



MAC 300 Handbook

Multiparameter signal converter

Software Revision: SR 1.39

The documentation is only complete when used in combination with the relevant documentation for the sensor.

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1 Safety instructions	5
1.1 Software history	5
1.2 Intended use	6
1.3 Certifications	6
1.4 Safety instructions from the manufacturer	7
1.4.1 Copyright and data protection	7
1.4.2 Disclaimer	7
1.4.3 Product liability and warranty	8
1.4.4 Information concerning the documentation	8
1.4.5 Warnings and symbols used	9
1.5 Safety instructions for the operator	9
2 Device description	10
2.1 Scope of delivery	10
2.2 Device description	11
2.3 Nameplate	12
3 Installation	13
3.1 General notes on installation	13
3.2 Storage and transport	13
3.3 Wall mounting	13
3.4 Noise suppression	14
4 Electrical connections	15
4.1 Safety instructions	15
4.2 Used abbreviations	15
4.3 Important device-specific notes on electrical connection	16
4.4 Opening the converter front cover	17
4.5 Connecting the signal cables	17
4.6 Basic connections	18
4.7 Supply voltage connections	19
4.8 Connecting the power supply	21
4.9 Analog current output connections	21
4.10 Relay connections	24
4.11 Digital inputs	27
4.12 SD card interface	28
4.13 Opening the converter cover / housing (wall mount)	28
4.14 Opening the converter cover (rack mount)	29
4.15 Add-in cards installation	30
4.16 Current output	33
4.16.1 Current output calibration	34
4.16.2 Resetting the current output user calibration	34
4.17 Digital inputs	35
4.18 Simulate channels	37
4.19 Setpoints	38

4.19.1 Setpoint Proportional Mode	41
4.19.2 Setpoint alarm mode	42
4.19.3 Setpoint cleaning mode	43
5 Start-up	44
5.1 Switching on the power	44
6 Operation	45
6.1 User interface	45
6.2 Menu overview	46
6.3 Function tables - Parameter TSS	48
6.4 Security code access	52
6.5 Access code management	52
6.6 Configuration	53
6.7 Update software	55
6.8 Optional software functions	56
6.9 Data logging	57
6.10 Live trend screen	58
6.11 SD card data logging	59
6.12 View SD card data logging	60
6.13 SD card data logging graph	60
6.14 Viewing the SD card data log on a PC	61
6.15 Error messages	61
6.16 Save, Restore and Reset	62
7 Service	63
7.1 Maintenance and repair	63
7.2 Spare parts availability	63
7.3 Availability of services	63
7.4 Returning the device to the manufacturer	63
7.4.1 General information	63
7.4.2 Form (for copying) to accompany a returned device	64
7.5 Disposal	64
8 Technical data	65
8.1 Measuring principle	65
8.2 Technical data table	65
8.3 Dimensions and weight	68
9 Notes	70

1.1 Software history

The "Electronic Revision" (ER) is consulted to document the revision status of electronic equipment according to NE 53 for all devices. It is easy to see from the ER whether troubleshooting or larger changes in the electronic equipment have taken place and how that has affected the compatibility.

Changes and effect on compatibility

1	Downwards compatible changes and fault repair with no effect on operation (e.g. spelling mistakes on display)	
2- <u> </u>	Downwards compatible hardware and/or software change of interfaces:	
	H	HART®
	P	PROFIBUS
	F	Foundation Fieldbus
	M	Modbus
	X	all interfaces
3- <u> </u>	Downwards compatible hardware and/or software change of inputs and outputs:	
	I	Current output
	F, P	Frequency / pulse output
	S	Status output
	C	Control input
	CI	Current input
	X	all inputs and outputs
4	Downwards compatible changes with new functions	
5	Incompatible changes, i.e. electronic equipment must be changed.	



INFORMATION!

In the table below, "x" is a placeholder for possible multi-digit alphanumeric combinations, depending on the available version.

Release date	Software history	Changes and compatibility	Documentation
2016-09-01	SR 1.39	-	MA MAC 300 R01

1.2 Intended use

**DANGER!**

Never install or operate the device in potentially explosive areas, it might cause an explosion that can result in fatal injuries.

**WARNING!**

If the device is not used according to the operating conditions (refer to chapter "Technical data"), the intended protection could be affected.

In combination with the different sensors of the OPTISENS series the MAC 300 measures analytical parameters in various applications.

1.3 Certifications

CE marking



The device meets the essential requirements of the EU directives. The CE marking indicates the conformity of the product with the union legislation applying to the product and providing for CE marking.

For full information of the EU directives and standards and the approved certifications, please refer to the EU declaration on the KROHNE website

1.4 Safety instructions from the manufacturer

1.4.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.4.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.4.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.4.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

1.4.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



DANGER!

This warning refers to the immediate danger when working with electricity.



DANGER!

This warning refers to the immediate danger of burns caused by heat or hot surfaces.



DANGER!

This warning refers to the immediate danger when using this device in a hazardous atmosphere.



DANGER!

These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.



WARNING!

Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.



CAUTION!

Disregarding these instructions can result in damage to the device or to parts of the operator's plant.



INFORMATION!

These instructions contain important information for the handling of the device.



LEGAL NOTICE!

This note contains information on statutory directives and standards.



• **HANDLING**

This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➞ **RESULT**

This symbol refers to all important consequences of the previous actions.

1.5 Safety instructions for the operator



WARNING!

*In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.*

2.1 Scope of delivery

**INFORMATION!**

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**

Do a check of the packing list to make sure that you have all the elements given in the order.

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.



Figure 2-1: Scope of delivery

- ① Signal converter
- ② Documentation

2.2 Device description

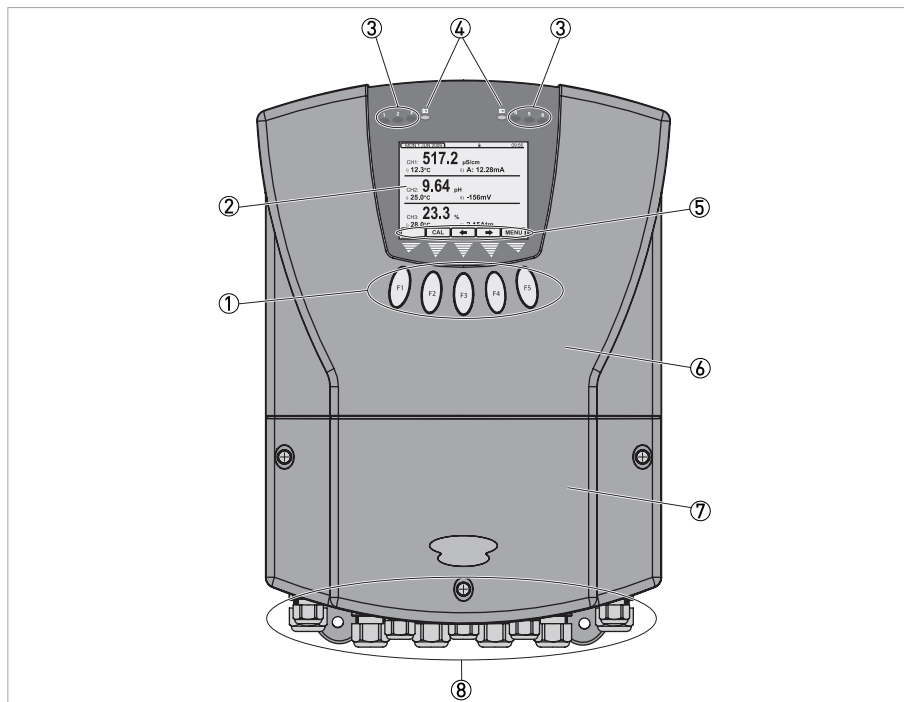


Figure 2-2: Device description

- ① Operation keys
- ② LCD Display
- ③ Relay status indicator
- ④ Alarm status indicator
- ⑤ Context sensitive menu options
- ⑥ IP66 enclosure
- ⑦ Terminal cover
- ⑧ 6 x M20 and 5 x M16 pre installed cable glands

The signal converter is a microprocessor controlled multi-parameter instrument that can be installed with a user selected combination of up to 3 Sensor Input Cards. The instrument may be subsequently modified to meet changing requirements by the installation of additional, or different, cards and the attachment of the appropriate sensor(s). Utilising a multifunction easy to read QVGA LCD the instrument displays readings and provides feedback to the operator on the status of the sensors and instruments outputs. In addition the instrument features, depending upon configuration, up to 6 control relays and up to 6 0/4...20 mA current outputs. These can be used to provide fully configurable control, alarm and feedback. Finally the instrument also features an SD card interface which enables the user to backup and restore instrument settings, copy settings between instruments, log the sensor readings (optional extra) and to upgrade the instrument's software.

The device possesses up to 3 sensor inputs for using sensors with different measuring principles:

- Absorption measurements (suspended solids)
- Potentiometric measurements (pH / ORP)
- Conductivity measurements (conductive / inductive) - restrictions in sensor use might apply

3.1 General notes on installation

**INFORMATION!**

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**

Do a check of the packing list to make sure that you have all the elements given in the order.

**INFORMATION!**

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Storage and transport

- Store and transport the device in a dry, dust-free location.
- Avoid continuous direct sunlight.
- Store and transport the device in its original packing.
- Storage temperature: -40...+70°C / -40...+158°F.

3.3 Wall mounting

**DANGER!**

Never install or operate the device in potentially explosive areas, it might cause an explosion that can result in fatal injuries.

**CAUTION!**

Always note the following items to ensure a proper and safe installation:

- *Make sure that there is adequate space to the sides.*
- *The device must not be heated by radiated heat (e.g. exposure to the sun) to a electronics housing surface temperature above the maximum permissible ambient temperature. If it is necessary to prevent damage from heat sources, a heat protection (e.g. sun shade) has to be installed.*
- *Signal converters installed in control cabinets require adequate cooling, e.g. by fan or heat exchanger.*
- *Do not expose the signal converter to intense vibration.*
- *Use assembly materials and tools in compliance with the applicable occupational health and safety directives (assembly materials and tools are not part of the scope of delivery).*

**CAUTION!**

Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

**INFORMATION!**

Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

3.4 Noise suppression

In common with other electronic circuitry, the instrument may be affected by high level, short duration noise spikes arising from electromagnetic interference (EMI) or radio frequency interference (RFI). To minimise the possibility of such problems occurring, the following recommendations should be followed when installing the unit in an environment where such interference could potentially occur.

The following noise generating sources can affect the instrument through capacitive or inductive coupling:

- Relay coils
- Solenoids
- AC power wires, particularly at or above 100V AC
- Current carrying cables
- Thyristor field exciters
- Radio frequency transmissions
- Contactors
- Motor starters
- Business and industrial machines
- Power tools
- High intensity discharge lights
- Silicon control rectifiers that are phase angle fired

The instrument is designed with a high degree of noise rejection built in to minimise the potential for interference from these sources, but it is recommended that you apply the following wiring practices as an added precaution. Cables transmitting low level signals should not be routed near contactors, motors, generators, radio transmitters, or wires carrying large currents.

If noise sources are so severe that the instrument's operation is impaired, or even halted, the following external modifications should be made, as appropriate:

- Fit arc suppressors across active relay or contactor contacts in the vicinity.
- Run signal cables inside steel tubing as much as is practical.
- Use the internal relays to switch external slave relays or contactors when switching heavy or reactive loads.
- Fit an in-line mains filter close to the power terminals of the instrument.

4.1 Safety instructions



DANGER!

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!



DANGER!

Observe the national regulations for electrical installations!



WARNING!

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.



INFORMATION!

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Used abbreviations

Abbreviation	Description
C_p	Control input passive
I_a	Current output active
I_{max}	Maximum current
I_{nom}	Nominal current
R_L	Load resistance
R plus number (e.g. R1)	Relay contact
P	Power
U_{ext}	External voltage source
$U_{ext, max}$	Maximum voltage of the external voltage source
$U_{int, nom}$	Nominal internal voltage
U_{on}	Voltage for triggering the control input (on)
U_{off}	Voltage for triggering the control input (off)

4.3 Important device-specific notes on electrical connection

**DANGER!**

Never install or operate the device in potentially explosive areas, it might cause an explosion that can result in fatal injuries!

**DANGER!**

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

**DANGER!**

When installing and wiring the device, note the safety regulations of the current state of the art. Also note the following items to avoid fatal injuries, destruction or damage of the device or measuring errors:

- *De-energise the cables of the power supply before you start any installation works.*
- *Always install input and control cables divided from each other and from high voltage current cables.*
- *Assure that all cables of the inputs and current outputs are shielded. Connect the shieldings only to one side, e.g. to the device.*
- *When using relays, note that with inductive loads the interference must be suppressed.*
- *Assure that all electrical connection works are compliant with the VDE 0100 directive "Regulations for electrical power installations with line voltages up to 1000 V" or equivalent national regulations.*
- *Use suitable cable glands for the various electrical cables and suitable connecting cables for the field of application. The outer diameter of the connecting cables has to fit to the cable glands.*
- *The nominal voltage of the connecting cable has to fit to the operating voltage of the device.*

**INFORMATION!**

Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.

