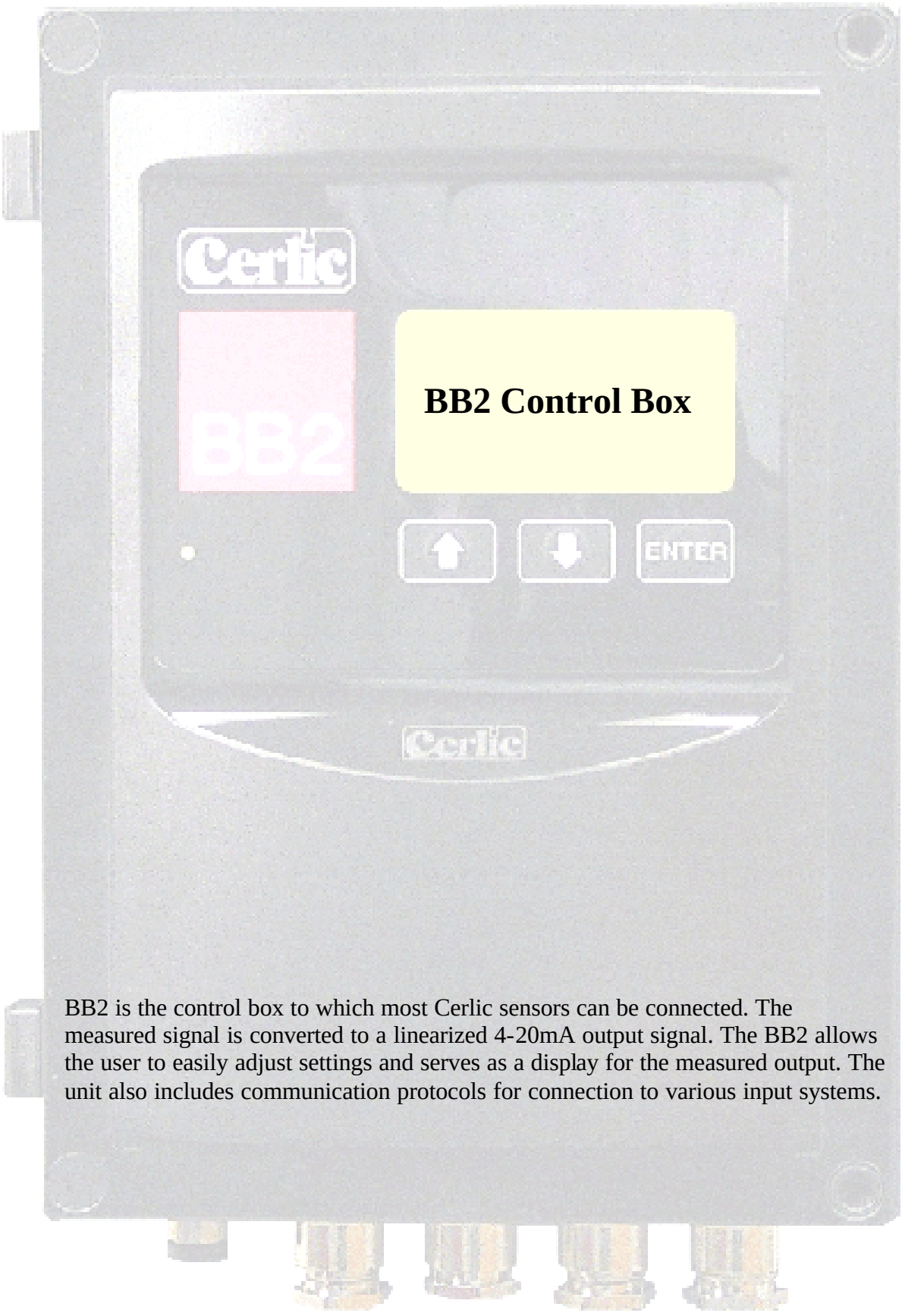


BB2 Control Box

BB2 is the control box to which most Cerlic sensors can be connected. The measured signal is converted to a linearized 4-20mA output signal. The BB2 allows the user to easily adjust settings and serves as a display for the measured output. The unit also includes communication protocols for connection to various input systems.

Table of contents

1. Introduction

The BB2 central unit is developed to make measurement easy. In combination with different sensors BB2 is used to measure fiber and particle consistency in the pulp and paper industry, or suspended solids, dissolved oxygen, pH, ORP and flow in water treatment plants.

2. A few words about this manual

The manual primarily contains information about the BB2 central unit. The operation and measuring principles of the sensors are described in the sensor manuals.

3. Design

The BB2 central unit is enclosed in a black plastic box, having a large graphic display and only three buttons to operate it. The electronics has been designed to achieve the highest reliability, and maximum ease of use. Measured values, settings and diagnostic information is transferred to and from up to four sensors using digital communication on a RS485-line. BB2 can be connected to a control or supervision system using standard 4-20 mA analog signaling or a standardized fieldbus such as Profibus (option).

4. Working principle

BB2 is based on a powerful 16-bit microprocessor. The internal software uses a real-time operating system, allowing multiple tasks to be carried out in "parallel". One process takes care of the display and the dialogs, one process is dedicated to handle each attached sensor, and one task is taking care of all the housekeeping.

After power up, the software will initialize the functionality, and data structures, reading information from a non-volatile memory. A welcome message is displayed for about ten seconds, showing the software version and serial number of the BB2. The unit will then start looking for sensors it already knows, and if found initialize them to start measuring. Twice a minute the unit looks for unknown sensors, if one is found, BB2 will find out the type and serial number, and open up a dialog box to let the operator select what slot to use for the new sensor.

All configuration of BB2 and connected sensors are done in menus, when a menu is opened on the display, the analog outputs of BB2 are frozen in order not to cause an alarm in the control system during calibration or while parameters are being changed.

If a sensor is disconnected, the analog output for this sensor will be frozen until the box is powered off, the sensor reconnected or the slot emptied.

Some sensors have automatic cleaning controlled by BB2, During, and a selectable time after the cleaning, the outputs for the sensor being cleaned is frozen.

Some sensors has the possibility to save more than one calibration curve, e.g. to handle different qualities of pulp. The calibration curve can then be chosen manually in the menu, or automatic using digital inputs of BB2.

5. Installation and start-up

Installation and start-up of a measuring system is best performed in the order stated below. Please note that the different steps may vary in meaning, depending on the particular sensor and the number of sensors that are to be connected to the control box.

Documentation of installation procedures and start-up can be done directly on this paper or on a copy of the paper.

