BCR3150
Blowdown Controller
Installation and Maintenance Instructions

1. Safety information

The equipment may only be installed, electrically connected and commissioned by suitable persons with the relevant instruction/training.

Maintenance and modification may only be performed by authorised staff who have undergone specific instruction/training.

Danger

The terminal strips of the equipment are live during operation! There is a risk of serious injury due to electric shock!
Always cut off the power supply to the equipment before installing, removing or connecting terminal strips!

Important

The name plate specifies the features of the equipment. Do not commission or operate any item of equipment that does not have its own specific name plate.

Directives and standards

VdTÜV Bulletin "Wasserüberwachung 100" (Water Monitoring 100)

The blowdown controller BCR3150 in combination with the conductivity probes CP10, CP30/CP40 and CP32/CP42 is type approved according to VdTÜV Bulletin "Wasserüberwachung (Water Monitoring) 100".

The VdTÜV Bulletin "Water Monitoring 100" states the requirements made on water monitoring equipment.
Type approval no. TÜV · WR · XX-XXX (see name plate).

LV (Low Voltage Directive) and EMC (Electromagnetic Compatibility)

The equipment conforms to the requirements of the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU.

ATEX (Atmosphère Explosible)

The equipment must not be used in potentially explosive atmospheres, in accordance with European Directive 2014/34/EU.

Note

The conductivity probes CP10, CP30/CP40 and CP32/CP42 are simple items of electrical equipment as specified in EN 60079-11 section 5.7.
According to the European Directive 2014/34/EU the equipment must be equipped with approved Zener barriers if used in potentially explosive areas. Applicable in Ex zones 1, 2 (1999/92/EC). The equipment does not bear an Ex marking.

2. General product information

2.1 Intended use

The BCR3150 blowdown controller in conjuction with conductivity probes CP10, CP30/CP40 and CP32/CP42 is used as blowdown controller and limit switch, for instance in steam boilers, (pressurised) hotwater installations as well as condensate and feedwater tanks.

A Pt100 temperature sensor may be connected to the controller to provide temperature compensation. This is recommended if the boiler is working at varying pressures, or for other applications such as condensate monitoring or coil boilers, where the temperature may vary.

The blowdown controller indicates when the preset MAX TDS/Conductivity is reached and opens or closes a blowdown valve. The controller can provide a MAX alarm.

2.2 Function

- TDS/Conductivity control and limit switch using conductivity probes CP10 or CP30/CP40, with or without a separate temperature sensor Pt 100 (TP20) to provide temperature compensation (0 - 250 °C)
- TDS/Conductivity control and limit switch using conductivity probe CP32/CP42, with an integrated temperature sensor (temperature compensation), scale management and optional alarm
- Manual electronic probe cleaning, to remove scale from probe tip
- ON/OFF control of blowdown valve, optional with purge time for probe in pipeline installations
- An optional filter to increase damping effects, to avoid overfrequent valve operation
- Conductivity to TDS conversion (unit in µS/cm or ppm)
- Standby/burner input (24 Vdc), to reduce boiler water loss, if the boiler is on standby or low demand
- Actual value output 4-20 mA
- Password protection

Fig. 1

2.3 Typical applications - Boiler control systems (BCS)

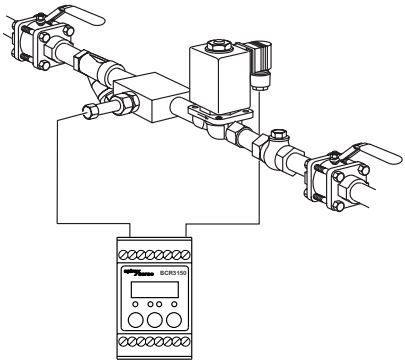


Fig. 2 BCS1 System

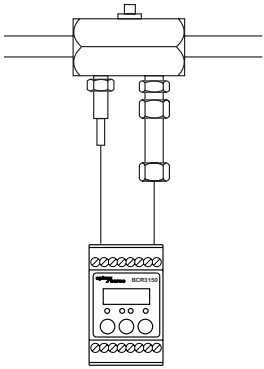


Fig. 3 BCS2 System

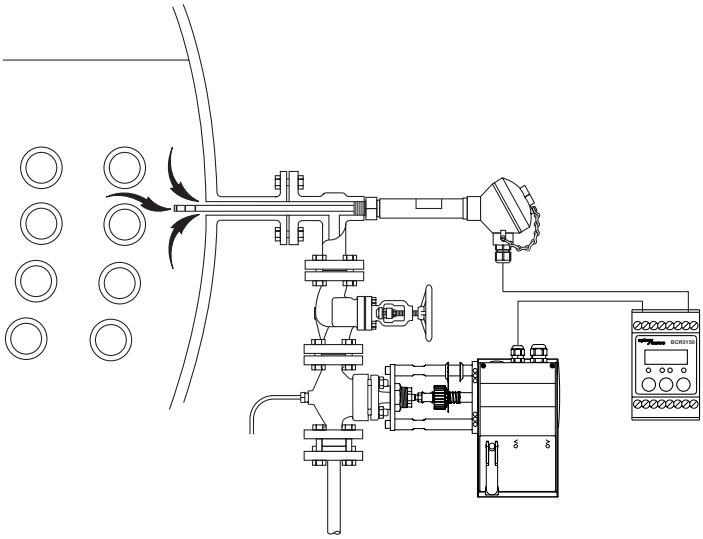


Fig. 4 BCS3 System

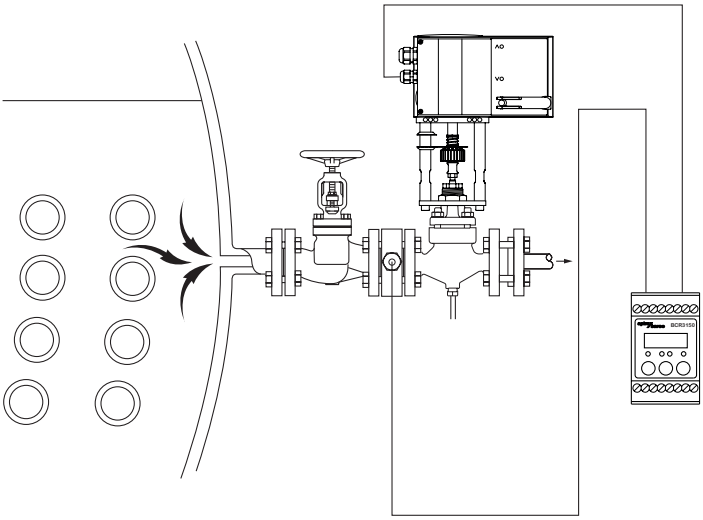


Fig. 5 BCS4 System

2.4 Typical applications - condensate contamination detection system (CCD)

System description

Note: Most countries have regulations that limit temperature and contamination levels for fluids being dumped to drain. It is also essential to follow guidelines issued by bodies such as the UK Health and Safety Executive.

The Spirax Sarco CCD system monitors and displays the conductivity of condensate return, and will redirect the flow to drain if the conductivity increases above a pre-set level to avoid contaminated water being returned to the boiler feedtank. It will not detect contaminants that do not change the conductivity, such as oils, fats, or sugars.

A conductivity sensor and a temperature sensor are mounted in a bypass line as shown in Figure 6.
A check valve in the main line ensures a flow past the sensor under low flow conditions. The 500 mm head prevents flash steam flow in the bypass line. We recommend a 3-port diverter valve such as the Spirax Sarco QL. A spring retract pneumatic actuator is normally fitted to cause the valve to divert on failure of the air supply. Alternatively, two 2-port valves (M20, for example) may be used as shown in Figure 7, one as a spring-to-close isolating valve in the condensate return line, and one as a spring-to-open dump valve, in the drain line. On detection of high conductivity, the isolating valve closes and the dump valve opens, both under spring pressure.