4.4 Opening the converter front cover



INFORMATION!

Clean and grease all threads each time you open the housing. Use only resin-free and acid-free grease. Before closing the cover, ensure that the housing gasket is properly fitted, clean and undamaged.

All installation works on the electrical connections require to open the converter cover:

Step 1

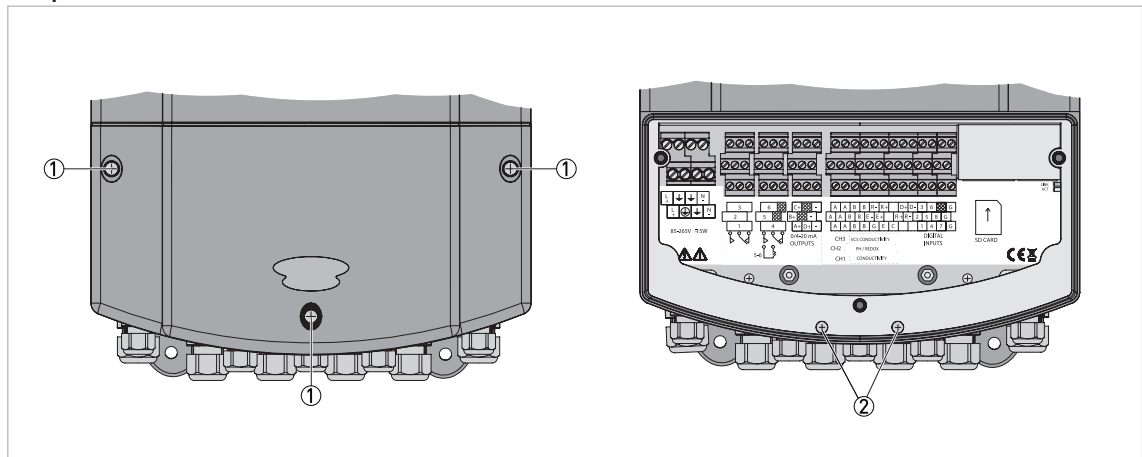


Figure 4-1: MAC 300 W front view

- ① Screw (crosstip)
- ② Screw (crosstip)



- Loose the 3 screws ① with a crosstip screwdriver.
- Lift the cover up.
- ➡ You have access to the terminal compartment now.

4.5 Connecting the signal cables



INFORMATION!

The cable glands installed by the manufacturer are designed for a cable diameter of 8 to 13 mm. If you are using cables with a larger diameter, you must replace the manufacturer's cable glands with suitable ones.

For all information concerning the signal cables of the used sensor(s) and their connection refer to the relevant sensor handbook(s).

4.6 Basic connections

Having ensured that the main power is isolated from the instrument, remove the terminal cover by releasing the three front screws. (The terminal cover is the small cover at the bottom of the front panel). Once the cover has been removed the following terminal arrangement should be visible. N.B. the appearance of the label will vary depending upon which options are installed in the instrument.

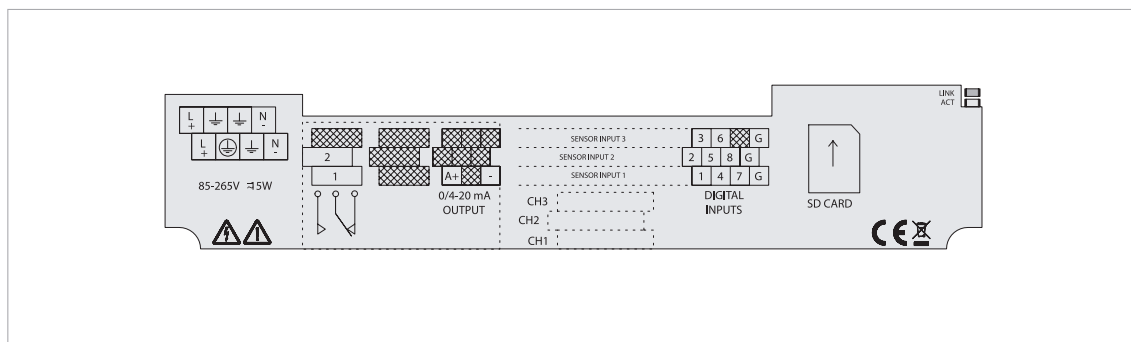


Figure 4-2: Overview basic connection

The cables should be fed through the cable glands. After each cable has been attached, pull most of the cable slack back through the cable gland to prevent any unwanted RF energy from being radiated inside the housing. Make sure not to strain the cable within the instrument. Tighten the cable gland onto the cable so that it grips sufficiently to seal and to prevent the cable from being pulled back through the gland.

4.7 Supply voltage connections

The converter can be powered from either an AC or DC supply voltage. The unit provides two terminals for each of the input connections ("Live" & "Neutral" for an AC input, or + & - for a DC Input), plus an "Earth" terminal. This allows the supply to be "daisy chained" to the relay contacts and/or other instruments. The instrument uses a universal power supply that accepts a wide range of voltage and frequency inputs. Refer to the label adjacent to the power supply terminals for the input voltage limits.

Wall mount (85-265V AC/DC)

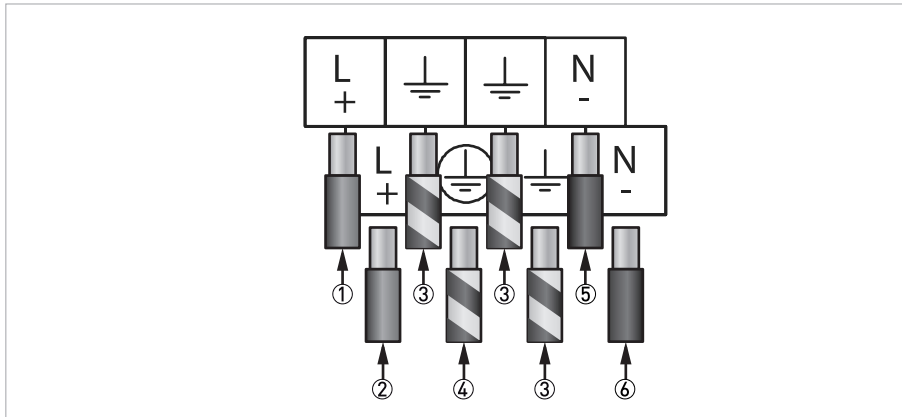


Figure 4-3: Power connector MAC 300 W

- ① Power supply "Live" out (for daisy chaining)
- ② Power supply "Live" in
- ③ Earth
- ④ Protective Earth (Must be connected)
- ⑤ Power supply "Neutral" out (for daisy chaining)
- ⑥ Power supply "Neutral" in

Wall mount (18-32V AC/DC)

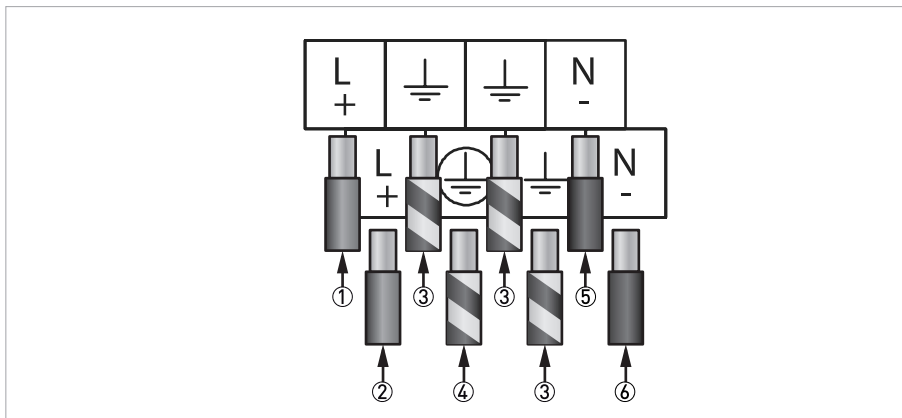


Figure 4-4: Power connector MAC 300 W

- ① Power supply "+" out (for daisy chaining)
- ② Power supply "+" in
- ③ Earth
- ④ Protective earth (Must be connected)
- ⑤ Power supply "-" out (for daisy chaining)
- ⑥ Power supply "-" in

Rack mount (85-265V AC/DC)

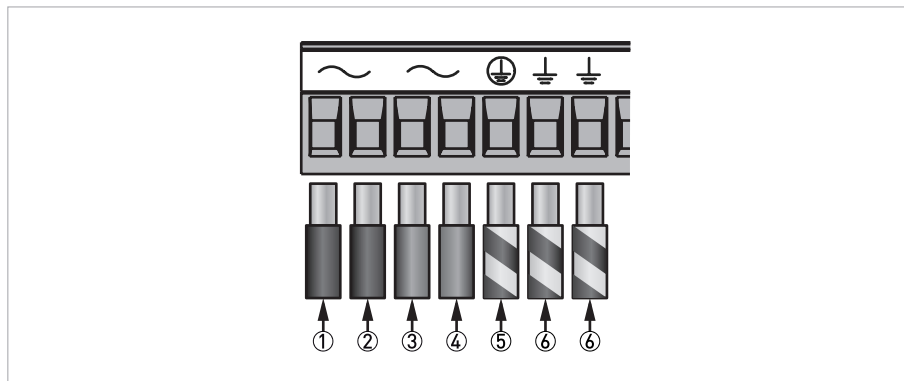


Figure 4-5: Main power connector MAC 300 R

- ① Power supply "Live" in
- ② Power supply "Live" out (for daisy chaining)
- ③ Power supply "Neutral" in
- ④ Power supply "Neutral" out (for daisy chaining)
- ⑤ Protective earth (must be connected)
- ⑥ Earth

Rack mount (18-32V AC/DC)

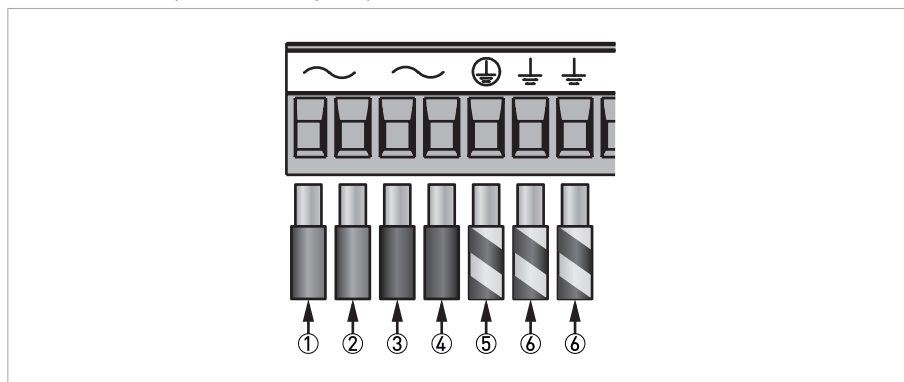


Figure 4-6: Main power connector MAC 300 R

- ① Power supply "+" in
- ② Power supply "+" out (for daisy chaining)
- ③ Power supply "-" in
- ④ Power supply "-" out (for daisy chaining)
- ⑤ Protective earth
- ⑥ Earth

**INFORMATION!**

To prevent destruction or damage, never operate the device outside of its permissible mechanical, thermal or chemical limits.

The power supply should be taken from an isolated spur and fused to a maximum of 3 Amps. If the relays require greater current, then a separate 5A fuse will be required. The incoming earth connection must be connected to the "Protective Earth" terminal.

4.8 Connecting the power supply



DANGER!

The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.



DANGER!

Never install or operate the device in potentially explosive areas, it might cause an explosion that can result in fatal injuries!



CAUTION!

When connecting the power supply, always note the safety regulations of the current state of the art. Also note the following items to avoid fatal injuries, destruction or damage of the device or measuring errors:

- *De-energise the cables of the power supply before you start any installation works!*
- *Always keep the housing of the device well closed if you do not perform any installation works. The function of the housing is to protect the electronic equipment from dust and moisture.*
- *Assure that there is a fuse protection for the infeed power circuit ($I_{nom} \leq 16\text{ A}$) and a disconnecting device (switch, circuit breaker) to isolate the signal converter.*
- *Check the nameplate and assure that the power supply meets the voltage and frequency of the device. Universal 80-265 V AC or DC, 15 W max. LV Option 18-32 V AC or DC, 20 W max. A power supply outside these specifications may destroy the device!*
- *Assure that the protective earth conductor (PE) is longer than the L- and N-conductor.*

4.9 Analog current output connections

The converter can be supplied with up to 6 current outputs designated A to F, which can terminate into a load resistance not exceeding 750Ω . For best noise immunity use a screened twisted pair cable, with the screen connected to Earth at one end. Use a sufficiently large cable to avoid a high resistance in the overall current loop.