Steps	Section	Performed		Note
		date	sign.	
Unpacking the BB2 control box	6			
Unpacking the sensor	Refer to the sensor manual			
Mounting of BB2 control box	7			
Mounting of sensor	Refer to the sensor manual			
Electrical installation of BB2 control box	8 - 12			
Electrical installation of sensor	Refer to the sensor manual			
Using BB2	13 - 15			
Settings and Calibration of sensor	Refer to the sensor manual			

6. Unpacking the BB2 control box

The unit has been tested and approved before delivery from the supplier. Please check that no visible damages are apparent in this shipment.

DAMAGES

If damages occurred during shipment, immediately contact the shipping company and the Cerlic representative. The shipment should be returned only after an return authorization number has been issued by Cerlic or representative.

PACKAGING

The original packaging is designed to protect the equipment and should be used for storage or if the product must be returned.

CONTENT

Please check that the content corresponds to your order and packing list.

OPTIONS AND ACCESSORIES

- Aluminum handrail mounting plate predrilled for BB2 or solenoid valves w/ u-bolts, outside US version P/N 10605533
- Aluminum handrail mounting plate predrilled for BB2 or solenoid valves w/ u-bolts, US version P/N 31204049
- 33 ft. (10m) cable for. Connection cable with plug-in. P/N 20805510
- Y-Splitter for two sensors to one BB2 control box P/N 21505534
- Solenoid valve for flushing P/N 11705516

7. Mounting of BB2 control box

The BB2 may be mounted on a mounting plate to a wall or handrail.

The mounting plate comes with a sun shield, so it can also be used for weather protection in outdoor installations.

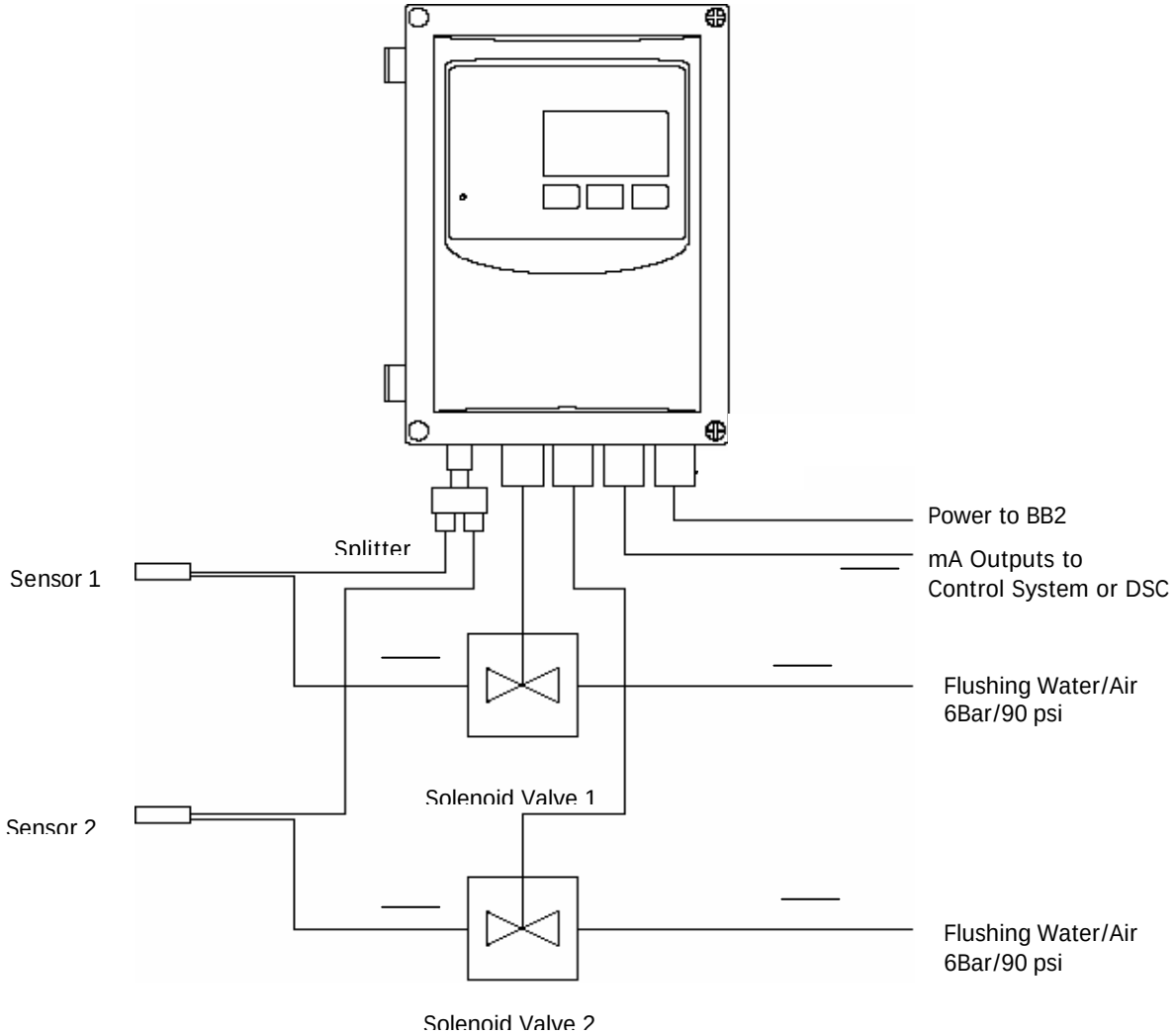


Figure 1 Connection of BB2 Control box with two sensors and two flushing valves

8. Wiring Connections

BB2 is connected to the power using a 3-lead cable approved for the rated current and voltage. We recommend that the power be connected with an external on/off switch.

The sensors are connected to the BB2 box using 33ft. (10m) Orange cables (O2X and ITX sensors have a 33ft. (10m) black cable attached). If the standard cable length is not sufficient several cables may be connected in series. In the event that two or more sensors are connected to the same control box, then the Y-splitter is needed.

There are two analog 4-20 mA outputs to transfer the measuring results from the BB2 box to a SCADA, DCS, or other type of system. The use of the two outputs is

configured in the sensor menu, and the box will prevent two sensors from using the same output. We suggest using a shielded twisted pair AWG20 (0.5mm^2) cable to connect the BB2 box to another system. If both outputs are connected to the same system a double twisted pair cable may be used. Make sure the shield is properly grounded according to good EMC practice.

The two relay outputs may be configured to be used for alarm or cleaning. The cable type required depend on the use, and selected voltage. Make sure the relays are jumped for the correct voltage, and that the maximum ratings of the outputs are not exceeded. Chart for relay jumpers is attached to the inside of the front door.