Suitable 3-port solenoid valves may be selected from the Spirax Sarco range, and are described in separate literature.

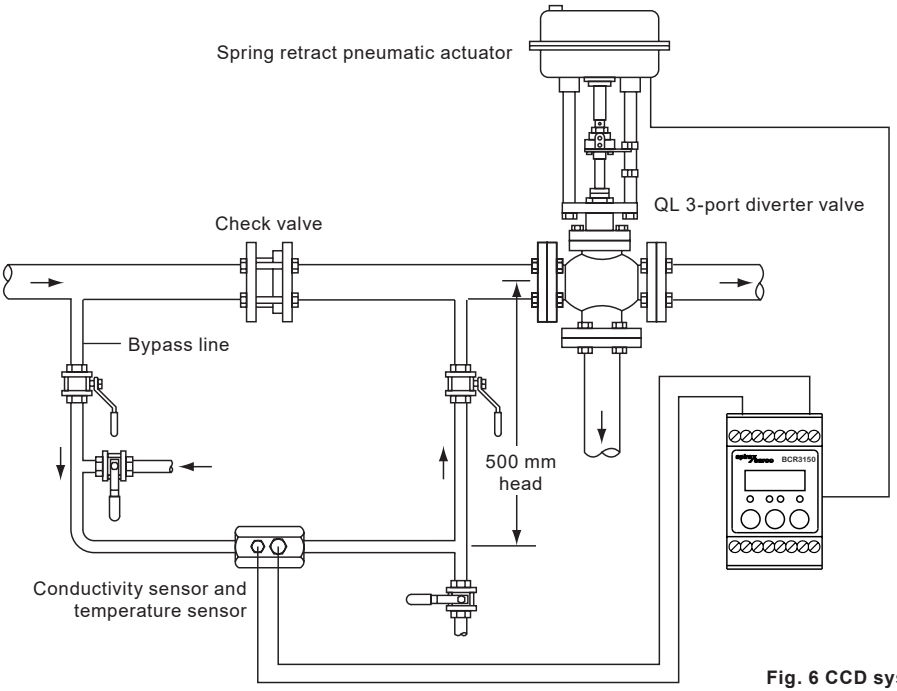


Fig. 6 CCD system

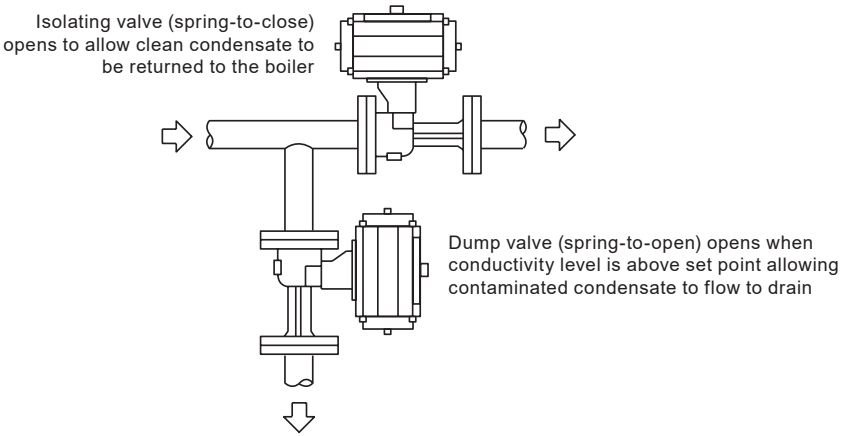
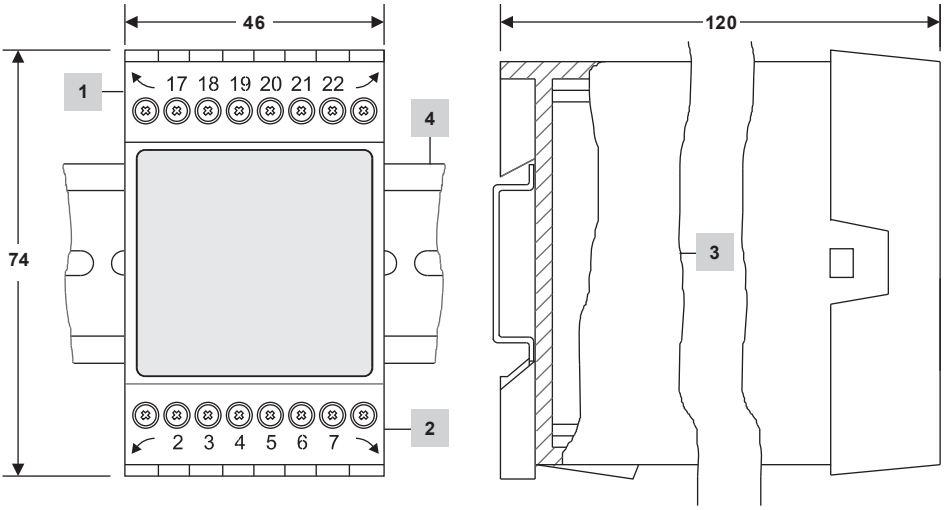


Fig. 7 CCD system showing alternative arrangement of seperate valves

3. Mechanical installation

3.1 Dimensions (approximate) in mm



Item	
1	Upper terminal strip
2	Lower terminal strip
3	Housing
4	Support rail TH 35, EN 60715

Fig. 8

3.2 Installation inside a control cabinet

The BCR3150 Blowdown Controller is clipped onto a type TH 35, EN 60715 support rail in the control cabinet Fig. 8, Item 4.

3.3 Installation in a control cabinet door

The BHC Panel Adaptor Small is available which enables the controller to be installed in a control cabinet door.