Rack mount

Analog output connector

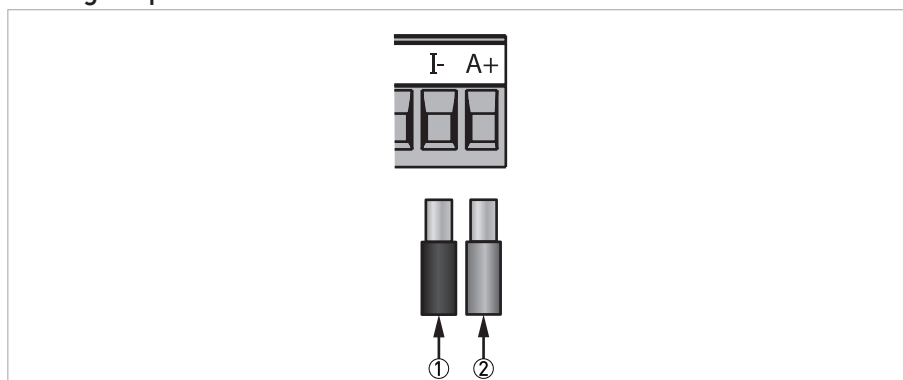


Figure 4-7: Current output A connection (MAC 300 R)

- ① Current output - [Common]
- ② Current output A+

Output option connector

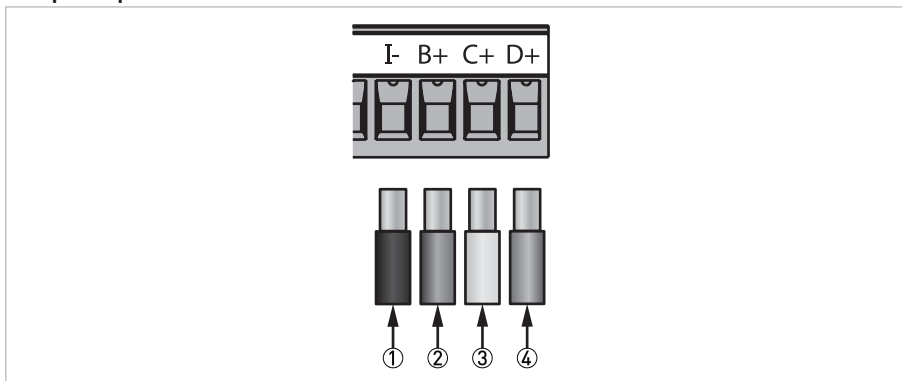
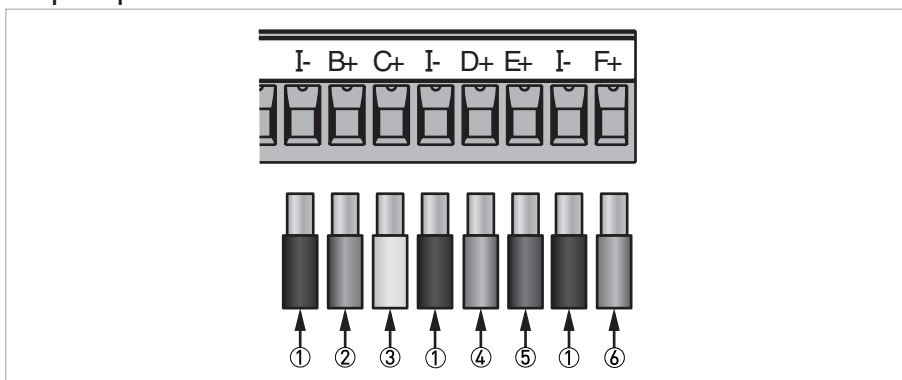


Figure 4-8: Current outputs B-D connection details (MAC 300 R)

- ① Current output - (Common)
- ② Current output B+
- ③ Current output C+
- ④ Current output D+

Output option connector

Figure 4-9: 5 current, 2 relays output expansion card
Current outputs B-F connection details (MAC 300 R)

- ① Current output - (Common)
- ② Current output B+
- ③ Current output C+
- ④ Current output D+
- ⑤ Current output E+
- ⑥ Current output F+

Wall mount

Current output connector

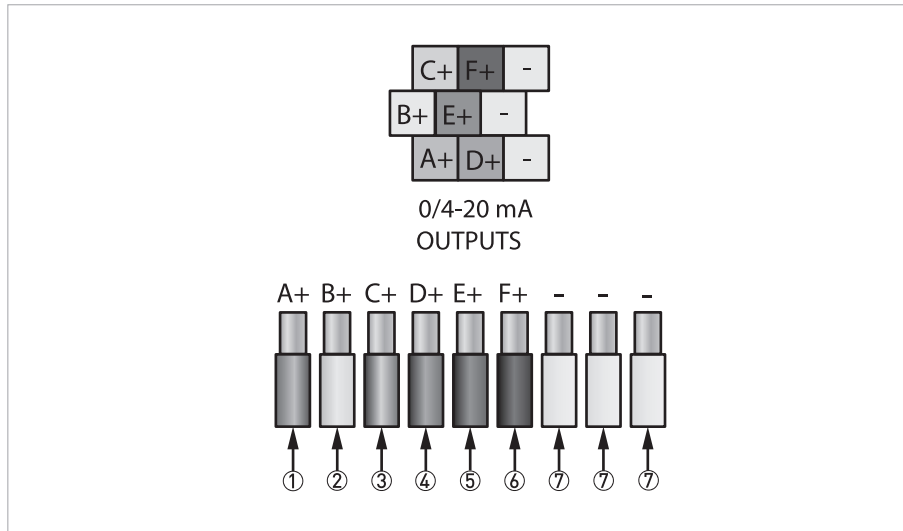


Figure 4-10: Current output connection detail (MAC 300 W)

- ① Current output A+
- ② Current output B+
- ③ Current output C+
- ④ Current output D+
- ⑤ Current output E+
- ⑥ Current output F+
- ⑦ Current output - (common)



INFORMATION!

Available current outputs varies depending upon instrument configuration

4.10 Relay connections

The converter can be supplied with up to 6 relays designated 1 to 6, 1 to 4 are change over relays while 5 to 6 are normally open relays. The relay contacts are connected to the terminals only and are electrically isolated from the instrument itself. They must be connected in series with a 5 Amp fuse. A contact arc suppressor may be required to prevent excessive electrical noise, depending upon the load. To switch more than 5 Amps will require a slave relay. For convenience, the power can be looped across from the supply connections.

Wall mount

Relays 1-3 connector

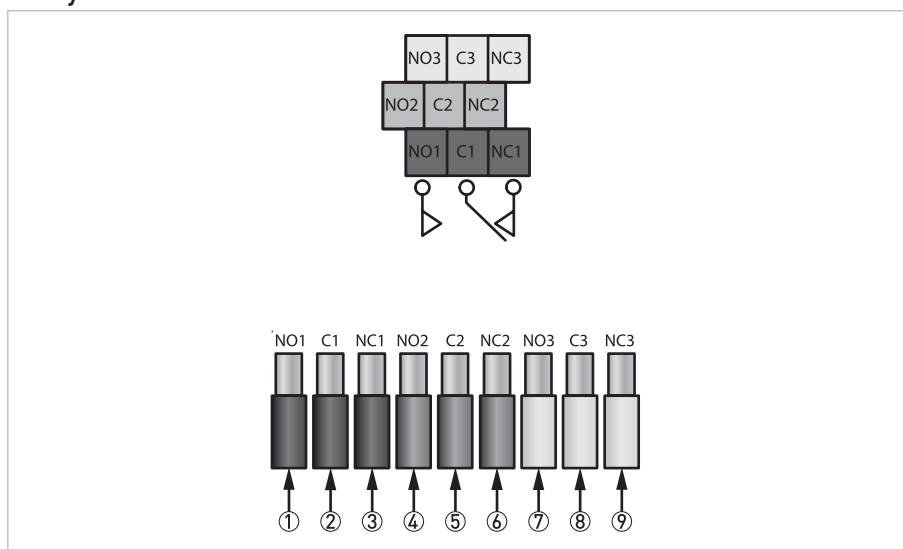


Figure 4-11: Connection details (MAC 300 W)

- ① Relay 1 normally open contact
- ② Relay 1 common contact
- ③ Relay 1 normally closed contact
- ④ Relay 2 normally open contact
- ⑤ Relay 2 common contact
- ⑥ Relay 2 normally closed contact
- ⑦ Relay 3 normally open contact
- ⑧ Relay 3 common contact
- ⑨ Relay 3 normally closed contact

Relays 4-6 connector

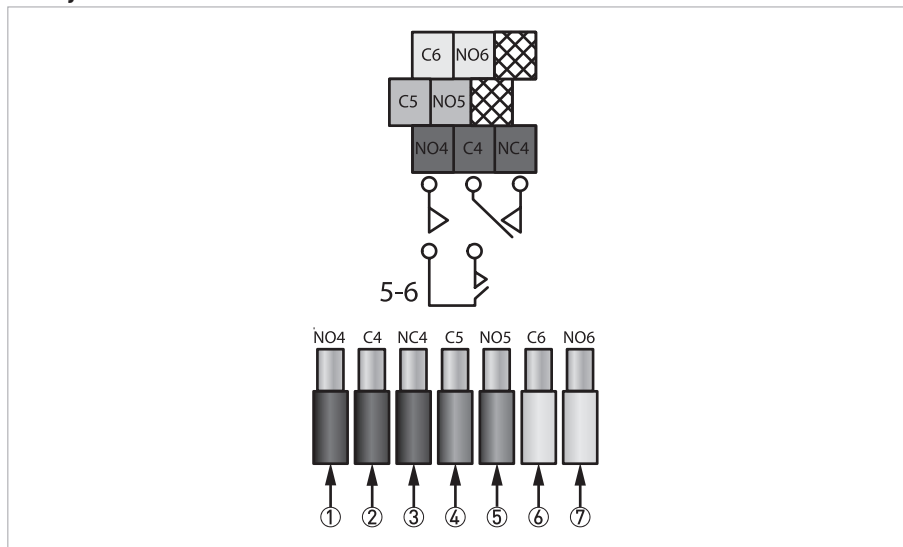


Figure 4-12: Connection details (MAC 300 W)

- ① Relay 4 normally open contact
- ② Relay 4 common contact
- ③ Relay 4 normally closed contact
- ④ Relay 5 normally open contact
- ⑤ Relay 5 common contact
- ⑥ Relay 5 normally closed contact
- ⑦ Relay 6 normally open contact

Rack mount

Main power and basic output connector

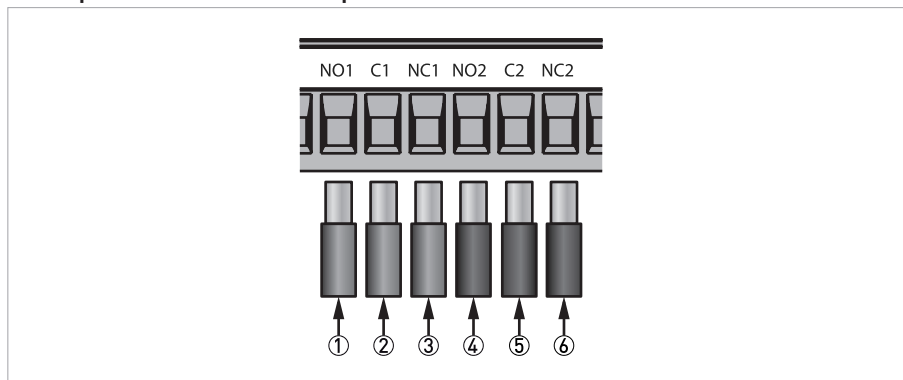


Figure 4-13: Relays 1-2 connection details (MAC 300 R)

- ① Relay 1 normally open contact
- ② Relay 1 common contact
- ③ Relay 1 normally closed contact
- ④ Relay 2 normally open contact
- ⑤ Relay 2 common contact
- ⑥ Relay 2 normally closed contact

Output option connector

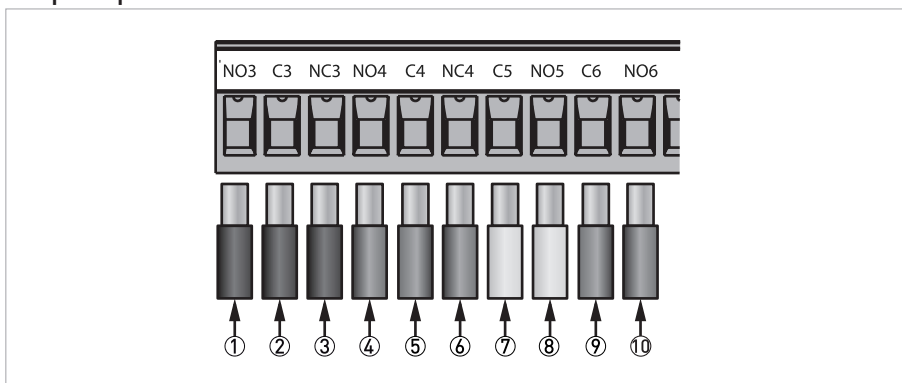


Figure 4-14: Relays 3-6 connection details (MAC 300 R)

- ① Relay 3 normally open contact
- ② Relay 3 common contact
- ③ Relay 3 normally closed contact
- ④ Relay 4 normally open contact
- ⑤ Relay 4 common contact
- ⑥ Relay 4 normally closed contact
- ⑦ Relay 5 common contact
- ⑧ Relay 5 normally open contact
- ⑨ Relay 6 common contact
- ⑩ Relay 6 normally open contact

**INFORMATION!**

Available current outputs varies depending upon instrument configuration

4.11 Digital inputs

The signal converter features 8 digital inputs, which can be used to initiate a user configurable instrument operation by use of a volt free link, switch or relay. The instrument can be configured to initiate the appropriate action when the contact either closes or opens.