Three digital inputs are used to select calibration curves for consistency or suspended solids sensors from a remote location. They are activated by applying +24 VDC, and have a common ground. We suggest the use of a 4-lead AWG20 (0.5mm^2) cable.

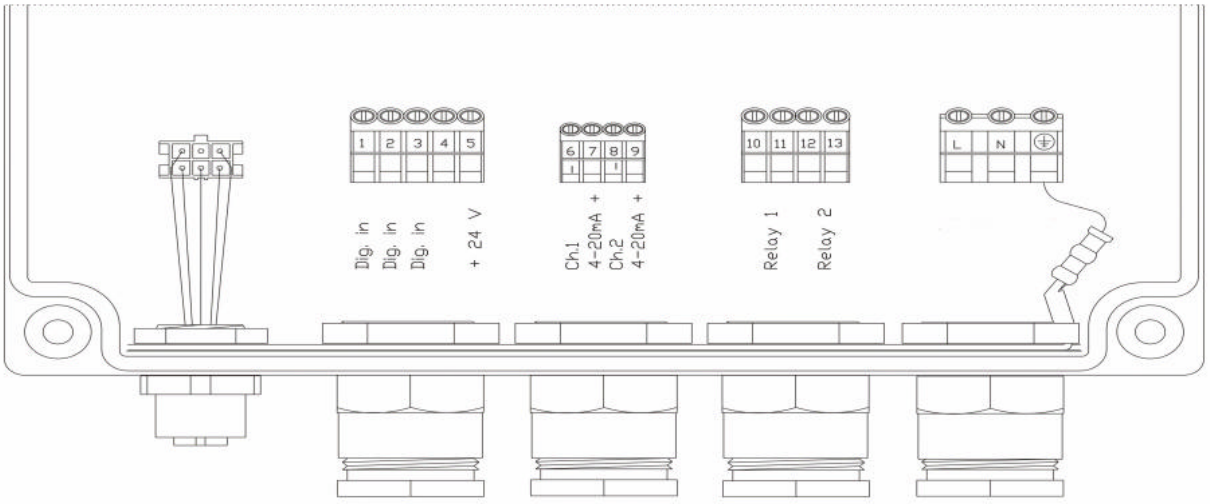


Figure 2 **1** **2** **3** **4** **5**

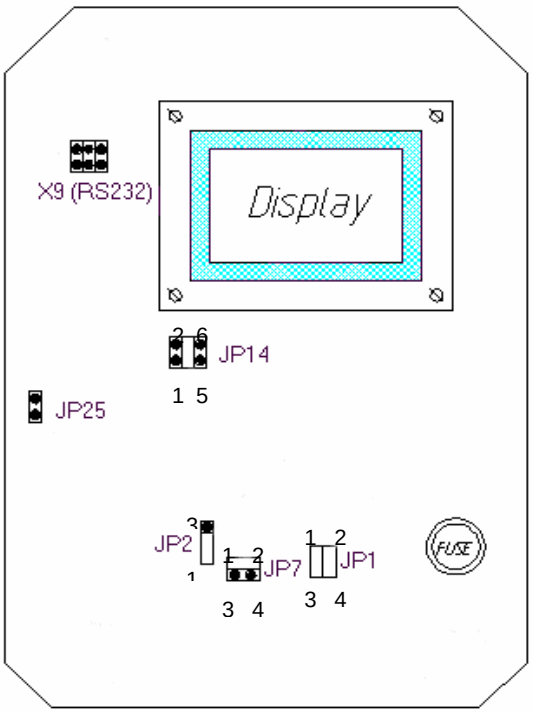
1. One sensor, or two sensors with Y-splitter, plug- and twist connection
2. Digital inputs (terminals 1 – 5)
3. 4-20mA outputs (terminals 6 – 9). Selected in each sensor set-up menu. (Please refer to the sensor manual)
4. Relays (terminals 10 – 13)
5. Power (terminals L (load or power), N (neutral) and ⏚ (ground)

NOTE! Start-up of the instrument takes place as soon as power is supplied although it may take up to 30 seconds before the sensor has been identified. When the instrument starts, then type of sensor and version is shown in the screen window for ten seconds.

When more than two sensors are connected to the BB2 control box, a Field Bus communication module must be installed in the BB2 control box to transfer the measuring results to a SCADA or DCS system.

9. Jumper settings

BB2 has five jumpers to configure the board.

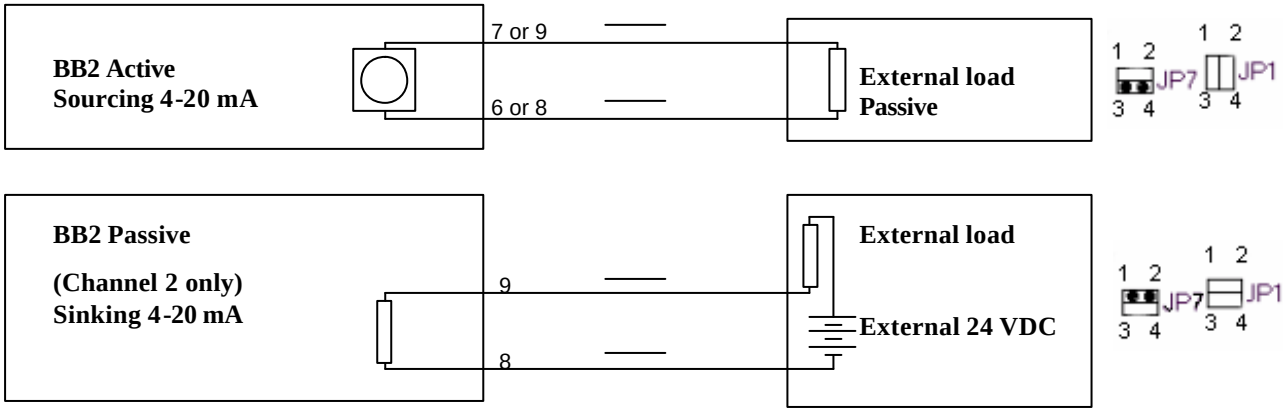


Jumpers on BB2

ANALOG OUTPUTS

The two analog outputs of BB2 are default active, sourcing 4-20 mA into a load of maximum 500 ohms. They are galvanic isolated from the rest of the system, but the two channels use a common ground. Channel 2 can be jumperd to be passive, and fully isolated sink 4-20 mA from an external supply of max 24V DC, by changing JP1 and JP7.