Fig. 9

3.4 Name plates

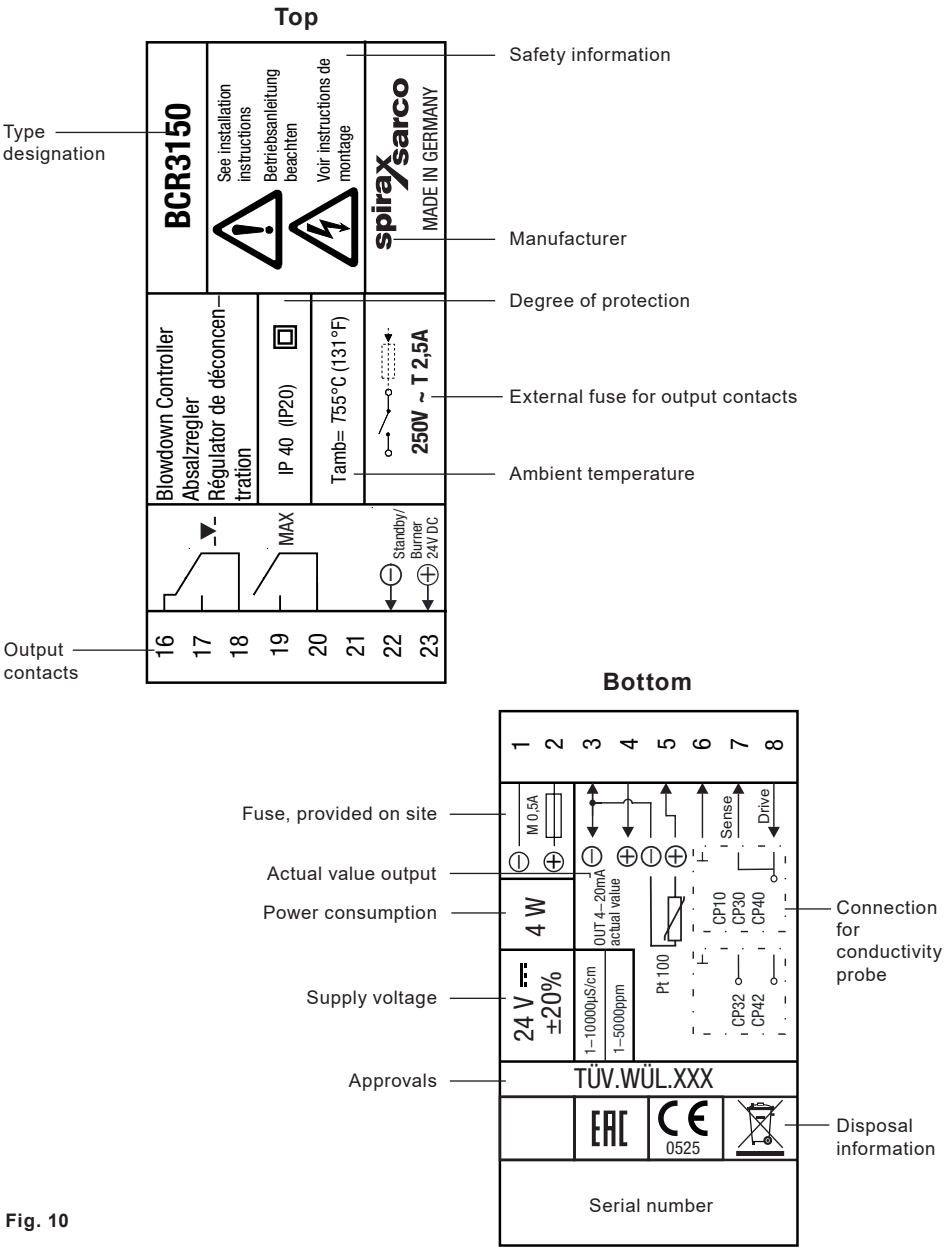


Fig. 10

4. Electrical installation

4.1 Wiring diagrams

4.1.1 Controller

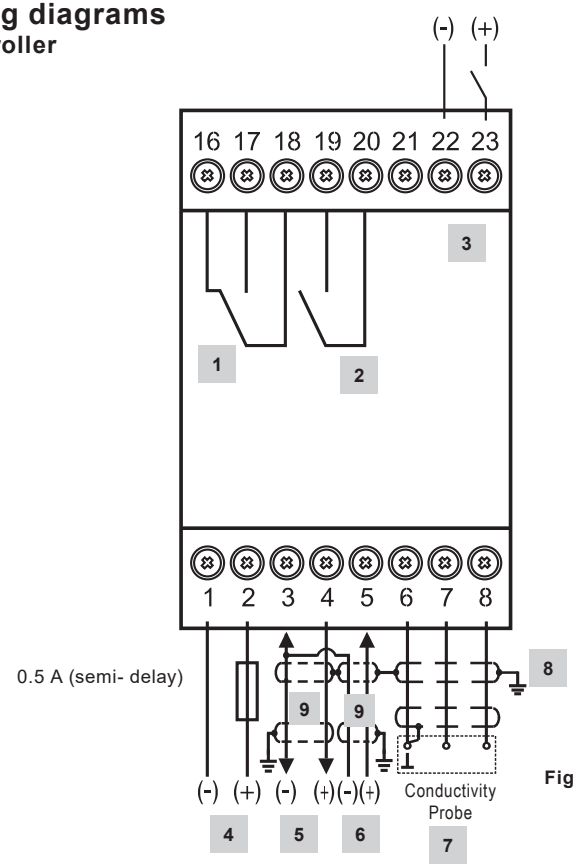


Fig. 11 Wiring Diagram

Item	
1	Output contacts for activating the control valve
2	MAX alarm output contact
3	Standby/burner input (24 Vdc), ON = standby/burner on, OFF = normal running/burner off
4	Connection of supply voltage 24 Vdc with fuse 0.5 A (semi-delay) provided on site
5	Actual value output 4-20 mA
6	2 wire Pt 100 temperature sensor input
7	Conductivity probe input
8	Central earthing point (CEP) in control cabinet
9	Earthing point at the auxiliary equipment (e.g. CP30/CP40)
10	Internal links in conductivity probe