Wall mount

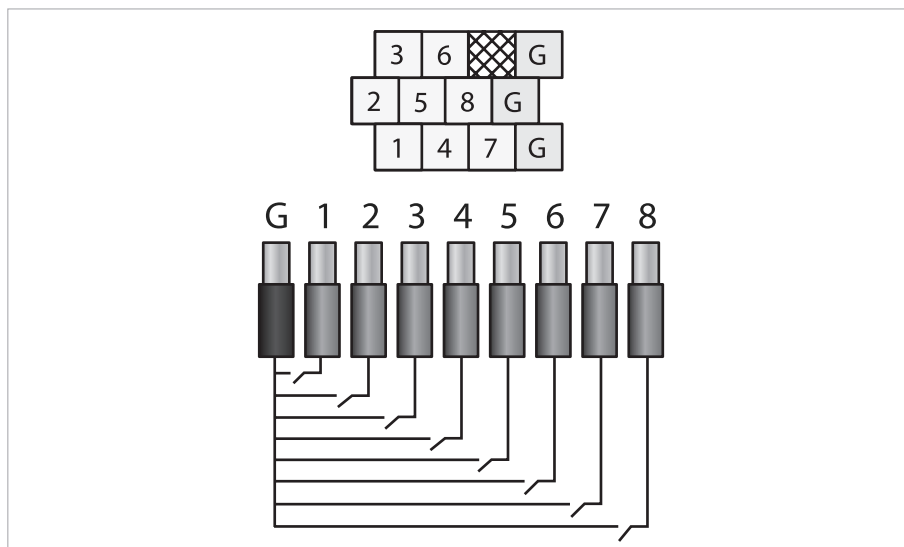


Figure 4-15: Connection details (MAC 300 W)

Rack mount

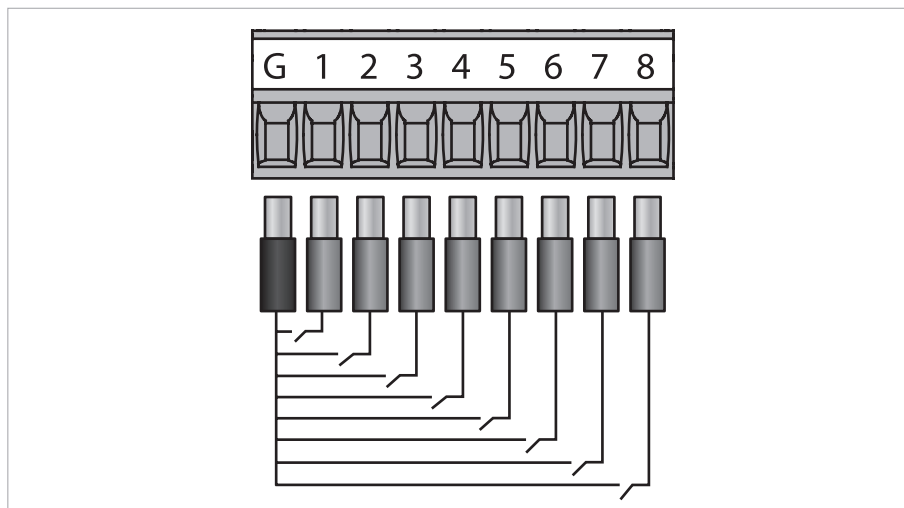


Figure 4-16: Connection details (MAC 300 R)

4.12 SD card interface

The converter features a SD card interface which is compatible with SD, SDHC and SDXC formatted cards (N.B. SDXC cards may need formatting by the converter before use). The card can be removed whilst the instrument is on but only when the disk icon is not shown at the top of the display.

To insert the card ensure that the corner notch is on the top right of the card, and then just push it all the way in to the socket. To remove the card push it in then release and the card should then come out of the socket.

4.13 Opening the converter cover / housing (wall mount)



INFORMATION!

Clean and grease all threads each time you open the housing. Use only resin-free and acid-free grease. Before closing the cover, ensure that the housing gasket is properly fitted, clean and undamaged.

All installation works on the electrical connections require to open the converter cover:

Step 1

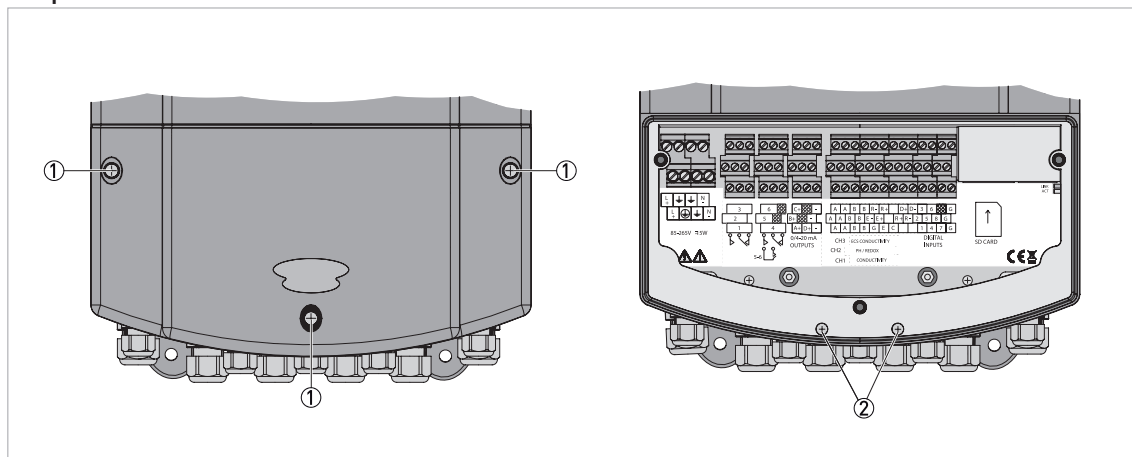


Figure 4-17: MAC 300 W front view

① Screw (crosstip)

② Screw (crosstip)



- Loose the 3 screws ① with a crosstip screwdriver.
- Lift the cover up.
- ➔ You have access to the terminal compartment now.



- Access to the mainboard
- Loose the 2 screws ② with a crosstip screwdriver.
- Continue with step 2

Step 2

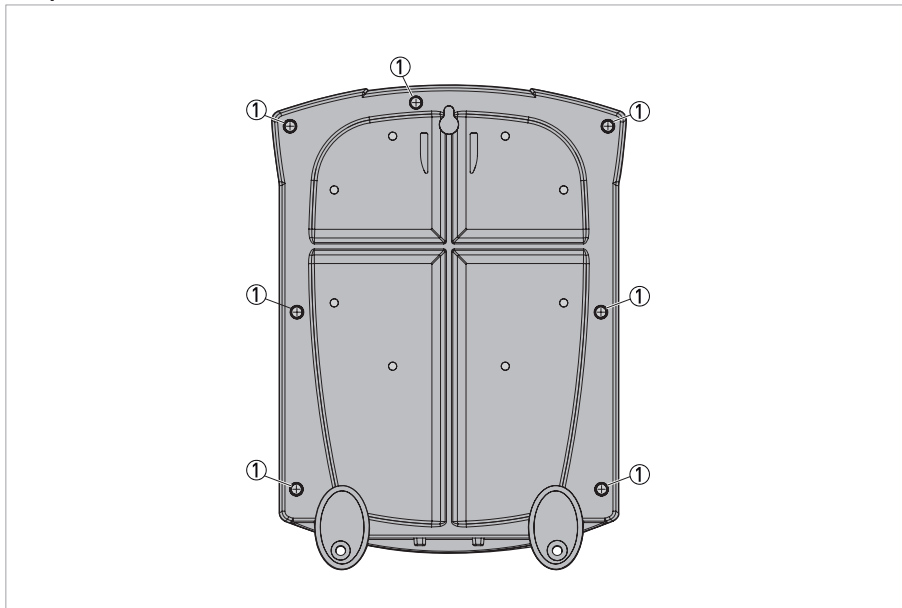


Figure 4-18: MAC 300 W rear view

① Screw (crosstip)



- Loose the 7 screws with a crosstip screwdriver.
- Lift the housing up.
- ➡ You have access to the mainboard now.

4.14 Opening the converter cover (rack mount)

**INFORMATION!**

Clean and grease all threads each time you open the housing. Use only resin-free and acid-free grease. Before closing the cover, ensure that the housing gasket is properly fitted, clean and undamaged.



- Loose the 4 screws with a crosstip screwdriver.
- Lift the housing up.
- ➡ You have access to the mainboard now.

4.15 Add-in cards installation

The signal converter is designed to be expandable by the use of add-in cards; these add-in cards can take the form of either a sensor input add-in card or an output option add-in card. The converter can be fitted with up to 3 sensor input cards and 1 output option card. The sensor input cards are designated Input Card 1, Input Card 2 and Input Card 3. On the instrument display these are designated Channel 1, Channel 2 and Channel 3.



INFORMATION!

Electrostatic precautions must be taken when handling the Add-in cards.

Wall mount

Input cards 1 & 2 are installed via the use of headers A and B. Insert the required input cards between the headers ensuring that the connectors are correctly aligned with the headers on the input cards.

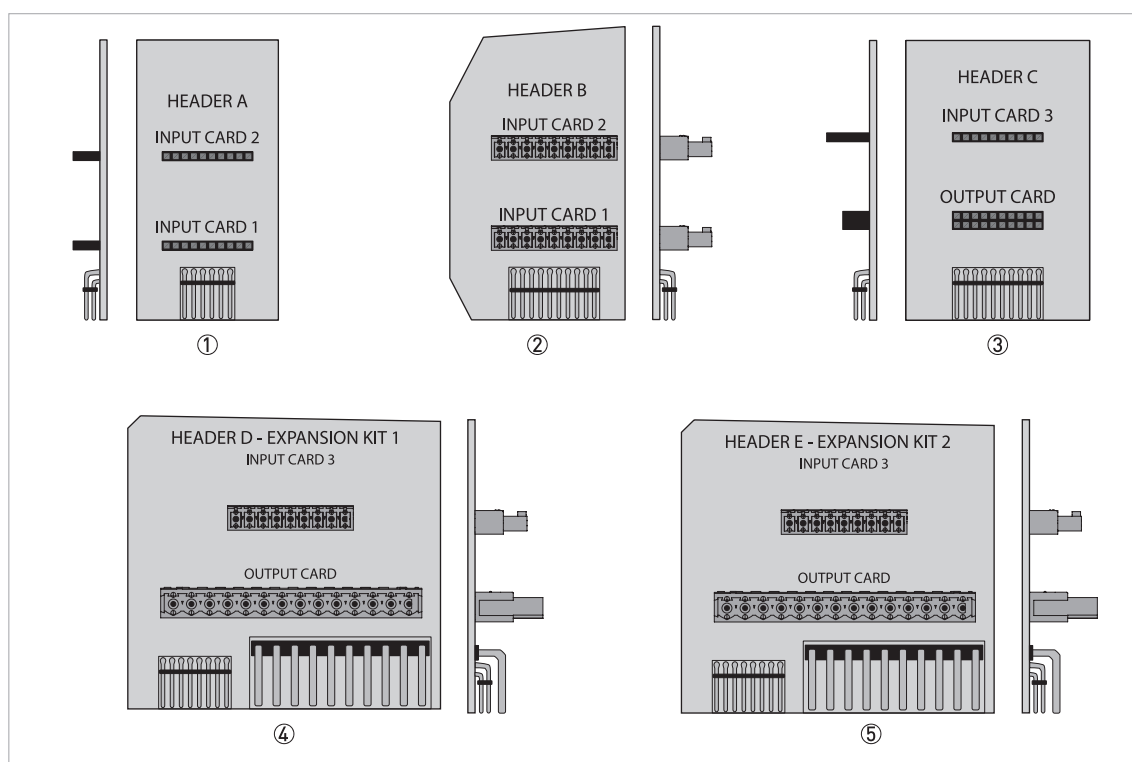


Figure 4-19: Overview header (MAC 300 W)

- ① Header A
- ② Header B
- ③ Header C
- ④ Header D
- ⑤ Header E

Insert the required input cards between the headers ensuring that the connectors are correctly aligned with the headers on the input cards.