Analog Output channel 2	JP1	JP7
Active, sourcing	1-3 and 2-4	1-2
Passive, sinking	1-2 and 3-4	3-4

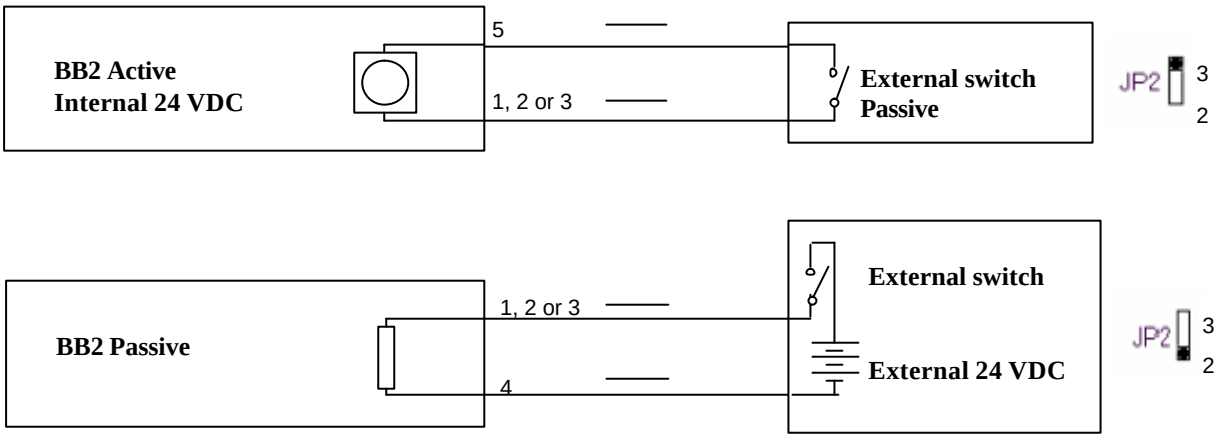


DIGITAL INPUTS

The three digital inputs are default using BB2's internal 24 VDC, but can be jumpered to use an external 24 VDC source, galvanic isolated from the rest of the system (e.g. from a DCS or control system). These inputs can be used to control the selection of calibration curve for sensors having more than one. The sensor then has to be set up to use "External" calibration curve, please refer to the sensor manual for more information on how to select calibration curve.

No active input will result in calibration curve "A", if input 1 is activated calibration curve "B" will be used, if input 2 is activated calibration curve "C" will be used, and finally if input 3 is activated calibration curve "D" will be used. The higher the number of the input the more dominant it is, in other words if input 3 is active calibration curve "D" will be used regardless of the state of the other inputs.

Digital inputs	JP2
Active, internal 24 VDC	1-2
Passive, external 24 VDC	2-3



PC-CABLE CONNECTOR

Connector X9 is a serial RS232 port that may be used to transfer values to a PC or printer via the PC-cable (part no. 10805480). The functionality of the serial port is configured in the settings menu of BB2

PROGRAM DOWNLOAD

Jumpers JP14 and JP25 are used when downloading new firmware to BB2. This may only be done by authorized service personnel. **Improper setting of jumpers JP14 and JP25 may destroy the unit. Any change of these jumpers will void the warranty.**

10. Relay outputs

BB2 has two relay outputs, configurable for Alarm or Cleaning. The relays can be used as Dry Contacts, 24 VDC output, or Mains AC output by setting jumpers according to figure 3. We do not recommend using 24 VDC outputs to drive solenoids.

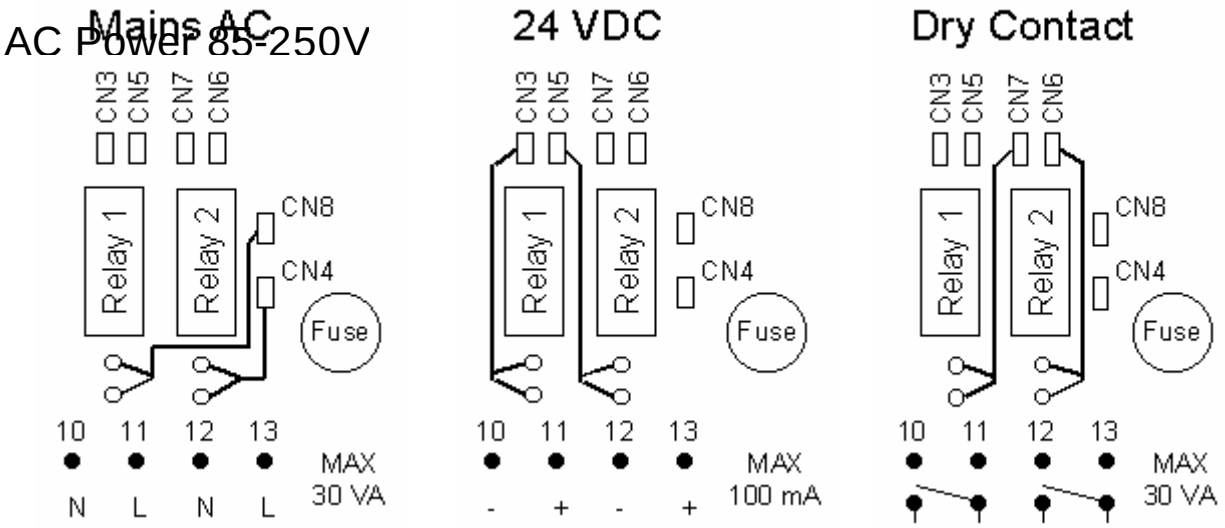


Figure 3. This drawing can also be found on the inside of the front door.

NOTE:

- The relays are a normally open contact. Do not overpower the relay contacts (see figure 3 for max VA rating per relay).
- Do not use 24 VDC outputs to drive solenoids.
- During set-up, please verify that the relay is not already being used for another function like flushing or brush cleaning.
- Several solenoid valves may be connected to the same terminal block. However, the power rating of the relay output must not be exceeded.

11. Connection of external alarm

The relay outputs may be used for external alarms, flushing or brush signals.

1. Set the jumpers CN 3, 4, 5, 6, 7 and 8 to preferred voltage (see Figure 3)
2. Connect the alarm to relay 1 or 2 (see Figure 2)
3. Configure the relay for alarm as shown in the sensor service manual under "Settings/Alarm Relay".