4.1.2 Probes

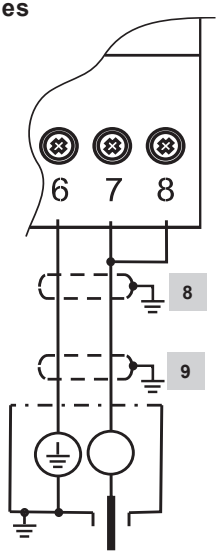


Fig. 12(a) CP10 Connection

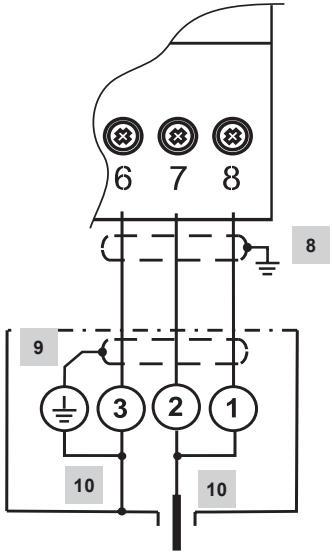


Fig. 12(b) CP30/CP40 Connection

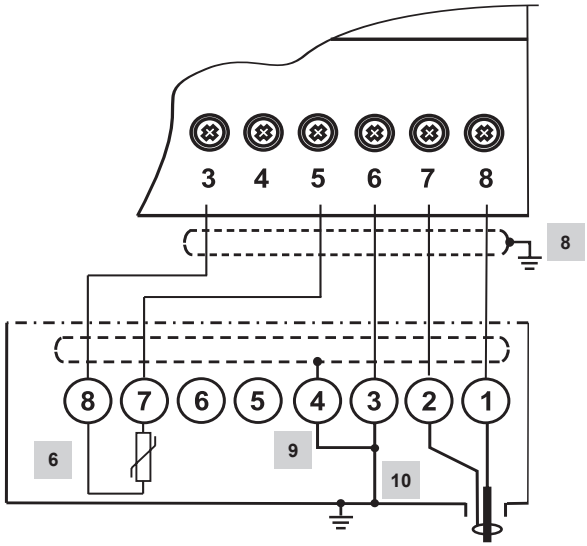


Fig. 12(c) CP32/CP42 Connection

4.1.3 Blowdown valve wiring notes

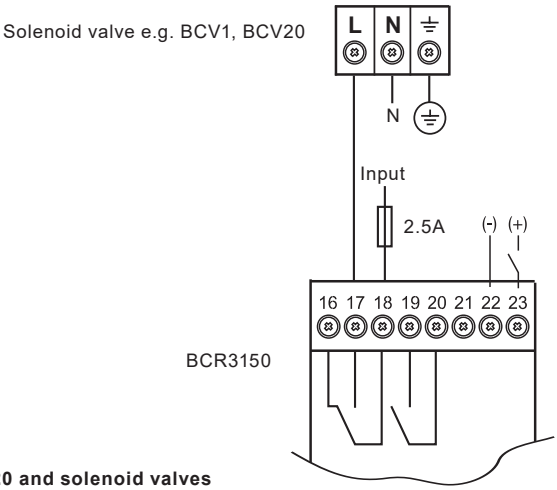


Fig. 13(a) BCV1, BCV20 and solenoid valves

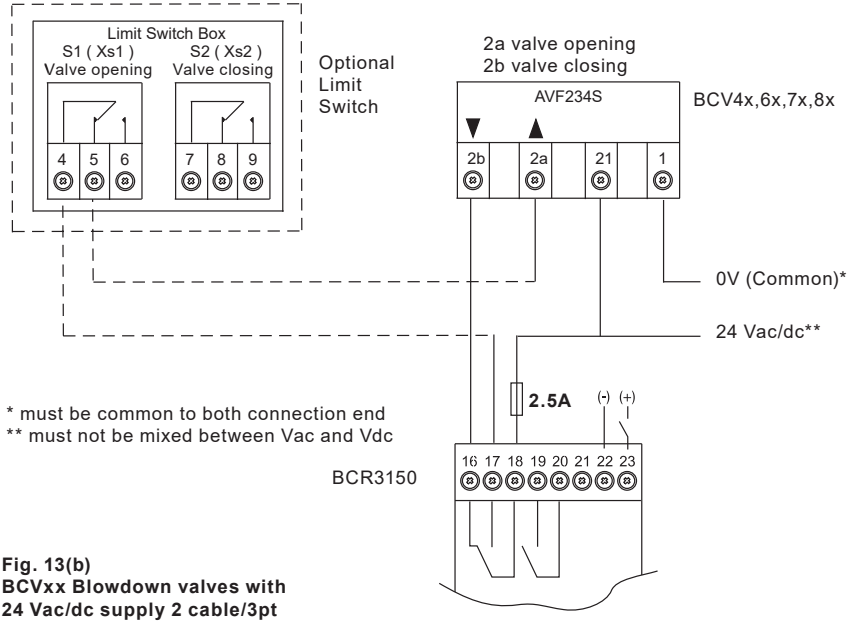


Fig. 13(b)
BCVxx Blowdown valves with
24 Vac/dc supply 2 cable/3pt

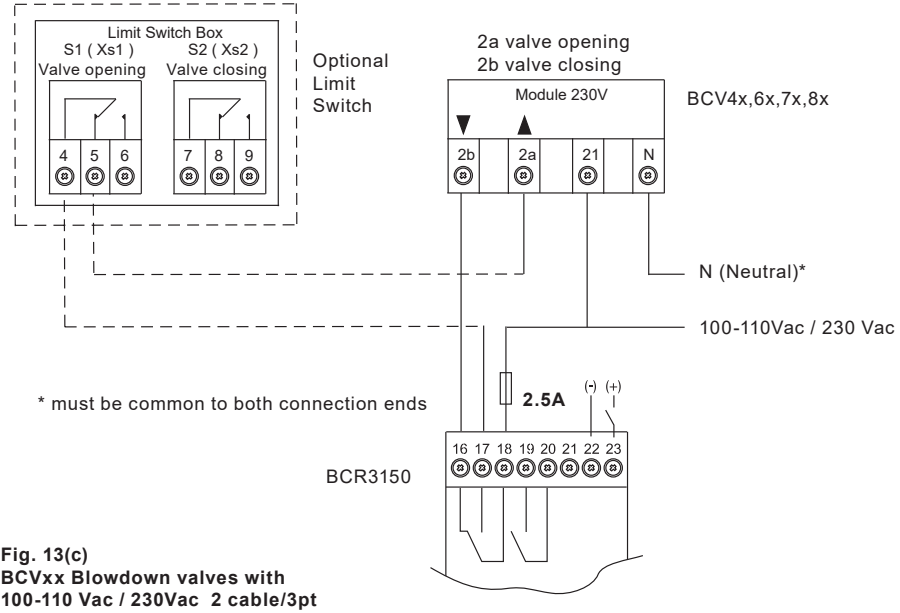


Fig. 13(c)
BCVxx Blowdown valves with
100-110 Vac / 230Vac 2 cable/3pt

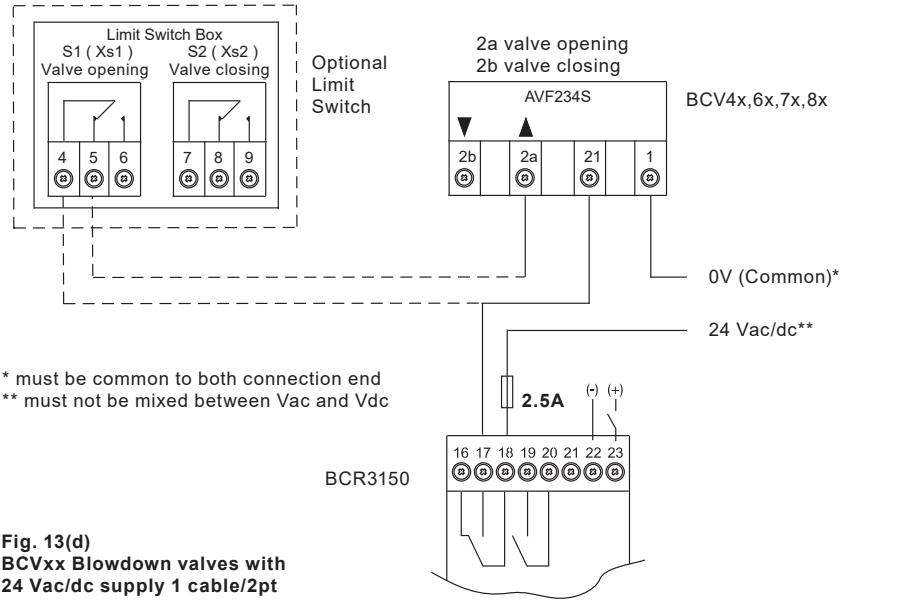


Fig. 13(d)
BCVxx Blowdown valves with
24 Vac/dc supply 1 cable/2pt

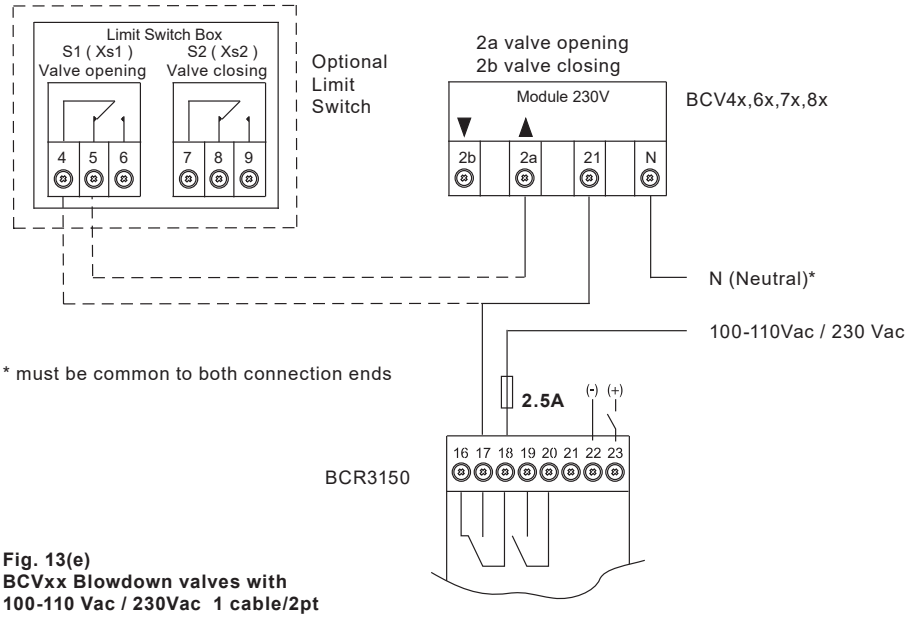


Fig. 13(e)
BCVxx Blowdown valves with
100-110 Vac / 230Vac 1 cable/2pt

4.2 Supply voltage connection

The equipment must be supplied with 24 Vdc from a SELV (Safety Extra Low Voltage) power supply.
An external 0.5A semi-delay fuse must also be fitted.
This power supply unit must be electrically isolated from dangerous live voltages and meet the requirements for double or reinforced insulation in accordance with one of the following standards:
EN 50178, EN 61010-1, EN 60730-1, EN 60950-1 or EN 62368-1.

4.3 Connection of output contacts

Wire the upper terminal strip 1 (terminals 16-20), shown in Figure 11, according to the desired switching functions. Provide an external slow-blow 2.5 A fuse for the output contacts.
When inductive loads are switched off, voltage spikes are produced that may have a major adverse effect on the operation of control and measuring systems. Connected inductive loads must therefore have interference suppression (RC combination) as per the manufacturer's specifications.