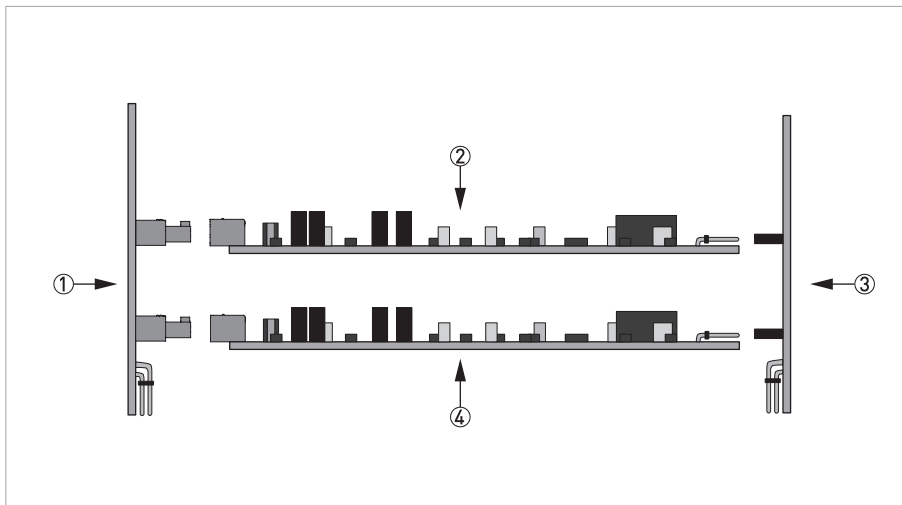


Figure 4-20: Header and input card mounting (MAC 300 W)

- ① Header B or header D/E
- ② Channel input card (only the channel 1 input card is not optional)
- ③ Header A or header C
- ④ Channel input card or output option card (Optional)

The headers with the cards attached must be inserted into the instrument's main board connectors. The header's name have to match with corresponding text on the board. Align the header board with the dotted outline on the main board. For an additional sensor attach the supplied connection labels to the terminal area label and inside the terminal.

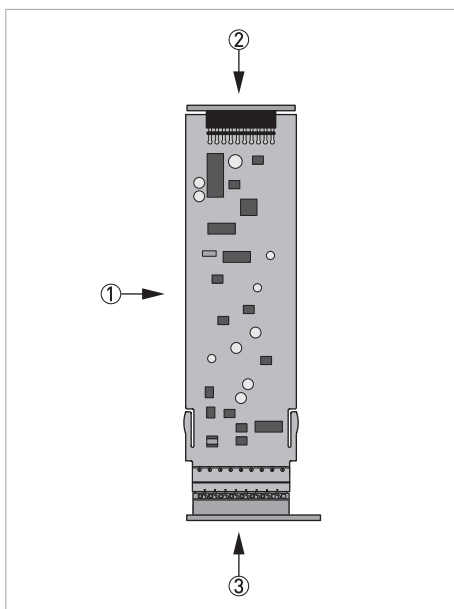


Figure 4-21: Input card (MAC 300 W and MAC 300 R)

- ① Channel input card
- ② Header A or header C
- ③ Header B or header D/E

Input card 3 and the output option card are installed via the use of header C and either header D or E depending on the configuration of the output option card.



INFORMATION!

Header's C, D and E are not supplied with the standard instrument and must be purchased separately if upgrading the unit after initial purchase.

Insert the required input card or output option card between the headers ensuring that the connectors are correctly aligned with the headers on the cards.

Rack mount



INFORMATION!

Cards must be inserted with the green connector towards the rear of the instrument case.

To install the new card into the instrument, first remove all existing connectors from the rear of the instrument. Then remove the four screws shown on the following diagram.

Remove the rear cover and the instrument note depending on the configuration of the instrument the add-in card slots may already be populated.

The add-in cards are inserted into the instrument with the edge of the card positioned down the middle of guide, and with the green connector towards the rear of the instrument case. Insert the card all the way in until the far connector is fully home.

Then depending upon the options installed affix the accompanying add-in description labels to the rear cover in the locations shown.

Put the rear cover back on the unit, screw the 4 screws and plug the connectors back in.



INFORMATION!

Depending on the configuration of the instrument the add-in card slots may already be populated.

4.16 Current output



DANGER!

Never install or operate the device in potentially explosive areas, it might cause an explosion that can result in fatal injuries.

The signal converter can be fitted with up to six current outputs designated A – F. Each individual current output can be assigned to any one of the sensor input channels. The current output menu contains all of the necessary setup functions to configure the current output sources. The instrument can display all of the enabled current outputs on one trend screen or alternatively if displaying only one sensor input channel, two trends can be shown on the front screen (see Configuration – Setup Front Screen, User Interface).

You are on the main menu level.
Press ↓ or ↑ until the submenu **4-20mA OUTPUTS** is highlighted.
Press ↵ to enter the chosen menu.

4-20mA OUTPUTS SETUP

Dependig on the installed card select either the input channel you wish to edit
Press ↓ or ↑ until the submenu you wish to edit is highlighted.

For example

- 4-20mA OP A → CHANNEL 1 (SENSOR)
- 4-20mA OP B → CHANNEL 1 (TEMP)
- 4-20mA OP C → CHANNEL 2 (SENSOR)
- 4-20mA OP D → CHANNEL 3 (SENSOR)
- 4-20mA OP E → DISABLED

Press ↵ to enter the chosen menu.

4-20mA OUTPUTS A SETUP

Press ↓ or ↑ until the submenu you wish to edit is highlighted.
Enter the access code with the help of ↓ or ↑. The default security access code is 1000

Press ↓ or ↑ to choose between

CHANNEL:

DISABLED / CHANNEL 1 (COND) / CHANNEL 2 (pH) / CHANNEL 3 (SS)

The "Sensor Input Channel" the current output is to be associated with. The channels shown depend on the configuration of the instrument. To disable the current output select the disabled option. This will turn off the output, remove it's reading from the front screen, the current output trend screen and the menu header. It will also clear any error messages associated with it.

INPUT SOURCE:

SENSOR / TEMPERATURE

OUTPUT:

4-20mA / 0-20mA

RANGE:

0 to 99.99µS/cm / 0 to 999.9µS/cm / 0 to 9.999mS/cm / 99.99mS/cm

This is only available if the associated sensor input channel has a range option and is set to auto in the channel's setup menu. The available options will depend on the cell constant of the sensor used, consult the sensor manual for more information.

ZERO (4mA):

0100 mg/l

Enter the desired sensor value to be represented by 0mA or 4mA (depends on current output scaling). An inverse relationship can be achieved by setting the Zero greater than the Span. If the sensor reading falls outside this and the span value an error / alarm will be activated.

SPAN (20mA):

1000 mg/l

Enter the desired sensor value to be represented by 20mA. An inverse relationship can be achieved by setting the Span less than the Zero. If the sensor reading falls outside this and the zero value an error / alarm will be activated.

ON ERROR:

NO ACTION / DRIVE TO 0mA / DRIVE TO 4mA / DRIVE TO 22mA / HOLD LEVEL

The current outputs can be programmed to output 0mA, 22mA or Hold their value when an error is detected on the input source (i.e. Sensor Fault, Temperature Fault), to provide remote warning of error conditions or to ensure fail safe operation.

Press ↵ to enter the chosen menu.

Press **EXIT** several times to return to the measuring mode.

4.16.1 Current output calibration

The user is provided with an opportunity to adjust the current output to calibrate any equipment that may be being used to monitor the current output signal.

- You are on the main menu level. - Press ↓ or ↑ until the submenu CALIBRATION is highlighted. - Press ↵ to enter the chosen menu.
CALIBRATION
Press ↓ or ↑ until the submenu 4-20mA OUTPUTS is highlighted. Press ↵ to enter the chosen menu.
CALIBRATE 4-20mA OUTPUTS
Press ↓ or ↑ until the submenu you wish to edit is highlighted.
Enter the access code with the help of ↓ or ↑. The default security access code is 1000
Press ↓ or ↑ to choose between 4-20mA OUTPUT A → SET OUTPUT TO DMM TO 0mA, 4mA and 20mA USING ↑ AND ↓ ARROWS 4-20mA OUTPUT B → SET OUTPUT TO DMM TO 0mA, 4mA and 20mA USING ↑ AND ↓ ARROWS 4-20mA OUTPUT C → SET OUTPUT TO DMM TO 0mA, 4mA and 20mA USING ↑ AND ↓ ARROWS 4-20mA OUTPUT D → SET OUTPUT TO DMM TO 0mA, 4mA and 20mA USING ↑ AND ↓ ARROWS 4-20mA OUTPUT E → SET OUTPUT TO DMM TO 0mA, 4mA and 20mA USING ↑ AND ↓ ARROWS 4-20mA OUTPUT F → SET OUTPUT TO DMM TO 0mA, 4mA and 20mA USING ↑ AND ↓ ARROWS
Press EXIT several times to return to the measuring mode.

4.16.2 Resetting the current output user calibration

If required the user can reset the current output user calibration back to factory settings.

- You are on the main menu level. - Press ↓ or ↑ until the submenu CALIBRATION is highlighted. - Press ↵ to enter the chosen menu.
CALIBRATION
Press ↓ or ↑ until the submenu RESET USER CALIBRATION is highlighted. Press ↵ to enter the chosen menu.
RESET USER CALIBRATION
Press ↓ or ↑ until the submenu RESET 4-20mA OUTPUTS is highlighted.
Enter the access code with the help of ↓ or ↑. The default security access code is 1000
Press ↓ or ↑ to choose between 4-20mA OUTPUT A → RESET 4-20mA OUTPUT B → RESET 4-20mA OUTPUT C → RESET 4-20mA OUTPUT D → RESET 4-20mA OUTPUT E → RESET 4-20mA OUTPUT F → RESET
Press EXIT several times to return to the measuring mode.

4.17 Digital inputs



DANGER!

Never install or operate the device in potentially explosive areas, it might cause an explosion that can result in fatal injuries.



INFORMATION!

For further information refer to the connection diagrams and the technical data table.

The signal converter is fitted with eight digital inputs designated 1 – 8. Each individual digital input can be assigned to any one of the sensor input channels or to the instrument as a whole. The digital input menu contains all of the necessary setup functions to configure the digital input sources. These inputs are intended to be switched using a volt free link, switch or relay. The user can select whether closing or opening the contact initiates the configured action.

- You are on the main menu level.
- Press ↓ or ↑ until the submenu **DIGITAL INPUTS** is highlighted.
- Press ← to enter the chosen menu.

DIGITAL INPUTS SETUP

Dependig on the installed card select either the input channel you wish to edit
Press ↓ or ↑ until the submenu you wish to edit is highlighted.

For example

DIG IP 1 → CH 1 (OFF-LINE)

DIG IP 2 → CH 1 (RANGE)

DIG IP 3 → CH 3 (SWITCH SETUP)

DIG IP 4 → CH 2 (CLEAN)

DIG IP 5 → CH 2 UNIT

DIG IP 6 → CH 2 DISABLED

The status of the Digital Input is also shown to the left of each item.

Filled circle = digital input closed circuit.

Empty circle = digital input open circuit

Press ← to enter the chosen menu.

Enter the access code with the help of ↓ or ↑. The default security access code is 1000
DIGITAL INPUT 1 SETUP

Press ↓ or ↑ until the submenu you wish to edit is highlighted.

CHANNEL:

DISABLED / CHANNEL 1 (SS) / CHANNEL 2 (pH) / CHANNEL 3 (COND)

The "Sensor Input Channel" the digital input is to be associated with. The channels shown depend on the configuration of the instrument. Alternatively if Whole Unit is selected the action will affect all of the input channels. To disable the digital input select the disabled option.

FUNCTION:

OFF-LINE / SWITCH SETUP / INTERLOCK / FLOW SWITCH INPUT / TANK LEVEL SWITCH / CIP / CLEAN / RANGE CHANGING / CALIBRATION

(within the sub menu shown functions only show if applicable for chosen measurement/sensor card)

OFF-LINE

These function when active will take the associated sensor input channel "offline". This causes any setpoints associated with the channel to deenergise. They are also accompanied by a message on the front screen informing the user which action is currently active. Note – When a digital input is assigned to one of these functions the user can no longer take the associated channel offline using the menu item in the channel setup menu or the channel calibration menu. As indicated by the "Cannot Edit, Digital Input Has Control" message. In addition to de-energising any associated setpoints the user can also define the operation the current outputs associated with the sensor input channel.

SWITCH SETUP

The digital input is used to load in an alternative sensor input channel configuration (Sensor Setup, Setpoint Setup and Current Output Setup) that have been stored in one of the two internal channel stores. Whilst the digital input is active no parameters assigned to the sensor input channel can be edited. The original configuration is restored upon the digital input going inactive. For information regarding saving the setup, see the Save and Restore section of the user interface guide. NOTE – Only one store at a time can be loaded per channel.