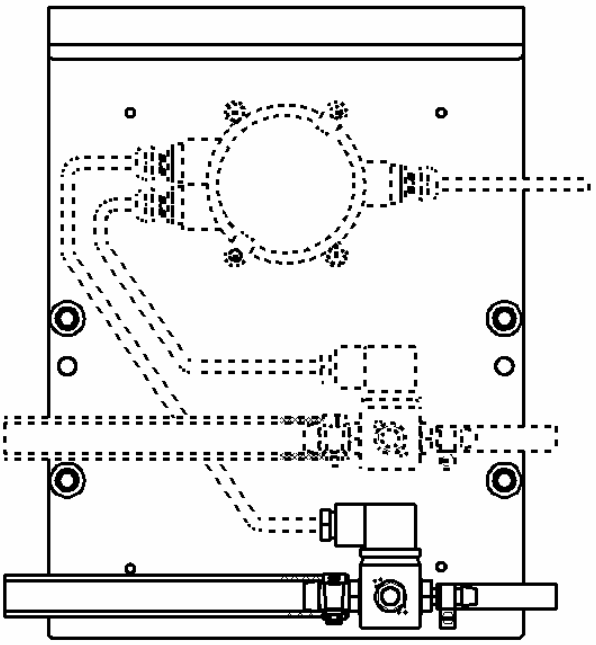
12. Connection of automatic flushing

Some of the sensors are equipped with built-in flushing nozzles. The nozzles are used to direct the cleaning fluid, compressed air or water, through a ¼”hose, (33ft. /10m long) that is connected on the top of the sensor housing. The air or liquid is controlled with a solenoid valve that is wired to the BB2 control box relays. The solenoid valve is connected to relay contact 1 or 2, which must configure or setup in the sensor menu.

1. Set the jumpers CN 3, 4, 5, 6, 7 and 8 to the proper voltage or power of the solenoid valve. (See Figure 3).
2. Connect the solenoid valve to relay contact 1 or 2 (Relay 1 – terminals 10/11 or Relay 2 – terminals 12/13). NOTE! If relay 1 is set for alarm then relay 2 can be used for flushing, and vice versa.
3. Configure the relay for cleaning in the sensor menu under “Settings/Cleaning/Relay”(refer to the sensor manual).
4. Check that flushing water/air pressure does not exceed 120 psig or 8 bars rating of solenoid valves.

Cerlic provides suitable valves for flushing and an Aluminum handrail mounting plate predrilled for the solenoid valves to give an easy way of mounting the flushing system. The mounting plate can be used for wall or rail mounting.

The plate has holes for one or two flushing valves as well as a junction box. The valves can be mounted with their inlet on the right or left hand side, the plate is prepared for both.



Mounting plate 10605533 (non US version) with two solenoid valves 11705516, and a junction box

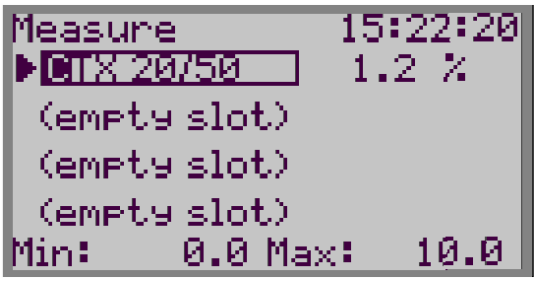
13. Operational interface

MAIN DISPLAY

Most of the sensors installed will display a bar indicating percent of full scale over the sensor name, and a measured value to the right of the sensor name. If contact with the sensor is lost, the text **"No transmitter"** is displayed in the slot where the sensor is configured. The different sensor slots are listed from top to bottom as slots 1 - 4.

At the bottom of the screen, the min and max values for selected sensor are displayed. An arrow to the left of the sensor name indicates active sensor.

- Use ⬆ or ⬇ to select a sensor in the main display.
- An empty slot, (the text says **empty slot)** cannot be chosen for display.
- If communication with the sensor is lost (indicated by **No transmitter)**, then the slot may still be chosen for display. The arrow returns to the first active sensor after five seconds.



SENSOR INFORMATION MENU

Many (not all) sensors have their own full screen info menu. The information in this menu is different for different types of sensors, please refer to the sensor manual for further details.

To change between the main menu and the sensor information menu for the selected sensor, press ⬇ and ENTER

MENUS AND DIALOGS

There are different menus to configure BB2 and its sensors. There is one menu for parameters in the central unit, and one menu for each type of sensor. This manual only describes the menus used to configure the BB2 central unit, for information regarding the different sensor menus, please refer to the sensor manual.

When a menu is open the value of both analog outputs are frozen in order to avoid unnecessary alarms in the control system when parameters are changed, and during calibration. This functionality can also be used if a sensor shall be temporary removed, e.g. to be inspected or cleaned. Just remember that an open menu will time out if not used for 5-10 minutes.

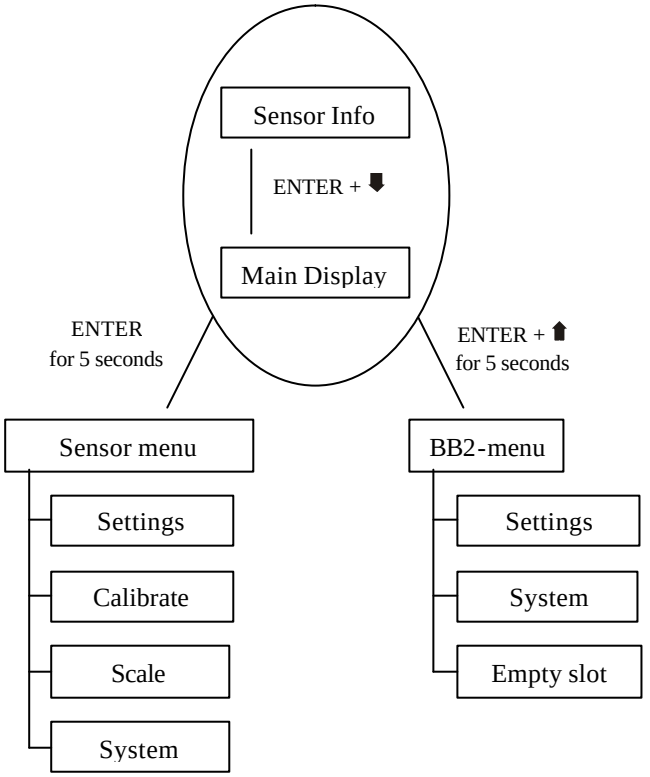
"TIME-OUT" FOR MENUS

Menus that are inactive for more than five minutes are automatically closed and the BB2 control box returns to the Main Menu. A menu is not considered to be inactive if a value is being edited or a function, e.g. calibration, is carried out. The back-light of the display is switched off at the same time, it is switched back on by pressing any button.

