display, Multi-Language User Interface, Alarm Reset
Inputs	1 Conductivity Input (via Probe), 1 Temperature Sensor Input (Pt100 via Probe), Ground Connection
Outputs	1 Valve Control Relay, 1 High TDS Alarm Relay, 4-20 mA Analog Conductivity Output, RS485 Modbus Communication
Range	0-10.000 μ S/cm (default)
Display & Control	Touch Screen
Label	Silicone Rubber
Max. Ambient Temp.	55°C
Enclosure	PC (Polycarbonate)
Type	Panel-mount and Din Rail
Protection Class	IP 40

Dimensions

H (mm)	H1 (mm)	L (mm)	L1 (mm)	C (mm)	D (mm)	B (mm)	G (mm)	A (mm)
134,6	156	72	130	64	148	136	136	130

BD 5300-T Conductivity Probe



No	Part	Material
1	Upper Connector Housing	GF-PP (Glass Fiber Reinforced Polypropylene)
2	Cable Gland	PA6 (Polyamide)
3	Lower Connector Housing	GF-PP (Glass Fiber Reinforced Polypropylene)
4	Label	Laser Marking
5	Cover Tube	Austenitic Stainless Steel 304
6	Probe Body	Austenitic Stainless Steel 316L
7	Probe Tip Sleeve	Politetrafluoroetilen (PTFE)
8	Probe Tip	Austenitic Stainless Steel 316L

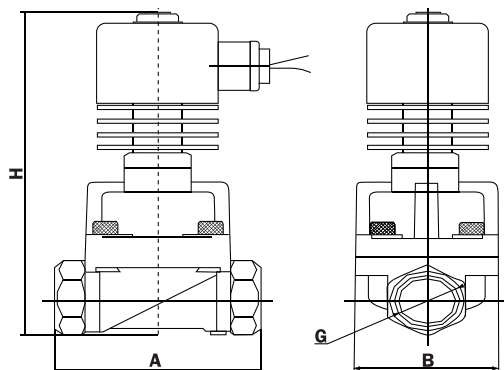
Dimensions

L (mm)	A (mm)	B (mm)	C (mm)	D (mm)
83,5	83	16,5	20	167



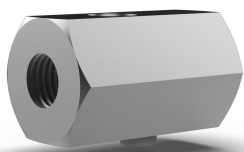
Solenoid Valve (NC)

Type	: BKV 5100
Nominal Pressure	: PN 40
Max. Operat. Temp.	: 225 °C
Max. Operat. Press.	: 25 Bar g
Size	: 3/4" - 1/2"
Body	: Stainless Steel



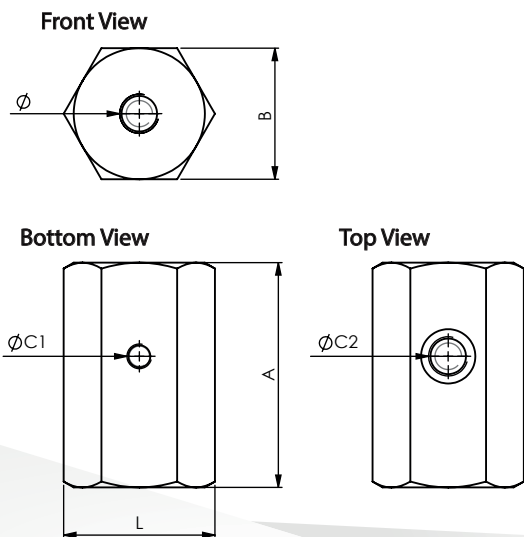
Dimensions

Type	Connection Thread	Orifice (mm)	CV factor	Operating Pressure differential kgf/cm			Max. Temperature °C	External Dimensions	Weight Kg
				Min Pressure	Max Pressure			Length A x Width B x Height H	
					Heat-conducting oil	Steam			
BKV 5120	3/4"	20	8.0	0.5	25	25	225	85x60x171	1.66
BKV 5115	1/2"	15	4.5	0.5	25	25	225	75x52x159	1.36



Conductivity Probe Body

Type	: DG 5100
Nominal Pressure	: PN 40
Size	: 1/2", 3/4"
Max. Operat. Press.	: 32 Bar g
Max. Operat. Temp.	: 239 °C
Body	: Carbon Steel



Technical Data

Type	DG 5100
Body	Carbon Steel
Pressure Class	PN 40
Process Connection	Threaded
Probe Connection	Threaded

Dimensions

Type	Size (φ)	L (mm)	A (mm)	B (mm)	φ C2	φ C1
DG 5115	1/2"	81	120	70	1/2"	1/4"
DG 5120	3/4"	81	120	70	1/2"	1/4"