INTERLOCK	These function when active will take the associated sensor input channel "offline". This causes any setpoints associated with the channel to deenergise. They are also accompanied by a message on the front screen informing the user which action is currently active. Note – When a digital input is assigned to one of these functions the user can no longer take the associated channel offline using the menu item in the channel setup menu or the channel calibration menu. As indicated by the "Cannot Edit, Digital Input Has Control" message. In addition to de-energising any associated setpoints the user can also define the operation the current outputs associated with the sensor input channel.
FLOW SWITCH INPUT	These function when active will take the associated sensor input channel "offline". This causes any setpoints associated with the channel to deenergise. They are also accompanied by a message on the front screen informing the user which action is currently active. Note – When a digital input is assigned to one of these functions the user can no longer take the associated channel offline using the menu item in the channel setup menu or the channel calibration menu. As indicated by the "Cannot Edit, Digital Input Has Control" message. In addition to de-energising any associated setpoints the user can also define the operation the current outputs associated with the sensor input channel.
TANK LEVEL SWITCH	These function when active will take the associated sensor input channel "offline". This causes any setpoints associated with the channel to deenergise. They are also accompanied by a message on the front screen informing the user which action is currently active. Note – When a digital input is assigned to one of these functions the user can no longer take the associated channel offline using the menu item in the channel setup menu or the channel calibration menu. As indicated by the "Cannot Edit, Digital Input Has Control" message. In addition to de-energising any associated setpoints the user can also define the operation the current outputs associated with the sensor input channel.
CIP	The CIP input indicates to the associated sensor channel that a CIP event is in progress so that the sensor can be disabled, to prevent overstressing the probe. When active a "CIP ACTIVE" message appears next to the associated channel and the probe signal will go to 0000. As this will affect the setpoints and current outputs associated with this channel the user is recommended to assign an additional digital input to this channel set it to offline and energise the digital input in tandem with the CIP input. Note. CIP is only available on Suspended Solids and Turbidity input channels.
CLEAN	SETPOINT SETPOINT 1 If the selected Input Sensor Channel has a setpoint configured for a cleaning operation, an external cleaning cycle can be initiated using this function.
RANGE CHANGING	RANGE 0 to 99.99µS/cm / 0 to 999.9µS/cm / 0 to 9.999mS/cm / 99.99mS/cm The digital input is used to change the displayed range of the selected sensor input channel. This also affects the operating range of both the setpoints and current outputs associated with the sensor input channel. When Auto is selected the setpoints and current outputs will revert to the internally set ranges. The available options will depend on the cell constant of the sensor used, consult the input cards manual for more information. Note – This is only available if the associated Sensor Input Channel has a range option.
CALIBRATION	Initialise a dissolved oxygen span calibration.
POLARITY: NORMALLY OPEN / NORMALLY CLOSED Configure whether the digital input activates on the closing of circuit (normally open) or the opening of the circuit (normally closed).	
4-20mA OP LEVEL: NO ACTION / DRIVE TO 0mA / DRIVE TO 4mA / DRIVE TO 22mA / HOLD LEVEL	
Press ↵ to enter the chosen menu.	
Press EXIT several times to return to the measuring mode.	

4.18 Simulate channels

The facility exists within the singal converter to simulate the input sensor levels to test the setpoint and current output operation. This function allows the user to cycle up and down through the sensor range whilst displaying the current output level, and with the relays responding accordingly.

- You are on the main menu level.
- Press ↓ or ↑ until the submenu **CHANNELS** is highlighted.
- Press ↵ to enter the chosen menu.

CHANNELS SETUP

Press ↓ or ↑ until the submenu **SIMULATE CHANNELS** is highlighted.
Press ↵ to enter the chosen menu.

SIMULATE CHANNELS

Select the sensor or temperature you wish to simulate and observe the associated setpoints operate and current outputs move. Only input sensors or temperatures with setpoints or current outputs associated with them will appear. Note – This menu will not “time out” back to the front screen.

Press ↵ to enter the chosen menu.

- Press **EXIT** several times to return to the measuring mode.

4.19 Setpoints

The signal converter can be fitted with up to six setpoint relays designated 1 – 6. Setpoints 1 – 4 are “Change Over” relays while 5 – 6 are “Normally Open” relays. Each individual setpoint can be assigned to any one of the Sensor Input Channels. The Setpoint/Relays menu contains all of the necessary setup functions to configure the setpoint sources. The instrument indicates the status of the enabled setpoints by means of 6 LED indicators located above the main instrument display. A lit LED indicates that the setpoint / Relay is active. If the LED is blinking it indicates a dose alarm has occurred on that setpoint.

You are on the main menu level.
Press ↓ or ↑ until the submenu **SETPOINT/RELAYS** is highlighted.
Press ↵ to enter the chosen menu.

SETPOINT / RELAYS SETUP

Dependig on the installed card select either the input channel you wish to edit
Press ↓ or ↑ until the submenu you wish to edit is highlighted.
For example

SETPOINT 1 → CHANNEL 1 (SENSOR)
SETPOINT 2 → CHANNEL 1 (TEMP)
SETPOINT 3 → CHANNEL 2 (SENSOR)
SETPOINT 4 → CHANNEL 3 (SENSOR)
SETPOINT 5 → CHANNEL 2 (CLEANING)
SETPOINT 6 → UNIT ALARM

Press ↵ to enter the chosen menu.

SETPOINT 1 SETUP

Dependig on the installed card select either the input channel you wish to edit.
Enter the access code with the help of ↓ or ↑. The default security access code is 1000

CHANNEL:

Select: DISABLED / CHANNEL 1 (COND) / CHANNEL 2 pH / CHANNEL 3 (SS) / UNIT ALARM

The “Sensor Input Channel” the setpoint is to be associated with. The channels shown depend on the configuration of the instrument. For more information regarding the Unit Alarm option see the setpoint alarm mode section. To disable the setpoint select the disabled option. This will turn off the setpoint and clear any error messages associated with it

INPUT SOURCE:

Select SENSOR / TEMPERATURE / ALARM

The input source for the selected setpoint. Available options vary depending on whether the appropriate source is enabled in the channel's setup menu. Alarm option – see the setpoint alarm mode section. Cleaning option – see the setpoint cleaning mode section (not available on all input card types.)

RANGE:

Select 0 to 99.99µS/cm / 0 to 999.9µS/cm / 0 to 9.999mS/cm / 99.99mS/cm

The setpoint's operating range. This is only available if the associated Sensor Input Channel has a range option and is set to Auto in the channel's setup menu. The available options will depend on the cell constant of the sensor used, consult the input card's manual for more information

TRIGGER: HIGH / LOW / BAND / LATCH HIGH / LATCH LOW / USP (Cond only, see conductivity manual for more information)	
HIGH	The setpoint will activate when the associated sensor input channel's input becomes greater than the setpoint level
LOW	The setpoint will activate when the associated sensor input channel's input becomes less than the setpoint level.
BAND	The setpoint will activate when the associated sensor input channel's input is either greater than the setpoint high level or less than the setpoint low level
LATCH HIGH	The setpoint will activate when the associated sensor input channel's input is greater than the setpoint high level and will remain active until the input falls below the setpoint low level. It will then remain inactive until the input level rises above the setpoint
LATCH LOW:	The setpoint will activate when the associated sensor input channel's input is less than the setpoint low level and will remain active until the input rises above the setpoint high level. It will then remain inactive until the input level falls below the setpoint low level.
HIGH VALUE: Enter the high value setpoint for the desired sensor	
LOW VALUE: Enter the low value setpoint for the desired sensor	
MODE: Select ON/OFF / PULSE PROB / TIME PROB The setpoints can operate in one of three modes. ON/OFF The setpoint energises when the setpoint is activated and de-energises when the setpoint is de-activated.	
ON / OFF	The setpoint energises when the setpoint is activated and de-energises when the setpoint is de-activated.
PULSE PROB	See setpoint proportional mode section.
TIME PROB	See setpoint proportional mode section.
DELAY: Enter the desired delay In order to prevent short duration changes at the input affecting the setpoint operation a delay can be set before the setpoint is energised. If the input is still the same after the delay, then the setpoint will be energised. Note- Only available when Trigger is set to High or Low and Mode is On/Off	
HYSTERESIS: Enter the desired Hysteresis A facility to apply hysteresis to the setpoint level allows the user to avoid setpoint "Chatter" when the sensor input level approaches the setpoint level. "Chatter" is caused when the sensor input is sufficiently close to the set point value and noise on the signal repeatedly crosses the set point level, thus causing the relay to switch on and off rapidly. The hysteresis level should therefore be set to be greater than the input noise level. The Hysteresis value is a percentage of the setpoint value applied both + and - to the setpoint. For example, if the setpoint was 10.00 and the Hysteresis was 1% then the hysteresis band would operate from 9.90 to 10.10. Hysteresis operates as follows: Trigger High – The setpoint is inactive until the reading is greater than the Setpoint High + (Setpoint High X Hysteresis %). It remains active until it goes below Setpoint High – (Setpoint High X Hysteresis %). Trigger Low – The setpoint is inactive until the reading is less than the Setpoint Low – (Setpoint Low X Hysteresis %). It remains active until it goes above Setpoint Low + (Setpoint Low X Hysteresis %). Trigger Band – The setpoint uses both high and low. Note. Hysteresis is only available when setpoint trigger is set to High, Low or Band.	

	DOSE ALARM: Select YES / NO The dose alarm timer can be used to prevent overdosing under many different fault conditions, such as sensor failure or application problems. Dose Alarm Active When the dose alarm activates the following happens: The setpoint will de-energise. The associated setpoint led will flash. The Dose Alarm error message will appear next to the associated input channel on the front screen. ACK will appear as a function to acknowledge the setpoint on the front screen. An error will be set for that input channel. To cancel the dose alarm and reactivate the setpoint, select the required setpoint. Note – If, once reset, the setpoint again remains energised for the length of the dose alarm timer then the dose alarm will once again activate. If this problem persists then a dosing problem will need to be investigated.
	ALARM TIME: Enter the desired Alarm Time Sets the time which if the setpoint is active for longer than causes the dose alarm to activate. During pulse or time proportional mode the cumulative “on” time that the setpoint is active will be measured
	INITIAL CHARGE: Select YES / NO This allows the user to have a one time over-ride of the Dose Alarm to use for example when filling a tank for the first time. The user enters a charge time and then initiates the charge time. The unit will then disable the dose alarm until either the relay becomes inactive because the setpoint has been reached or the charge timer reaches zero in which event the unit will automatically display a Dose Alarm.:
	CHARGE TIME: Enter the initial CHARGE TIME
	INITIAL CHARGE ACCESS: Select YES / NO Enabling this allows the user to initialise the initial charge by means of a menu on the front screen. Front Screen Initial Charge Enter the Initial Charge Menu by means of the INIT button. Initialise Initial Charge Select which setpoint to initialise the initial charge. Note – Once started the Initial charge timer will appear next to the associated input channel on the front screen.
	INITIAL CHARGE: Select YES / NO The user can also start the initial charge via this option in the setpoint menu. Note – Once started the Initial charge timer will appear next to the associated input channel on the front screen.
	CYCLE TIME: Sets the cycle time (sum of both On and Off periods). Note – Time Proportional mode only.
	PROPORTIONAL BAND: Enter the size of the proportional band in measurement units.
	Press EXIT several times to return to the measuring mode.

4.19.1 Setpoint Proportional Mode

In addition to On/Off mode the signal converter also provides two forms of pseudo proportional control, which can be used to control the levels to a defined value when used in conjunction with a pump or valve. When the reading deviates from the programmed set point level the relay pulses at a rate proportional to that deviation. Note – Only available when Setpoint Trigger is set to either High or Low.

Pulse Proportional Mode

The Pulse Proportional mode is intended to drive solenoid type dosing pumps which have the facility to accept an external pulse input. The setpoint relay operates by producing a pulse of 0.2 seconds in duration and with a maximum period of one pulse per 30 seconds. The pulse rate increases as the measurement moves further from the set point, until it reaches the minimum period of one pulse per 0.4 seconds at the limit of the proportional band.

For example if the user sets a proportional band of 1.00, the setpoint trigger to LOW, and a setpoint value of 10.00. When the reading falls just below 10.00 the setpoint will begin to pulse at its longest period of once per 30 seconds. As the reading falls further from the setpoint the period will decrease until it reaches its minimum of one pulse every 0.4 seconds at the limit of the proportional band. (See Setpoint Pulse Rate – Pulse Proportional Mode section on the diagram below.)

Time Proportional Mode

Time Proportional Mode allows a user defined cycle time to control any on/off device such as a solenoid valve or dosing pump over a user set proportional band.

For example if the user sets a proportional band of 1.00, the setpoint trigger to LOW, and a setpoint value of 10.00. When the reading falls below 9.00 the setpoint would be energised 100% of the cycle time. As the input rises and approaches the set point the setpoint starts to cycle on and off with the on time reducing and the off time increasing, respectively until it reached the setpoint and would be off for 100% of the cycle time. The cycle time is adjustable and is the sum of the on and off times. (See Setpoint Cycle Time – Time Proportional Mode section on the diagram below.)

4.19.2 Setpoint alarm mode

By selecting alarm in the setpoints input source the setpoint can be configured as an alarm output triggered by one of a number of events.

- Sensor error - When a sensor related error is detected on the associated sensor input channel.
- Dose alarm - When any of the dose alarms is active on a setpoint associated with this setpoints sensor input channel.
- Calibration - When a calibration is in progress on the associated sensor input channel.
- Off-Line - When the associated sensor input channel has been taken "Off-Line."
- Any error - When any error is detected on the associated sensor input channel.
- Cleaning - When a cleaning operation is in progress on a setpoint associated with this setpoints sensor input channel.
- Calibration due - When if enabled the calibration due timer has expired on the associated sensor input channel.
- Gain error - When a gain error is present on the associated sensor input channel. Only available when set to a suspended solids input channel.
- Power failure - Holds the relay in a permanently energised state until the unit is powered down. Only available when using unit alarm.