MENU TOPOLOGY

There are menus to configure BB2 and its sensors, they are divided in two branches, each having a set of submenus:

1. ***BB2 menu,*** to make changes to the setup of the BB2 control box. It is selected by pressing ⬆ and ENTER simultaneously for five seconds.
2. ***Sensor menus***, to make changes to each sensor' s setting, calibration, scale or system parameters. It is selected by pressing ENTER for five seconds.



WORKING IN THE MENUS

- A square in front of a line in the menu indicates the top of the menu. If ENTER is pressed when this line is highlighted, the menu is ended.
- An arrow to the right ➢ indicates that a *submenu* is displayed if ENTER is pressed when this line is highlighted.
- Pressing ENTER on a highlighted line with an arrow to the left ➣ will take the user back to the previous menu.
- If there is not enough room on the screen for the menu, an arrow pointing down ➘ is shown at the end of the screen to indicate that the menu continues. Use the button down arrow ⬇ to access these additional lines.

All the menus can be ended anywhere by pressing ⬆ and ENTER simultaneously to go back to the main menu or sensor listing screen. It is not necessary to go through the whole screen menu to get back to the main menu.

CHANGING VALUES IN THE MENUS

A highlighted area in the BB2 means that you can use the ↑ or ↓ keys to change the selection. However, an exception is when values or numbers are displayed one figure at a time. In this case, the arrow keys are used to change the value and **ENTER** is used to advance to the next digit. When changing options, the highlighted option Settings indicates that ↑ and ↓ can be used to change between options. When the shaded area is over a number, then the arrow keys will increase or decrease the value.

Occasionally, a list indicator (↕) will appear in a dialog box. This indicates that the user can use the arrows to select between the different functions that are available.

When a value can not be displayed, which might be due to the fact that it is to large, negative or an error has occurred in a calculation stars are shown instead of a number, e.g. *****.* (number of stars is depending on value and unit settings). If it is possible to edit the parameter it can be set to zero by pressing ENTER a number of times.

All selected changes are implemented immediately and measuring is continuous.

DIALOGS

The BB2 sometimes shows a small dialog box containing a message. Sometimes at the bottom of the dialog box there is a message that says, “ENTER”. This indicates that the dialog will be confirmed and consequently disappears when the ENTER key is pressed. If several dialogs are stacked, the one at the top will be confirmed first.

SENSOR MENU

The sensor menu is accessed by first selecting the sensor, then pressing ENTER for five seconds. See the sensor manual for more information.

If the selected sensor is not active (the text **No transmitter** is shown) a warning is displayed that asks you to make another choice in order to show the sensor menu.

To access the menu of a sensor that is not connected, change the highlighted text from “abort” to “show” using the arrows and press ENTER.

14. Menus for the BB2 control box

Press ⬆ and ENTER simultaneously for five (5) seconds to enter the BB2 Menu. Sensor menus are different for each type of sensor, and are entered by pressing ENTER for five (5) seconds on selected sensor. Sensor menus are described in the various sensor manuals.

Setup

Language	English or Swedish
System	Metric or US, selects mm or inch, m^3 or Gallon, °C or °F (the latest can be overridden in the format menu below),
Date	Show and change current date
Time	Show and change current time
Contrast	The contrast is compensated for temperature effects but may have to be changed due to local lighting conditions or Temperature
Formats	Press "ENTER" to go to the "Formats" sub menu
Temp	°F or °C
Date	YY-MM-DD, MM/DD/YY, or DD-MM-YY
Time	TT:MM:SS, or TT:MM
Fieldbus	Press "ENTER" to go to the "Fieldbus" sub menu
DP address	Node address in a Profibus network
Transmitter	1 – 4, Transmitter using the fieldbus
Fieldbus type	Installed fieldbus module
Out sig 1	4-20 mA, or 20–4 mA
Out sig 2	4-20 mA, or 20–4 mA
Serial log	Off, Slot 1 – Slot 4 or All. Selects a sensor to be logged using the serial RS232 interface. The protocol is clear text. This function is implemented for Cerlic' s tests, and may change in the future without notice
Interval min	0 –999 minutes interval between the logging a value on the serial channel.

System

Version	Program version, read only
Serial	Circuit board S/N, read only
Box temp	Internal box temperature, read only
Box heat	Indication of heat ON / OFF, read only
Fieldbus	Press "ENTER" to see the Fieldbus status sub *menu*
Correct type	Yes or no, read only
Installed	Yes or no, read only
Hardwarefail	Yes or no, read only
Initialised	Yes or no, read only
Online	Yes or no, read only
Software v.	Software version of the Fieldbus module, read only
Outdata	Last data sent to master, read only
Err Cmd	Last error, read only
Err Cmd 1	Last error, read only
Test	Press "ENTER" to go to the system test sub menu
Relay1	Off / On, be careful if something is connected to the relay
Relay2	Off / On, be careful if something is connected to the relay
Analog 1 mA	Current of analog output 1, read only
Analog 2 mA	Current of analog output 2, read only
Panel LED	Green / Red
Box heat	Off / On, read only
➢	There may or may not be an additional Cerlic internal submenu that is not documented, and that may change without notice.

Empty Slot

slot 1	Forget the previously installed transmitter in slot 1
slot 2	Forget the previously installed transmitter in slot 2
slot 3	Forget the previously installed transmitter in slot 3
slot 4	Forget the previously installed transmitter in slot 4

15. Getting started

Start-up of the instrument begins when power is supplied. While a self-test is being performed, it may take up to 30 seconds for the sensor to initialize and be identified. Changes to the settings can not be made until the BB2 control box has recognized the sensor. When recognized, the sensor will appear in the display mode.

If the self-test indicates that the internal clock has been without electric power for a period of time, the unit goes to a menu for setting date and time. After this setting is complete, the display mode shows the sensors in the order in which they were tagged or slot number.

- To accept the slot choice for the sensor, press “ENTER”. Data stored in the sensor is transferred to the BB2 control box.
- Press ⬆ and ENTER simultaneously for 5 seconds. The BB2-menu opens.
- Select “Settings” and confirm by pressing ENTER.
- Set the different parameters for the control box in this menu.
- Press ⬆ and ENTER simultaneously to return to the Main Menu.
- Select the sensor you want to set up using ⬇ / ⬆.
- Press ENTER for 5 seconds. The sensor menu for selected sensor opens.
- Select “CALIBRATE”. Calibrate each sensor according to the description.
- Quit the calibration menu by pressing ⬆ to the highest level. Press “ENTER”.
- Select “SETTINGS”.
- Insert the appropriate values for the sensor selected. Note that “Cleaning” has a submenu with additional parameters.
- Select “SCALE”.
- Insert the appropriate values for the sensor selected. Min and Max refers to the measured value required for 4 and 20 mA output.