When used as TDS/Conductivity limit switch the blowdown controller BCR3150 does not interlock automatically when the readings exceed the MAX limit.

If an interlock function is required for the installation it must be provided in the follow-up circuitry (safety circuit). The circuitry must meet the requirements of the EN 50156.

4.4 Connecting the TDS/Conductivity probes and Pt 100 temperature sensor

To connect the equipment use screened multi-core control cable with a min. conductor size 0.5 mm², e.g. LiYCY 2 x 0.5 mm² (for CP10 and TP20), LiYCY 3 x 0.5 mm² (for CP30/CP40) or LiYCY 5 x 0.5 mm² (for CP32/CP42).

Maximum cable length for conductivity probe:	10m	1 - 10 µS/cm
	30m	10 - 10000 µS/cm
Maximum cable length for temperature sensor:	30m	

Wire terminal strip in accordance with the wiring diagram Figure 4. Connect the screen to the central earthing point (CEP) in the control cabinet and the auxiliary equipment (e.g. CP30/CP40).
Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.
Due to the 2 wire connection of the temperature sensor the temperature reading is not very accurate. This does not effect the functionality because the temperature is used for compensation purpose only.

4.5 Connecting the 4-20 mA output

To connect the equipment use screened multi-core control cable with a min. conductor size of 0.5 mm², e.g. LiYCY 2 x 0.5 mm², max. length: 100 m.
Please observe the max. load of 500 ohm for the 4-20 mA output.
Wire terminal strip in accordance with the wiring diagram. Figure 11 and 12.
Connect the screen to the central earthing point (CEP) in the control cabinet.
Make sure that connecting cables are segregated and run separately from power cables.

4.6 Connection of input for standby/burner (24 Vdc)

To connect the equipment use multi-core control cable with a min. conductor size of 0.5 mm², e.g. LiYY 2 x 0.5 mm², max. length: 100 m.
Wire terminal strip in accordance with the wiring diagram. Figure 11.
Make sure that connecting cables are segregated and run separately from power cables.

4.7 Tools

Screwdriver size 3.5 x 100 mm, fully insulated to VDE 0680-1.

Important

- **To put the equipment into operation follow the instructions given in the installation and operating manuals for CP10, CP30/CP40, CP32/CP42 and TP20.**
- **Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.**
- **Do not use unused terminals as support point terminals.**

Danger

The 24V power supply, probes, temperature sensor, 4-20mA output, and standby/ burner circuits must be electrically isolated from dangerous voltages and must meet at least the requirements on double or reinforced isolation according to one of the following standards: DIN EN 50178, DIN EN 61010-1, DIN EN 60730-1 or DIN EN 60950.

5. Commissioning

5.1 Factory settings

- Probe selection = CP40
- Probe filter = OFF
- Units = µS/cm
- Measuring range = 1 to 6000 µS/cm
- MAX switchpoint = 6000 µS/cm
- Reset hysteresis: MAX limit – 3 % (fixed)
- Setpoint SP = 3000 µS/cm
- Setpoint SP hysteresis = 150 µS/cm
- Probe factor PF = 1/cm
- Temperature compensation = deactivated
- Temperature coefficient = 2.1 %/°C (fixed)
- Purging duration = 0 seconds
- Standby/burner input function = standby

Code switch **C**: S1 = OFF, S2 = OFF, S3 = ON, S4 = OFF	See Figure 14

5.2 Changing factory settings

Danger

The upper terminal strip of the equipment is live during operation.

There is a risk of serious injury due to electric shock!

Always cut off the power supply to the equipment before installing, removing or connecting the terminal strip!

5.3 Changing the function and input of the blowdown controller

The input and function are determined by the setting of code switch C. To make changes, you can access the code switch as follows:

- Switch off the supply voltage
- Remove the lower terminal strip (Fig. 15)
- Insert a screwdriver between the terminal strip and the front frame, to the right and left of the arrow markings
- Release the terminal strip on the right and left sides, by turning the screwdriver in the direction of the arrow
- Remove the terminal strip

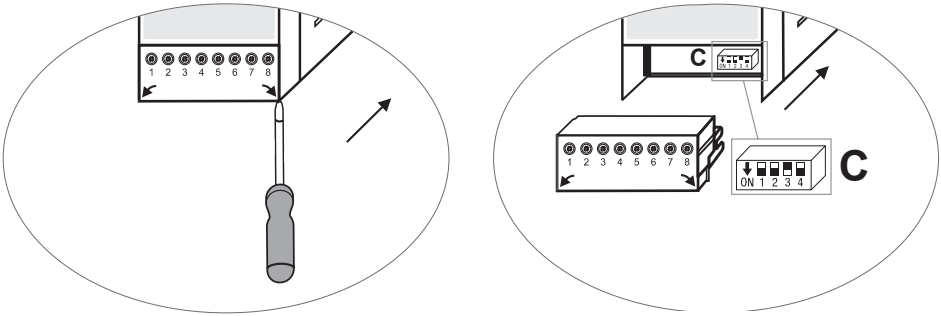


Fig. 14

When your changes are complete:

- Refit the lower terminal strip
- Switch the supply voltage back on, the equipment restarts

If you wish to change the input or the function, set code switch **C** S1 to S4 in accordance with Table 1 below.

Table 1

Code switch C	ON 1 2 3 4 Toggle switch, white			
Blowdown controller BCR3150	**S 1**	**S 2***	**S 3**	**S 4**
Not used	OFF			
Not used	ON			
Input terminals 22, 23 = Standby function		OFF		
Input terminals 22, 23 = Burner function		ON		
Not used			OFF	
On/Off control mode			ON	
Electrical conductivity measured in µS/cm				OFF
Electrical conductivity measured in ppm				ON

grey = factory setting

*Purge interval dependent on cumulative boiler firing time is automatically activated when S2 is switched on.

Important

It is important that you follow the instructions given in the installation and operating manual for the probe used in your system i.e. CP10, CP30/CP40, CP32/CP42 and TP20.

5.4 Meaning of codes on the 7-segment display

Fig. 15

Code	Meaning	
Indicated when up and down buttons are pressed:		
SP	Setpoint	Adjustable between 1 and 9999 µS/cm (1-5000ppm).
HYSt	Hysteresis	Adjustable between 0 and 3000 µS/cm (0-1500ppm).
AL	Max alarm	Adjustable between 1 and 9999 µS/cm (1-5000ppm).
CAL	Calibrate probe	Probe calibration. Shows last measured value.
PF	Probe factor	Calculated probe factor. Range 0.005 to 5.
Pur	Purge duration → mode	Adjustable between 0 and 180s. 0 = purge mode off.
PuL	Pulsed mode	Turn pulsed output mode on / off.
Prob	Probe	Probe selection: CP10, CP30, CP32, CP40, CP42.
FiLt	Filter	Turn filter on / off.
tC	Temperature compensation	Turn temperature compensation on / off.
tEMP	Actual temperature	Measured temperature (approximate).*
CLn	Manual cleaning	Start manual probe cleaning.
rEt	Actual value output ranging	Adjustable between 1 and 9999 µS/cm (1-5000ppm).
tSt.o	Test valve output	Test of valve output relay.
tSt.A	Test alarm output	Test of alarm relay.
*The temperature in the "tEMP" menu item is only displayed if the tC is switched on. If tC = oFF, only "----" is displayed under tEMP.		

Indicated if malfunctions occur.		
E.001	Error	Temperature sensor defective (value too low).
E.002	Error	Temperature sensor defective (value too high).
E.005	Error	TDS/Conductivity probe defective (open circuit).
E.006	Error	TDS/Conductivity probe defective (short circuit).
E.097	Error	Walkthrough test error.
E.098	Error	Walkthrough application error.
E.099	Error	Internal test error.