INFORMATION!

By selecting Unit Alarm in the setpoint channel option each alarm option will activate if they occur on any of the instruments three sensor input channels.

4.19.3 Setpoint cleaning mode

The setpoints can be configured to operate a cleaning system on a timed cycle (e.g. jet pressure of pump or a solenoid for air pressure clean, depending on customer requirements). Its purpose is to prevent accumulation of particulate matter on the active surfaces of the sensor. Note that cleaning is not available on all sensor input types.

You are on the main menu level.
Press ↓ or ↑ until the submenu **SETPOINT/RELAYS** is highlighted.
Press ↵ to enter the chosen menu.

SETPOINT / RELAYS SETUP

Dependig on the installed card select either the input channel you wish to edit
Press ↓ or ↑ until the submenu you wish to edit is highlighted.
For example

SETPOINT 1 → CHANNEL 1 (SENSOR)
SETPOINT 2 → CHANNEL 1 (TEMP)
SETPOINT 3 → CHANNEL 2 (SENSOR)
SETPOINT 4 → CHANNEL 3 (SENSOR)
SETPOINT 5 → CHANNEL 2 (CLEANING)
SETPOINT 6 → UNIT ALARM

Press ↵ to enter the chosen menu.

SETPOINT 1 SETUP

Press ↓ or ↑ until the submenu **INPUT SOURCE** and the associated submenu **CLEANING** is highlighted.
Press ↵ to enter the chosen menu.

Enter the access code with the help of ↓ or ↑. The default security access code is 1000

Now you have the oppurtunity to adjust the CLEAN DURATION / CLEAN INTERVAL / TIME REMAINING / CLEAN MODE / CLEAN RECOVERY / CLEAN DELAY / MANUAL CLEAN

CLEAN DURATION

Enter the desired duration

Enter the duration of the cleaning operation. For the duration of the clean, cleaning will appear in the associated sensor input display section on the front screen.

CLEAN INTERVAL

Enter the desired interval

Enter the duration of the cleaning operation. For the duration of the clean, cleaning will appear in the associated sensor input display section on the front screen.

TIME REMAINING

Shows the time remaining till the next clean operation. Note – Cannot be edited.

CLEAN MODE

Select ON-LINE / OFF-LINE

Associated sensor input channel state when cleaning. It is recommended that off-line is selected. This will automatically take the associated sensor input channel offline, de-energise associated setpoints and hold associated current outputs, during a clean operation. This will prevent any undesired control actions resulting from spraying cleaning solution onto the sensor.

CLEAN RECOVERY - Signal hold time

Enter the desired recovery (Signal hold time)

If cleaning "Off-line" then the user can introduce an additional post cleaning delay before coming back "On-line", this provides the sensor a period to stabilise.

CLEAN DELAY

Select YES / NO

If enabled this causes the clean cycle to wait if any other control setpoints associated with the sensor input channel are active. This is shown by a clean delayed message on the front screen.

MANUAL CLEAN

Select YES / NO

This manually starts a clean cycle. Note this can also be accomplished via the digital inputs, see Digital Inputs section.

Press **EXIT** several times to return to the measuring mode.

5.1 Switching on the power

**DANGER!**

To avoid fatal injuries as well as destruction or damage of the device assure a correct installation before switching on the power. This includes:

- *The device is mechanically safe, mounting and power connection comply with the regulations.*
- *The electrical terminal compartments must be secured, i.e. the housing has to be closed and the screws have to be tightened.*
- *The electrical operating data of the power supply comply with the requirements of the device.*

**CAUTION!**

Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

**INFORMATION!**

The manufacturer delivers the device preconfigured and ready for operation with the sensor specified in the customer's order. Though due to the physics of the measurement, the operator has to perform an onsite calibration or an adjustment to the relevant sensor and to the environmental conditions at the initial start-up. For more details refer to the manual of the relevant sensor!



- Switch on the power with the help of a disconnecting device (switch, circuit breaker).
- ➡ The device performs a self test; afterwards it begins to measure immediately if a sensor is connected and the display shows the current value(s).

6.1 User interface



CAUTION!

Before proceeding, ensure that the installation instructions have been followed correctly. Failure to do so may result in an electrically hazardous installation or irreparable damage to the instrument.

The signal converter uses a high quality backlit 3 3/4" QVGA LCD to display the channel readings and settings. This is accompanied by 5 control buttons whose function varies depending upon which screen the user is viewing. The button function is indicated by the control section at the bottom of the display. Also present are six Setpoint Status LEDs that when illuminated indicate which setpoint / relay is active. Located between the setpoint LEDs there are two Alarm Status LEDs which provide clear indication of a fault within the instrument.

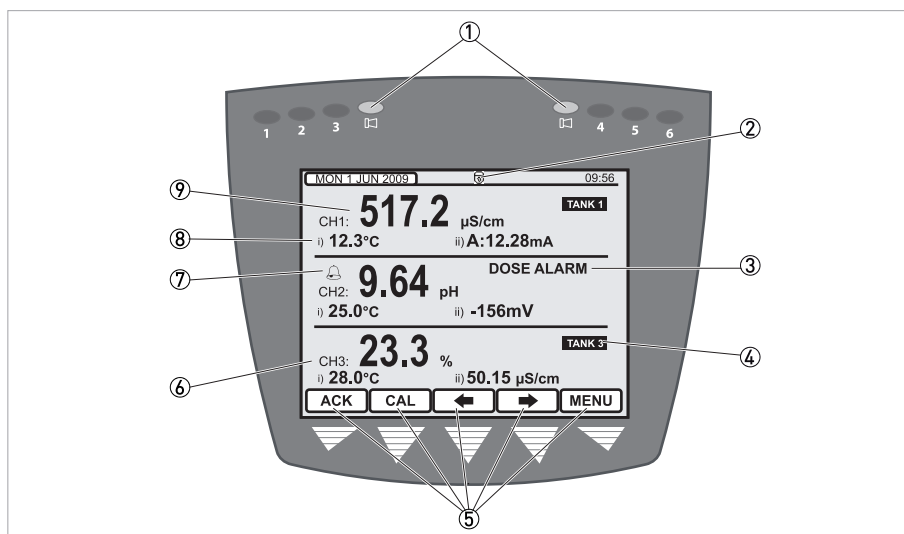


Figure 6-1: Overview display

- ① Alarm status led's
- ② Unit status
- ③ Channel messages
- ④ Channel label
- ⑤ Context sensitive button functions
- ⑥ Channel ID
- ⑦ Channel alarm status
- ⑧ Channel secondary reading
- ⑨ Channel primary reading

The signal converter front screen has the capability of showing up to three sensor input channels. Each channel shows the main sensor reading, two secondary readings and a channel label, all of which can be customised to the user's requirement. If only one channel is displayed on the front screen then the ability to show up to two current output trends becomes available. Alternatively a current outputs trend screen is available or if purchased, three live trend screens which can show up to 200 readings.

6.2 Menu overview



INFORMATION!

The following table just presents an overview. Additional levels are accessible from certain menus offering the possibility to change presets.

When the instrument is switched on it will complete a configuration check that will take approximately 20 seconds after this it will default to the front screen. The user interface is arranged in two ways, the first is a quick configuration overview which is accessible by scrolling left or right from the front screen.

↔	4...20 mA OUTPUTS SETUP	↔	DIGITAL INPUTS SETUP	↔	ERROR MESSAGES	↔	Front screen	↔
↔	CURRENT OUTPUT BARGRAPH	↔	LIVE TRENDS 1,2&3	↔	CHANNELS SETUP	↔	SETPOINT / RELAYS SETUP	↔

The second menu is accessible by pressing the menu button on the front screen. This brings up the main menu from which the user can access the instruments settings.

Within the Front Screen modus press the "MENU" Button to enter the "MAIN MENU".

Menu overview

Main menu	Submenu	Parameter
CHANNELS	← CHANNEL 1 → SUSPENDED SOLIDS	← For further information see function tables.
	CALCULATION 1	
	CALCULATION 2	
	SIMULATE CHANNELS	
CALIBRATION	CHANNEL 1 → SUSPENDED SOLIDS	
	4...20 mA OUTPUTS	
	RESET USER CALIBRATION	
SETPOINT / RELAYS	SETPOINT 1 → DISABLED	
	SETPOINT 2 → DISABLED	
4...20 mA OUTPUTS	4...20 mA OP A → DISABLED	
DIGITAL INPUTS	DIG IP 1 → DISABLED	
	DIG IP 2 → DISABLED	
	DIG IP 3 → DISABLED	
	DIG IP 4 → DISABLED	
	DIG IP 5 → DISABLED	
CONFIGURATION	LANGUAGE	
	TIME / DATE	
	SETUP FRONT SCREEN	
	SETUP MENU HEADER	
	SERVICE ALARMS	
	CHANGE DISPLAY CONTRAST	
	SOFTWARE STATUS	
	UNLOCK SOFTWARE	
	UPDATE SOFTWARE	
	FORMAT SD CARD	
ACCESS CODE MANAGEMENT	CHANGE USER ACCESS CODE	
SAVE / RESTORE	SAVE SETUP	
	RESTORE SAVED SETUP	
	DELETE SAVED SETUP	
	RESET SETUP	
ERRORS	UNIT ERRORS	
	NO ERRORS	
↓↑	↓↑	↓↑

The main menu is split into two main sections. The top shows the current time & date, the unit status and the instrument's current readings. The bottom section shows the current options for that menu which may be selected by moving the cursor with the arrow buttons and pressing the enter button. The exit button is used to return to the previous menu or alternatively if held down for 3 seconds will take the instrument straight back to the front screen. If no buttons are pressed after 2 minutes the instrument will default back to the front screen. To the right of the menu screen arrows will indicate if there are further menu pages above or below the current one.

When changing a setting an option pop-up will appear from which the user can select an option or alternatively enter in a value. When looking at a list of options an arrow in the top right or bottom right corner of the pop-up indicates further options above or below the ones currently shown.

Security access pop-up

To protect the instrument setup from unauthorised or accidental tampering, a security access code system is present. This is implemented via the instruments's menu system which operates in two modes, "locked" as indicated by a padlock symbol and "unlocked" as indicated by a key symbol.

The default Access Code is: 1000

6.3 Function tables - Parameter TSS

Depending on the submenu the Security code is queried. The standard code is 1000. Function tables will vary depending on installed measurement card and the measured parameter.

Menu - Channels

Menu	Submenu	Sub-Submenu
CHANNELS ↓ CHANNEL 1 → SUSPENDED SOLIDS	← ENABLED	← YES or NO
	MODE	ON-LINE or OFF-LINE
	UNITS	NTU, FNU mg/l, g/l ppt, ppm EBC,OD % PS (Sensor Signal)
	RANGE	9.999 99.99 999.9 9999
	LINEARISATION SOURCE	CURVE A CURVE B
	SETUP CURVE A	NUMBER OF POINTS: 1-10 SETUP ALL POINTS: enter the concentration for each calibration point
	INPUT FILTER	OUT 1 SEC 2 SEC 4 SEC 8 SEC 16 SEC 32 SEC
CALCULATION 1	CALCULATION 1:	OFF or ON
CALCULATION 2	CALCULATION 2:	OFF or ON
SIMULATE CHANNELS	ENTER ACCESS CODE with the help of ↑ or ↓	

Menu - Calibration

Menu	Submenu	Submenu
CALIBRATION ↓ CHANNEL 1 → SUSPENDED SOLIDS	← MODE:	← ON-LINE or OFF-LINE
	SENSOR ZERO ADJ:	Adjust the value with the help of ↑ or ↓
	SENSOR SPAN ADJ:	Adjust the value with the help of ↑ or ↓
	CALIBRATION HISTORY:	History of the channel is listed
	FRONT CAL ACCESS:	YES or NO
	CALIBRATION REMINDER:	YES or NO
4-20 mA OUTPUTS	4-20 mA OUTPUT A	Adjust the value with the help of ↑ or ↓
RESET USER CALIBRATION	RESET CHANNEL 1 → CALIB: [SS]	RESET SS CAL: YES or NO
	RESET 4-20 mA OUTPUTS	4-20 mA OUTPUT A: YES or NO ALL 4-20 mA OUTPUTS: YES or NO
	RESET ENTIRE UNIT	YES or NO

Menu - Setpoint / Relays

Menu	Submenu	Submenu
SETPOINT / RELAYS ↓ SETPOINT 1 → DISABLED SETPOINT 2 → DISABLED	← CHANNEL: DISABLED	← DISABLED CHANNEL 1 (SS) UNIT ALARM

Menu - 4-20 mA Outputs

Menu	Submenu	Submenu
4-20 mA OUTPUTS ↓ 4...20 mA OP A → DISABLED	← CHANNEL: DISABLED	← DISABLED CHANNEL 1 (SS) CALCULATION 1

Menu - Digital inputs

Menu	Submenu	Submenu
DIGITAL INPUTS ↓ DIG IP 1 → DISABLED DIG IP 2 → DISABLED DIG IP 3 → DISABLED DIG IP 4 → DISABLED DIG IP 5 → DISABLED DIG IP 6 → DISABLED DIG IP 7 → DISABLED DIG IP 8 → DISABLED	← For example CHANNEL 1 → SUSPENDED SOLIDS	← DISABLED CHANNEL 1 (SS) WHOLE UNIT