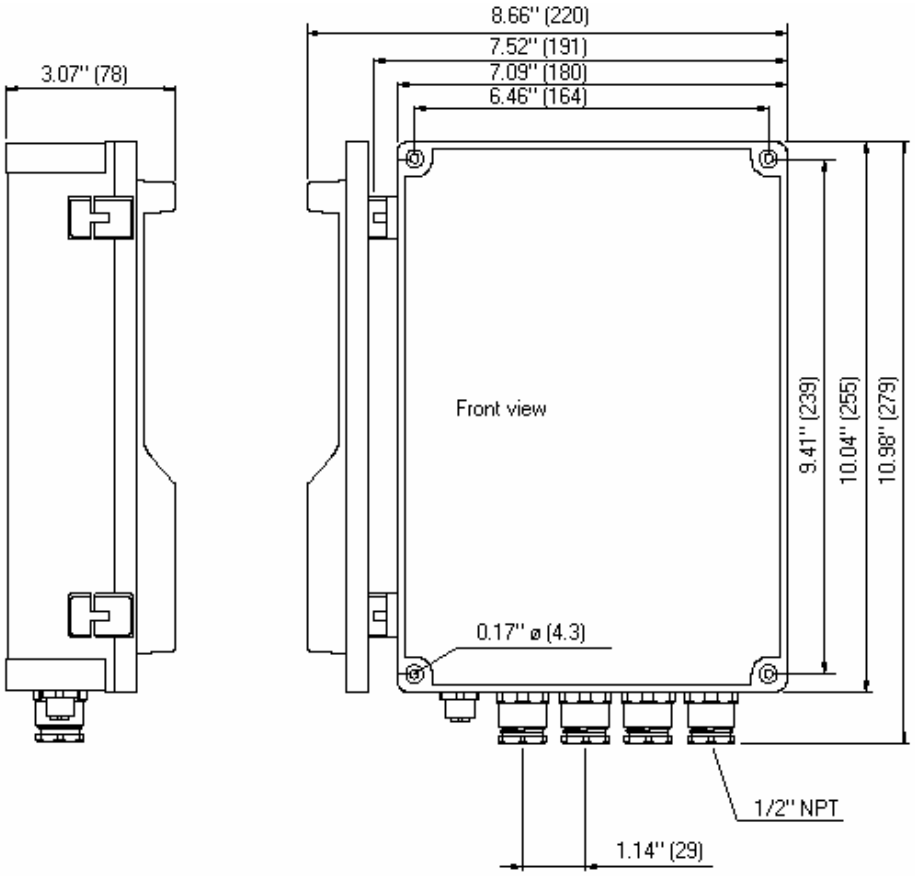
16. Technical specification for BB2 control box

Manufacturer	Cerlic Controls AB, Solna, Sweden
Name	BB2
Measurement	See drawing in section 17
Enclosure	NEMA4 (IP65)
Weight	2.8 lbs (1,3 kg)
Supply voltage	85 – 250 V AC, 50 – 60 Hz
Fuse	3.15 A Slow 250V 4 x 20mm
Power Usage	20 Watts (0.180 Amps @ 110V)
Ambient temp	-4 – +122 °F (-20 – +50 °C)
Internal Heating	Full power below 63 °F (17 °C), Off above 66 °F (19 °C)
Storage temp	32 - +140°F (0 – 60 °C)
Connected sensors	Displayed on the screen at start-up
Output signals	Two (2) 4 – 20 mA (20 – 4 mA), galvanic isolated, 500 ohm
Relays	Selectable function, 85-250VAC max 30VA, 24VDC max 100mA or Dry contacts 250VAC / 30VDC, max 30 VA, normally open

OPTIONAL PARTS FOR BB2 CONTROL BOX:

Aluminum handrail mounting plate predrilled for BB2 or solenoid valves w/ u-bolts, outside US version	P/N 10605533
Aluminum handrail mounting plate predrilled for BB2 or solenoid valves w/ u-bolts, US version	P/N 31204049
33 ft. (10m) cable for. Connection cable with plug-in.	P/N 20805510
Y-Splitter for two sensors to one BB2 control box	P/N 21505534
Solenoid valve for flushing	P/N 11705516

17. Dimensions



APPENDIX 1, Instructions for EMC

General EMC Requirements

In order to ensure the instrument's capability to fulfil the EMC requirements, no other components, parts or accessories other than those specifically mentioned in the instructions or this appendix may be removed, replaced or connected to the instrument.

Devices marked with a CE-label must only be connected to intended transmitter's.

The enclosure lid must be closed tight to maintain a proper electrical environment.

Connecting Mains Power Supply

All three wires must be connected to the filter if it is to function properly.

L	=ElectricPhase
N	=Zero
⏚	= Protector Ground

General Instructions for Connecting Cables

Only shielded cables should be connected to the instrument. The cable connection must provide proper shielding between the sensor cable and the fitting. Please refer to section "Connection of Shielded Cable to Fitting".

Any unused wire apart from the signal wires (please refer to appropriate section in the Instructions) should be neatly cut level with the cable covering.

Connecting the mA Signal

Only shielded cable, such as 4-wire 0.75 mm^2 equipped with x-shield, may be used. If the cable shield cannot be properly connected to the enclosure fitting, it may be connected directly to protector ground. Please observe that connecting the cable shield directly to protector ground causes the instrument to be more sensitive to electromagnetic interference (EMI).

Connecting Counter

Only shielded cable may be used.

Cut the shield level with the cable covering at the end connected to the counter. The unshielded signal wires should be cut as short as possible.

Extending a Shielded Cable

When extending a shielded cable, a special EMC extension box should be used in order to avoid electromagnetic interference (EMI). Please refer to section "Extending Shielded Cable" in
Appendix 4.

Installation Rekommendations

Keep signal cables and power supply cables as far apart as possible. Cable grooves separating signal cables and power supply cables are strongly recommended. If signal cables and power supply cables cross, they should intersect perpendicular to one another.

Signal and power supply cables should not be running parallel to one another in instrument cabinet inlets. Any risk of electromagnetic incompatibility will be reduced to a minimum if signal cable inlet and power supply inlet are separated and at opposite sides of the cabinet. Cables should be properly fastened along the cabinet walls.

When connecting shielded cables with different protector ground points far from each other, there may be interference problems stemming from differences in potential in the ground net. This is caused by stray currents between the protector ground points. If this occurs, the stray current loops have to be cut.

Some measures to cut stray current loops in order of priority are described below.

Insulate the sensor from surrounding metal structures.

Open the cable shield at the transmitter end of the cable and connect a capacitor (10nF/3000 V) between the cable shield and the protector ground wire. The capacitor will limit low frequency currents and short circuit high frequency currents.