5.5 Password entry

Fig. 16

Start
The ability to change parameters of the controller is password protected from software version S-18 onwards. The default password is 7452

Password Entry		
Action	**Display**	**Function**
Press the up or down button until desired parameter is shown.	Display toggles between parameter and saved value.	Selecting the parameter.
Press and hold the ok button.	**P A S S** is displayed.	Password protection is active.
Press and hold the ok button.	First digit (000**0**) flashes.	Password entry mode active. You can change the first digit.
Press the up or down button.	A new value is displayed.	Pressing the up button increases the value, pressing the down button reduces the value.
Briefly press ok button.	2nd, 3rd or 4th digit flashes (from right to left).	2nd, 3rd or 4th digits can now be changed using the up and down buttons. Pressing the up button increases the value, pressing the down button reduces the value.
When your entries are complete: Press and hold the ok button for 3 sec.	**d o n E** is briefly displayed. Next, the display toggles between the parameter and value.	Correct password entered. System switches back to the parameter. Now all paramaters can be changed.
	F A i L is briefly displayed After this, the display toggles between the parameter and value.	Wrong password entered. System switches back to the parameter.
If you do not make any further entries for 10 sec.	**q u i t** is briefly displayed After this, the display toggles between the parameter and value.	Password entry has timed out. System switches back to the parameter.
After 30 minutes of inactivity (no button pressed) the password has to be entered again. After power cycling the device always starts password protected.		

5.6 Setting parameters

Fig. 17

Start		
Action	**Display**	**Function**
Switch on supply voltage. TDS/conductivity value between 0 and MAX.	7-segment display shows software and type of equimpent.	System test, takes approx. 3 sec.
	7-segment display shows actual value.	System switches to operating mode.

Setting parameters		
Action	**Display**	**Function**
Press the up or down button until desired parameter is shown.	Display toggles between parameter and saved value.	Selecting the parameter.
Press and hold the ok button.	**P A S S** is displayed.	Password Entry, follow section 5.5.
Press and hold the ok button.	First digit (000**0**) flashes.	Parameterization mode active. You can change the first digit.
Press the up or down button.	A new value is displayed.	Pressing the up button increases the value, pressing the down button reduces the value.
Briefly press ok button.	2nd, 3rd or 4th digit flashes (from right to left).	2nd, 3rd or 4th digit can now be changed using the up and down buttons. Pressing the up button increases the value, pressing the down button reduces the value.
When your entries are complete: press and hold the ok button within 3 sec.	**donE** is displayed. Next, the display toggles between the parameter and the new saved value.	Input is confirmed. System switches back to the parameter.
If you do not confirm your entry within 3 sec. or you do not make any further entries:	**quit** is briefly displayed. After this, the display toggles between the parameter and the old value.	If you do not confirm, your entries will not be applied. Please repeat the procedure. If you do not confirm, the system switches back to the parameter.
Press the up or down button until the next parameter is shown. Or press the up or down button until the actual value is displayed. Or after 30s, the actual value is displayed automatically.		

5.7 Setting switchpoints and control parameters

Fig. 18

Setting the setpoint	
Select parameter **SP**, enter and save the desired value.	Setpoint setting between 1-9999µS/cm (1-5000ppm).
	Please take the settings for MAX switchpoint into consideration.
Setting the hysteresis	
Select parameter **HYSt**, enter and save the desired value.	Hysteresis setting between 0-3000µs/cm (0-1500ppm) (150µS/cm = 5% of SP).
Setting the Max alarm	
Select parameter **AL**, enter and save the desired value.	Max alarm switchpoint setting between 1-9999µS/cm (1-5000ppm).
Setting the probe calibration	
Select parameter **CAL**, enter and save the desired value.	Calibration setting between 1-9999µS/cm (1-5000ppm).
Setting the probe factor	
Select parameter **PF**, enter and save the desired value.	Probe factor setting between 0.005 and 5.
Setting the purge duration	
Select parameter **Pur**, enter and save the desired time.	Duration time between 0 and 180s, 0 = purge mode off.
Setting pulsed mode	
Select parameter **PuL**, enter and save the desired option.	Mode options on or off. Pulsed valve drive mode is useful for small boilers.

Setting the probe type	
Select parameter **Prob**, enter and save the desired type.	Probe options CP10, CP30, CP32, CP40 or CP42.
Setting the filter	
Select parameter **FiLt**, enter and save the desired option.	Select either on (64s) or off (8s). The 8 second filter includes a jump out function for quick response to rapid TDS/conductivity changes which is useful in CCD systems. The 64 second filter can be activated to dampen the effects of turbulent TDS/Conductivity value. This feature has to be set to "off" when purge duration is greater than zero seconds (probe installed in pipeline).
Setting the temperature compensation	
Select parameter **tC**, enter and save the desired option.	Select either on or off.
Setting manual cleaning	
Select parameter **CLn**, press and hold the OK button.	Display will flash "**CLn**", probe clean commence Cleaning cycle starts for 40s overall. Cleaning for 20s and afterwards measurement is interrupted for 20s (bubbles may dissolve) Return back to "**CLn**" menu item. A short press of the OK button aborts the cleaning procedure.
Setting the actual value output	
Select parameter **rEt**, enter and save the desired value.	Set actual TDS/conductivity value retransmit current output range between 1-9999µS/cm (1-5000ppm). 0 µS/cm (ppm) = 4 mA (fixed) Selected value = 20 mA

5.8 Purge setup

Select a Purge Duration, if the probe is installed in the pipeline and enter a suitable purge time (> 0 seconds). This time should be sufficient to ensure the probe measures a representative sample of water at boiler operating temperature.

The purge duration should be set to zero if the probe is installed in boiler or for a CCD system. On BCS1 and BCS4 systems a duration of 30 seconds is normally sufficient to ensure the sensor reaches boiler temperature. Where a slow-opening valve is used or where there is a long or large bore pipework between the boiler and the sensor, a longer purge time will be required. The time can be entered from 0 (default) to 180 seconds in 1-second steps.

To manually find the best purge time:

- Allow the blowdown pipework to cool for 15 minutes
- Set the purge time to maximum
- Start the calibration procedure and note the purge time needed for the measured value to stabilise
- Set this time as the purge duration

The purge interval can be either independent of burner firing (normal) or dependant on cumulative burner firing time (cumulative). The cumulative function is set by selecting the burner input using the code switches.

The purge Interval is fixed to 30 minutes between blowdowns. A purge cycle is started immediately after power-up.

5.9 Displays

Operation		
Action	**Display**	**Function**
Value below setpoint		
Actual value < setpoint.	Valve and MAX LEDs do not light up.	Valve output contact 17/18 open. MAX output contacts 19/20 closed.
Value above setpoint		
Actual value > setpoint < Max.	Valve LED lights up.	Valve output contact 17/18 closed. MAX output contacts 19/20 closed.
MAX alarm		
Actual value > Max.	Valve and Max LEDs lights up.	Valve output contact 17/18 closed. MAX output contacts 19/20 open.
Standby/Burner Input		
S/B input not active.	S/B LED does not light.	Valve output operates / purge interval countdown paused.
S/B input active.	S/B LED lights up.	Valve output does not operate / purge interval countdown running.

5.10 Check function of relay output contacts

Test of Valve and Alarm Relay outputs		
Action	**Display**	**Function**
In operating mode: Select parameter **tSt.o**. Press and hold the ok button until test starts.	Valve LED lights up, display toggles between "**tSt.o**" and valve open time countdown.	Valve Relay energised for 60s. Short press of OK button aborts the test.
In operating mode: Select parameter **tSt.A**. Press and hold the ok button.	MAX LED lights up for 6s.	Output Relay de-energised for 6s.
	MAX LED is off for 3s. Display blinks **tSt.A**.	Output Relay energised for 3s.
Note: If you continue holding the test button (OK), the test sequence will start again. You can interrupt the test sequence at any time by releasing the test button (OK). Alarm relay can only be tested in normal operation and not during alarm state.		
	display briefly shows **donE**.	Test complete.
Press the up or down button until the actual value is displayed. Or after 30 s, the actual value is displayed automatically.		

Note

The test festure is protected by the requirement for PASSWORD entry see section 5.5

5.11 Modes of Operation

5.11.1 ON/OFF control without purge

Used when the probe is mounted in the boiler. The probe is able to constantly monitor the conductivity from the probe tip to the boiler shell. When the TDS/conductivity value exceeds the set-point (SP) the valve will open and will remain open until the TDS/conductivity value drops below the hysteresis. See Figure 19.

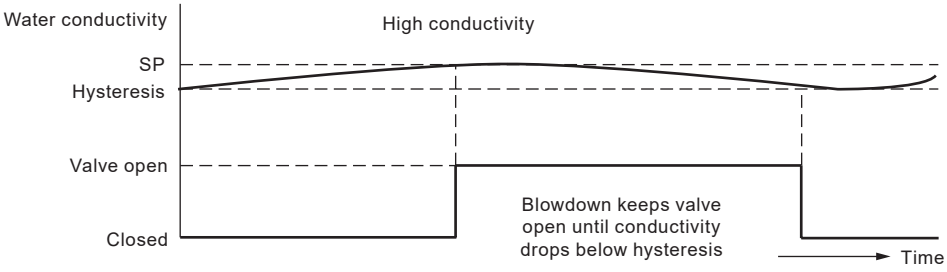


Fig. 19 ON/OFF control without purge

5.11.2 ON/OFF control with purge

Used only when the probe is mounted in the blowdown line. Purge ensures the sensor measures the conductivity at boiler temperature. The purge duration is the time the valve is open to enable a representative boiler sample to reach the probe. A purge occurs every 30 minutes either independent of burner firing, or dependent on cumulative boiler firing time.

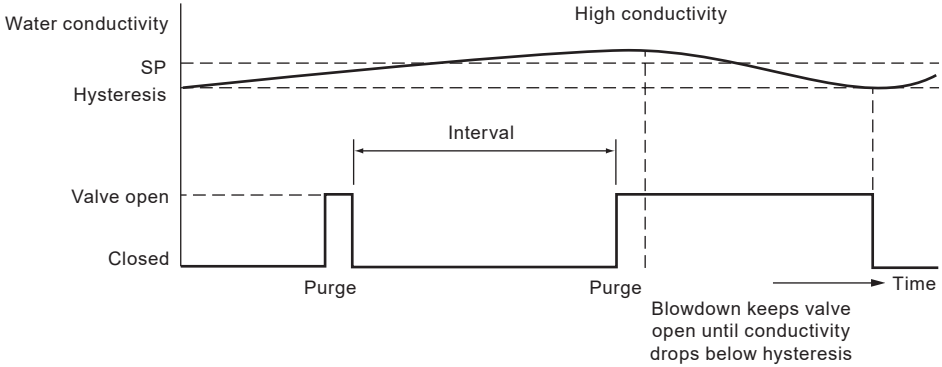


Fig. 20 ON/OFF control with purge

5.11.3 ON/OFF control with purge and pulsed output

For smaller boilers where the capacity of the blowdown valve is relatively high compared to the boiler size, the blowdown may be set to pulsed, rather than continuous output, opening for 10 seconds, and closing for 20 seconds. This slows the rate at which the boiler water is removed so that the level is not unduly affected, avoiding the risk of triggering a low water alarm.

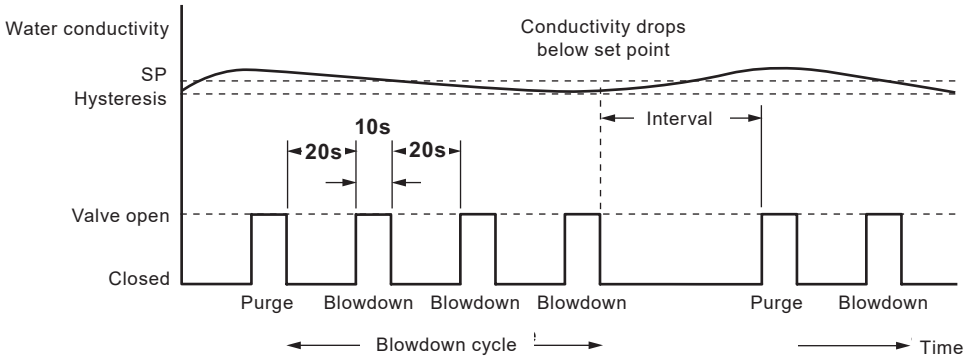


Fig. 21 ON/OFF control with purge and pulsed output

5.12 Calibration

5.12.1 Calibration - general

The boiler must be at working temperature when calibrating a system. This is particularly important if a temperature sensor is not fitted.
For best accuracy calibrate the controller with the TDS/Conductivity as close as possible to the Set Point. In some cases the boiler may need to be run for a period of time to allow the TDS to build up before calibration. Recalibrate the TDS/Conductivity at Set Point once the boiler has settled down (after a few days in most cases).
Check the calibration (as close to the Set Point as practical) weekly to ensure optimum performance.
Take a sample of the boiler water and measure its conductivity (in µS/cm) using a meter such as the Spirax Sarco MS1. If the controller is required to be calibrated as neutralised conductivity or TDS, neutralise the sample and measure again using the meter.

5.12.2 Probe calibration

Continuous mode (Purge time = 0)		
Action	**Display**	**Function**
Press the up or down button until CAL is displayed.	Display toggles between parameter and saved value.	Selecting Calibration.
Press and hold the ok button.	**P A S S** is displayed.	Password Entry, follow section 5.5.
	The last measured value is displayed for change.	
Press and hold the ok button.	First digit (000**0**) flashes.	Entry mode active, follow section 5.6 to enter desired value.
Press and hold the ok button.	**d o n E** is briefly displayed. Next, the display toggles between **CAL** and desired value.	New calibration value succesfully entered and is in valid range.
	PF.Er is briefly displayed. After this, the display toggles **CAL** and previous value.	Probe factor is outside of the valid range. Previous calibration value has been kept.

Purge mode (Purge time > 0)		
Press the up or down button until CAL is displayed.	Display toggles between parameter and saved value.	Selecting Calibration.
Press and hold the ok button.	**P A S S** is displayed.	Password Entry, follow section 5.5.
	Display toggles between **Pur**, purge time countdown and measured TDS/conductivity value.	Purge time countdown starts.
	The last measured value is displayed for change.	The measured value is shown at the end of the cycle and displayed for change.
Press and hold the ok button.	First digit (000**0**) flashes.	Entry mode active, follow section 5.6 to enter desired value.
Press and hold the ok button.	**d o n E** is briefly displayed. Next, the display toggles between **CAL** and desired value.	New calibration value succesfully entered and is in valid range.
	PF.Er is briefly displayed After this, the display toggles **CAL** and previous value.	Probe factor is outside of the valid range Previous calibration value has been kept.

Note

The calibration entry is protected by the requirement for PASSWORD entry see section 5.5
Parameter entry is described in section 5.6

5.12.2 Calibration procedure for probe in a CCD system:

We recommend that a competent water treatment company be consulted to establish the most suitable conductivity level for individual plant. Conditions vary widely, as do the chemical properties and conductivity of contaminants.

In many cases, the normal measured value of 'clean' condensate will be very low, perhaps only 1 or 2 µS/cm in some cases, whereas the set point may be much higher perhaps 30 or 40 µS/cm.