If the instrument is installed in an EMC-proof cabinet and the cable inlets are properly done, stray currents may be prevented by cutting the cable shield at the transmitter end of the cable.

It is improper to connect sparkling lights to the same terminal as the measuring equipment. Sparkling lights can often generate generates very high levels of EMI when turned on/off.

Frequency converters are also very often causes of EMI, especially the older types which is not CE-marked. It is therefore not recommenced to install measuring equipment nearby frequency converters.

APPENDIX 2, Connection of shielded cable to fitting

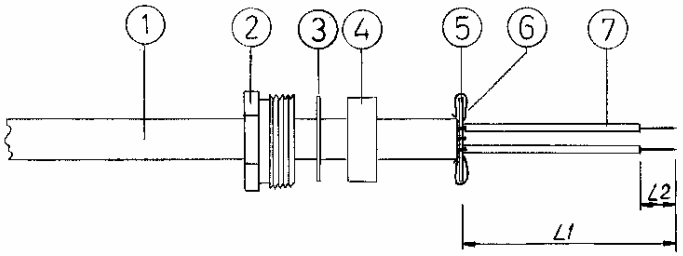


Illustration 1: Cable with fitting details

1. Insert the cable through fitting (2), washer (3), rubbersleeve, (4) and washer (5).
2. Remove 90 mm (L1) of the cable covering.
3. Strip the end of the signal wires. The stripped ends should be approx. 7 mm (L2).

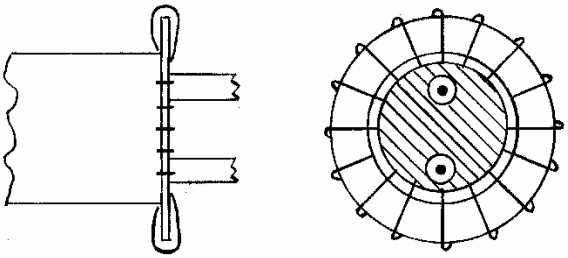


Illustration 2: Connection of the cable -shield to the washer

4. Cut the shield to a length of approx. 20 mm. Entwine the shield.
5. Thread the entwined shield around the washer (5). Trim the shield-threads to an appropriate length so that the connection resembles illustration 2.

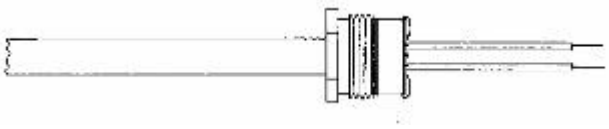


Illustration 3: Shielded cable and fitting ready to be attached.

6. Press the cable fitting parts gently together. Be careful not to damage the cable shield connection to the washer. The cable and fitting are now ready for attachment to the signal control box.

APPENDIX 3, shielded cable without fitting

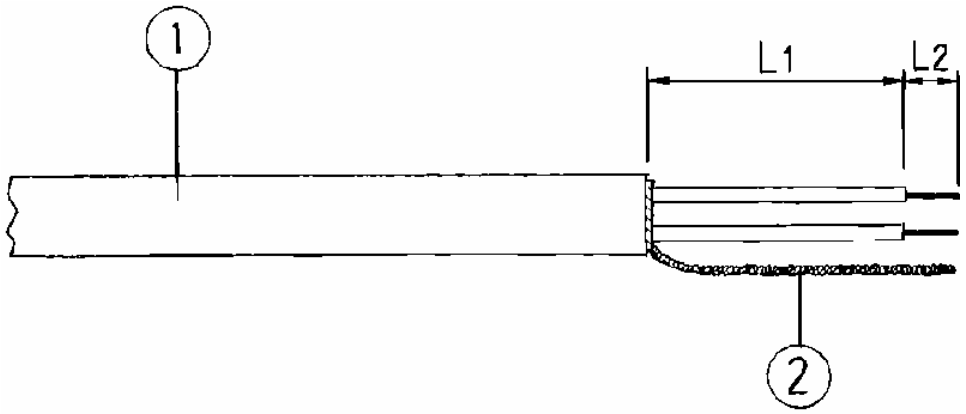


Illustration 1: Shielded cable with plait.

1. Remove to 90 mm (L1) of the cable covering
2. Tear the cable shield open and twine it to a plait (2)
3. Cut the signal wires to shortest possible length (L1) and add 10mm for L2.
   L1 should not be more than 25 mm.
4. Peel off the signal wires to L2 (10mm).
5. Connect the signal wires to the plinth.
6. Connect the plait (2) to nearest protector ground or protector ground rail in order to provide proper ground connection. The shorter the length of the plait the better.

APPENDIX 4, Extending Shielded Cable

1. Open the enclosures lid on the shielded box and fasten the box where appropriate.

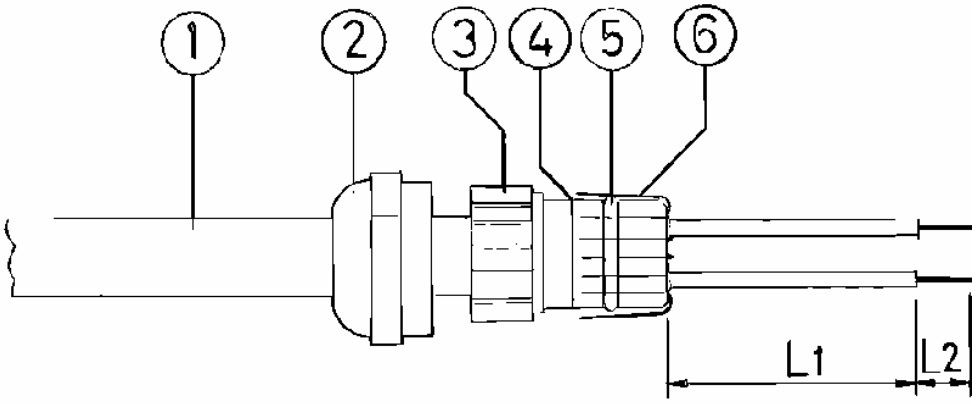


Illustration 1: Cables with shield and fitting.

2. Put the fitting (2) and container (3) on the sensor cable.
3. Peel the covering off the cable (1) to L1 (90 mm).
4. Cut the cable shield (6) to 12 mm and fold it back over the O-ring (5) to the edge (4).
5. Press the container (3) to fit the female connector in the box and tighten the fitting.
6. Repeat no 2-5 at the extension cable.
7. Cut the signal wires to suitable lengths and connect to the connecting terminal in the box (L2 = 7mm).
8. Close the lid of the shielded box tight.