To calibrate a CCD system, a liquid at approximately the maximum allowable conductivity is introduced into the system. Use a mixture of tap water and condensate, to simulate condensate at approximately the maximum allowable conductivity level (the set point). 5 litres (1.3 US gallons) will be plenty for most systems. Use the Spirax Sarco MS1 conductivity meter to check the conductivity. Close both stop valves and open the drain valve and 'water for flushing and calibration' valve. Pour in the prepared water, and let it run through the system until bubble free. Close the drain valve. Allow the display to settle for two minutes.

Calibrate the controller as described in the main text. It is advisable to check calibration after the system has been running for a few days, then periodically depending on the individual plant conditions. Consult your water treatment specialist if in any doubt.

Note: Ensure purge time is set to zero and a temperature sensor is installed.

6. Fault finding

6.1 Display, diagnosis and troubleshooting

Important

Please check the following before fault diagnosis:

Supply voltage:
Is the equipment supplied with the voltage specified on the name plate?

Wiring:
Is the wiring in accordance with the wiring diagram?

Faults indicated by the Display		
Fault code	**Fault**	**Remedy**
E.001	Temperature sensor defective (value too low).	Check temperature sensor for correct readings and, if necessary replace it. Check sensor wiring (open/short circuit).
E.002	Temperature sensor defective (value too high).	
E.005	TDS/Conductivity probe defective (open circuit).	Check conductivity probe and, if necessary, replace it. Check electrical connection.
E.006	TDS/Conductivity probe defective (short circuit).	
E.097	Walkthrough test.	Error.
E.098	Walkthrough application.	Error.
E.099	Internal test.	Error.
In the event of a malfunction, the MAX alarm is triggered.		

Important

Please follow the instructions given in the installation and operating manual for the CP10, CP30/CP40, CP32/CP42 and TP20 for further fault finding and troubleshooting.

Note

If a malfunction occurs in the blowdown controller, the MAX alarm will be triggered.

In the case of some internal errors (E.097) and when the cyclic self-test reports OK again, the device restarts.

Should this happen over and over again, replace the equipment with a new one.

6.2 Determining the probe condition

The probe condition can be checked without removing it from the boiler.
From the probe parameter page, compare the displayed probe factor with the following table:

Probe factors	Typical
BCS1, BCS2 and BCS4	0.2 - 0.6
BCS3	0.3 - 0.7

A low probe factor indicates that the probe is able to conduct well, whereas a high probe factor indicates that the probe tip has become less conductive, perhaps due to a build-up of scale.

A very low probe factor, however, could indicate an internal short circuit. The further the probe tips from any part of the boiler, the higher the probe factor.

Note: If the system is operated without temperature compensation, the probe factor will not be calculated correctly.

6.3 Action against high-frequency interference

High frequency interference can occur for example as a result of out-of-phase switching operations. Should such interference occur and lead to sporadic failures, we recommend the following actions in order to suppress any interference.

- Provide inductive loads with RC combinations according to manufacturer's specification to ensure interference suppression
- Make sure that all connecting cables leading to the sensors are segregated and run separately from power cables
- Increase the distance from sources of interference
- Check the connection of the screen to the central earthing point (CEP) in the control cabinet and auxilliary equipment
- Suppress HF interference using hinged-shell ferrite rings
- Use a separate power supply for the controller

6.4 Decommissioning/replacing the blowdown controller BCR3150

- Switch off the power supply and cut off power to the equipment
- Remove the upper and lower terminal strips (Fig. 22)
- Insert a screwdriver between the terminal strip and the front frame, to the right and left of the arrow markings
- Release the terminal strip on the right and left sides, by turning the screwdriver in the direction of the arrow
- Remove the terminal strips
- Release the white sliding fixture at the bottom of the housing and take the device off the support rail

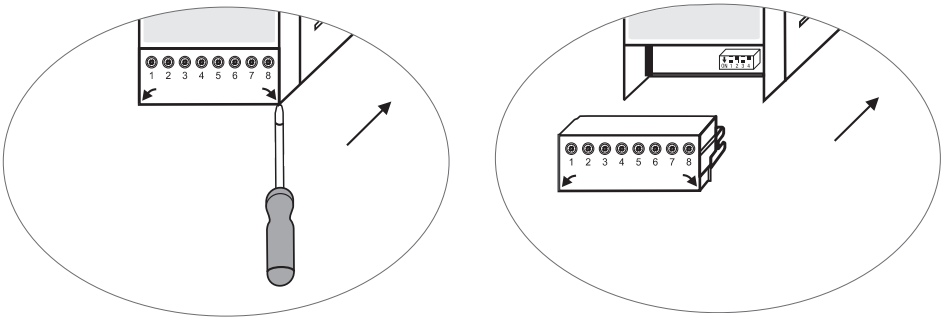


Fig. 22

6.4 Disposal

The equipment must be disposed of in accordance with statutory waste disposal provisions.

In the event of faults that cannot be remedied with the aid of this manual, please see the contact details in Section 8.

7. Technical information

Supply voltage	24 Vdc +/– 20%
Fuse	External 0.5 A (semi-delay)
Power consumption	4 W
Inputs	1 five-wire connection to CP32/CP42 or three-wire connection to CP30/CP40 and two-wire connection to the CP10 (Drive+Sense bridged at controller) 1 two-wire Pt100 temperature sensor (range 0 - 250°C) 1 two-wire standby or burner connection (24Vdc +/– 20%, 10mA)
Outputs:	1 volt-free change-over contacts, 8 A 250 Vac/30 Vdc cos ϕ = 1 (valve control) 1 floating open/close contact, 8 A 250 Vac/30 Vdc cos ϕ = 1 (MAX alarm) Provide inductive loads with RC combinations according to manufacturer's specification to ensure interference suppression 1 analogue output 4-20 mA, max. load 500 ohms, e.g. for an actual value display
Displays and controls	3 push-buttons for output test and parameter setting 1 green 4 digit 7-segment LED display 1 red LED for MAX alarm 1 amber LED for control valve open, 1 amber LED for standby/burner input indication 1 4-pole code switch for configuration
Housing	Housing material, base: black polycarbonate; front: grey polycarbonate Maximum Conductor size*: 1 x 4.0 mm^2 solid, per wire, or 1 x 2.5 mm^2 per stranded wire with sleeve to DIN 46228, or 2 x 1.5 mm^2 per stranded wire with sleeve to DIN 46228 (min. Ø 0.1 mm) *Please see section 4.2 to 4.6 for recommended cable specifications Terminal strips can be detached separately Housing attachment: Mounting clip on support rail TH 35, EN 60715
Electrical safety	Pollution degree 2 for installation in control cabinet with degree of protection IP 54, fully insulated
Protection	Housing: IP 40 to EN 60529 Terminal strip: IP 20 to EN 60529
Weight	approx. 0.2 kg
Ambient temperature	when system is switched on: 0° ... 55 °C during operation: –10 ... 55°C
Transport temperature	–20 ... +80 °C (<100 hours), defrosting time of the de-energised equipment before it can be put into operation: 24 hours
Storage temperature	–20 ... +70 °C, defrosting time of the de-energised equipment before it can be put into operation: 24 hours
Relative humidity	max. 95%, no moisture condensation

Contents of package

1 x Blowdown controller BCR3150
1 x Installation and Maintenance Instructions

8. Technical assistance

Contact your local Spirax Sarco representative. Details can be found on accompanying order/delivery documentation or on our web site:

www.spiraxsarco.com

Returning faulty equipment
Return all items to your local Spirax Sarco representative. Ensure all items are suitably packed for transit (preferably in the original cartons).

Please provide the following information with any equipment being returned:

1. Your name, company name, address and telephone number, order number and invoice and return delivery address.
2. Description and serial number of equipment being returned.
3. Full description of the fault or repair required.
4. If the equipment is being returned under warranty, please indicate:
   a. Date of purchase.
   b. Original order number.

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