Menu - Configuration

Menu	Submenu	Submenu	Submenu
CONFIGURATION ↓ LANGUAGE	← ENGLISH FRANCAIS ESPAÑOL ITALIANO	← Adjust the value with the help of ↑ or ↓	←
TIME / DATE	SET TIME:	Adjust the value with the help of ↑ or ↓	
	SET DATE:	Adjust the value with the help of ↑ or ↓	
	DAYLIGHT SAVING	ENABLED or DISABLED	
	DST START DATE	LAST SUN MAR	
	DST START TIME:	Adjust the value with the help of ↑ or ↓	
	DST END DATE	LAST SUN OCT	
	DST END TIME:	Adjust the value with the help of ↑ or ↓	
SETUP FRONT SCREEN	For example CHANNEL 1 → SUSPENDED SOLIDS CALCULATION 1	CHANNEL SHOWN: YES or NO	YES or NO
		i) PROBE SIGNAL or CLEAR	i) CLEAR or PROBE SIGNAL
		ii) PROBE SIGNAL or CLEAR	ii) CLEAR or PROBE SIGNAL
		CHANNEL LABEL: Adjust the value with the help of ↑ or ↓	CHANNEL LABEL: Adjust the value with the help of ↑ or ↓
SETUP MENU HEADER	i) ii) iii) iv) v) vi)	CLEAR CH1 READING CAL CALCULATION 1 CH1 PS	
SERVICE ALARMS	For example CHANNEL 1 → SUSPENDED SOLIDS	SERVICE REMINDER:	ENTER ACCESS CODE with the help of ↑ or ↓
CHANGE DISPLAY CONTRAST	Adjust the value with the help of ↑ or ↓		
SOFTWARE STATUS	Overview Status of SOFTWARE VERSION: BASE UNIT SERIAL NO: CHANNEL 1 SERIAL NO: CHANNEL 2 SERIAL NO: CHANNEL 3 SERIAL NO: OUTPUT CARD SERIAL NO:		

Menu	Submenu	Submenu
UNLOCK SOFTWARE	DATA LOGGING:	ENTER UNLOCK CODE
UPDATE SOFTWARE	START UPDATE:	START SD card is necessary
FORMAT SD CARD	FORMAT SD CARD:	START SD card is necessary

Menu - Access code management

Menu	Submenu	Security Code
ACCESS CODE MANAGEMENT	← CHANGE USER ACCESS CODE	← ENTER NEW USER ACCESS CODE with the help of ↑ or ↓
		← YES or NO

Menu - Save / Restore

Menu	Submenu	Submenu	Submenu
SAVE / RESTORE	← SAVE SETUP	← For example CHANNEL 1 → SUSPENDED SOLIDS	← SAVE A SAVE B SD CARD A SD CARD B SD CARD C SD CARD D SD CARD E SD CARD F SD CARD G SD CARD H
		ENTIRE UNIT	
	RESTORE SAVED SETUP	For example CHANNEL 1 → SUSPENDED SOLIDS	RESTORE A RESTORE B SD CARD A SD CARD B SD CARD C SD CARD D SD CARD E SD CARD F SD CARD G SD CARD H
		ENTIRE UNIT	
	DELETE SAVED SETUP	For example CHANNEL 1 → SUSPENDED SOLIDS	SAVE A SAVE B SD CARD A SD CARD B SD CARD C SD CARD D SD CARD E SD CARD F SD CARD G SD CARD H
		ENTIRE UNIT	
	RESET SETUP	For example CHANNEL 1 → SUSPENDED SOLIDS	Confirm the Reset with YES or NO
		RESET WHOLE UNIT	

Menu - Errors

Menu	Submenu
ERRORS	← UNIT ERRORS
	← NO ERRORS
	← Press HELP and read the following text
	Press HELP and read the following text

6.4 Security code access

To protect the instrument setup from unauthorised or accidental tampering, a security access code system is present. This is implemented via the instrument's menu system which operates in two modes, "locked" as indicated by a padlock symbol and "unlocked" as indicated by a key symbol. The locked mode allows the user to observe the instruments configuration but without the ability to change it. If the user wishes to change a setting then the "Security Code" pop-up will appear that will prompt them to enter the security code which will then change the instruments mode to "unlocked". Once unlocked, the user can change any setting without having to re-enter the security access code, however the instrument will automatically lock itself if no further buttons are pressed after 2 minutes 30 seconds.

The default security access code is 1000.

For example

- You are on the main menu level. **CHANNELS** is highlighted.
- Press **↵** to enter the chosen menu.

CHANNELS SETUP	
Dependig on the installed card select either the input channel you wish to edit Press ↓ or ↑ until the submenu you wish to edit is highlighted. For example CHANNEL 1 → SUSPENDED SOLID CHANNEL 2 → pH CHANNEL 3 → COND SIMULATE CHANNELS Press ↵ to enter the chosen menu.	
CHANNEL 1 SETUP	
• Press ↓ or ↑ until the submenu MODE is highlighted. • Press ↵ to enter to bring up the security Code pop-up.	
Enter the access code with the help of ↓ or ↑ . The default security access code is 1000 Press ↵ to enter the chosen menu.	
Press EXIT several times to return to the measuring mode.	

6.5 Access code management

The user can select their own access code in the access code management menu, or alternatively they can disable the security system permanently by changing the access code to 0000.

For example

- You are on the main menu level. **ACCESS CODE MANAGEMENT** is highlighted.
- Press **↵** to enter the chosen menu.

ACCESS CODE MANAGEMENT	
Dependig on the installed card select either the input channel you wish to edit Press ↓ or ↑ until the submenu CHANGE USER ACCESS CODE is highlighted. Press ↵ to enter the chosen menu.	
Enter the access code with the help of ↓ or ↑ . The default security access code is 1000 Press ↵ to enter the chosen menu.	
Press ↓ or ↑ to enter a new code. Press ↵ to confirm the new code.	
Press ↵ to confirm the message "ACCES CODE CHANGED SUCCESSFULLY".	
Press EXIT several times to return to the measuring mode.	

6.6 Configuration

The configuration menu enables the user to configure the basic operating parameters of the instrument.

You are on the main menu level. CONFIGURATION is highlighted. Press ⬅ to enter the chosen menu.		
CONFIGURATION		
Press ↓ or ↑ until the submenu you wish to edit is highlighted.		
Language ENGLISH / FRANCAIS / ITALIANO / ESPANOL The signal converter has the ability to support multilingual menus. The language of choice can be selected from this menu.		
TIME / DATE Configure the internal battery backed clock. Set TIME / DATE / DAYLIGHT SAVINGS / DST START DATE / DST END DATE / DST START TIME / DST END TIME		
TIME	Set the time with the help of ↓ or ↑ and →	
DATE	Set the date with the help of ↓ or ↑ and →	
DAYLIGHT SAVINGS	This allows the instrument to automatically adjust it's time for when daylight savings starts and ends. The start and end times may be adjusted to allow for local differences. ENABLED / DISABLED	
DST START DATE	LAST / SUN / MAR	
DST END DATE	Set the date with the help of ↓ or ↑ and →	
DST START TIME	LAST / SUN / OCT	
DST END TIME	Set the time with the help of ↓ or ↑ and →	
SETUP FRONT SCREEN This allows the user to customise the information the front screen displays Press ↓ or ↑ until the channel you wish to edit is highlighted. Set CHANNEL SHOWN / i, ii / CHANNEL LABEL		
	CHANNEL SHOWN	Select whether the channel is shown or not.
	i, ii	Define which is displayed in the either of the two secondary reading slots. Available options depend on the selected input card type but include temperature, sensor current, pressure and any associated current output values.
	CHANNEL LABEL	Define the channel label that appears on the front screen adjacent to the channel reading (7 characters maximum).
SETUP FRONT SCREEN Press ↓ or ↑ until 4-20mA Output is highlighted.		
CHANNEL 1 → CONDUCTIVITY CHANNEL 2 → pH CHANNEL 3 → SUSPENDED SOLIDS 4-20mA OUTPUT TREND Press ⬅ to enter the chosen menu.		
	4-20mA OUTPUT TREND If only one channel is displayed on the front screen the user has the ability to show up to two current output trends called 4-20mA Output Slot 1, and 4-20mA Output Slot 2. Note, that you will only be able to select the current outputs that are associated with the displayed channel. DISABLED / 4-20mA OUTPUT A / 4-20mA OUTPUT B	
SETUP MENU HEADER This allows the user to customise the information the menu header displays. i / ii / iii / iv / v / vi		

SETUP MENU HEADER	
By looking at the legend shown select which menu header location you wish to edit, then chose the value from the displayed pop-up.	
i)	CLEAR / CH1 READING / CH1 PS (Probe signal)
ii)	CLEAR / CH1 READING / CH1 PS (Probe signal)
iii)	CLEAR / CH1 READING / CH1 PS (Probe signal)
iv)	CLEAR / CH1 READING / CH1 PS (Probe signal)
v)	CLEAR / CH1 READING / CH1 PS (Probe signal)
vi)	CLEAR / CH1 READING / CH1 PS (Probe signal)
SERVICE ALARMS The signal converter has an inbuilt service alarm for each channel which will activate when the maintenance engineer's service interval has expired. By default the alarms are disabled and can only be setup using the service access code. Press ↓ or ↑ until the channel you wish to edit is highlighted	
CHANNEL 1 → CONDUCTIVITY	SERVICE DUE DATE: Update – Automatically increment the next service date by the service interval. Requires service security code prior to use. SERVICE REMINDER – Turn the service alarm on or off. Requires service security code prior to use. SERVICE INTERVAL – Set the Service Interval. Requires service security code prior to use. NEXT SERVICE DATE – Sets the exact service date. Requires service security code prior to use. DEFER SERVICE DATE – Only appears once the service interval has expired. Increases the service interval by an extra 7 days. Requires standard security code prior to use.
CHANNEL 2 → pH	
CHANNEL 3 → SUSPENDED SPOLIDS	
CHANGE DISPLAY CONTRAST Change the contrast by pressing the ↓ or ↑ buttons.	
SOFTWARE STATUS Overview software status	
UNLOCK SOFTWARE DATA LOGGING: LOCKED / UNLOCKED	
UPDATE SOFTWARE	
FORMAT SD CARD	
Press ⬅ to enter the chosen menu.	
CHANNEL 1 SETUP	
Press ↓ or ↑ until the submenu MODE is highlighted. Press ⬅ to enter the chosen menu.	
Enter the access code with the help of ↓ or ↑. The default security access code is 1000 Press ⬅ to enter the chosen menu.	
Press ↓ or ↑ to choose the option OFF-LINE . Press ⬅ to confirm the entered value.	
Press EXIT several times to return to the measuring mode.	

6.7 Update software

The signal converter operating software can be upgraded by saving the latest version onto a SD card, inserting it into the instrument and following the instructions below. All three files must be present on the SD card for the update to work. All units support SDHC and SDXC cards using the fat32 format. If the card is not formatted correctly the instrument will inform the user, the card must then be reformatted using the Format SD Card function.



INFORMATION!

The update may take up to 5 minutes, during which time the unit will not operate.

You are on the main menu level. **CONFIGURATION** is highlighted.
Press **↵** to enter the chosen menu.

CONFIGURATION

Press **↓** or **↑** until the submenu **UPDATE SOFTWARE** is highlighted.

Enter the access code with the help of **↓** or **↑**. The default security access code is 1000
Press **↵** to enter the chosen menu.

UPDATE SOFTWARE

Verify that the new software is of a higher version than the current one shown. It is recommended that the entire unit is saved before the update is started.
Press **↵** to start the update.

If the instrument has verified that all of the required software is present on the SD card press enter to begin the update. During the update the display and LEDs will indicate the progress of the update. Once finished the instrument will restart automatically.

6.8 Optional software functions

The signal converter features optional software functions which when purchased will expand the instrument's capabilities. These functions by default are locked. They can be unlocked your local distributor at the time of order. Alternatively the functions may be ordered after purchase by your local distributor the serial number of your instrument along with the purchase order. In return they will supply you with an 8 digit unlock code that is unique to the instrument and the required function to be unlocked.

- You are on the main menu level. **CONFIGURATION** is highlighted.
- Press **↵** to enter the chosen menu.

CONFIGURATION	
Press ↓ or ↑ until the submenu SOFTWARE STATUS is highlighted. Press ↵ to enter the chosen menu.	
	SOFTWARE STATUS
	Record the base unit serial number and supply it to your local distributor along with your purchase order.
	Press EXIT several times to return to the measuring mode.
CONFIGURATION	
Press ↓ or ↑ until the submenu UNLOCK SOFTWARE is highlighted. Press ↵ to enter the chosen menu.	
	UNLOCK SOFTWARE
	Select the optional software function you wish to unlock. Press ↵ to enter the chosen menu.
	Enter the required Unlock Code. If the code is incorrect the user will be prompted to try again. If the code is correct the function will now be unlocked
	Press EXIT several times to return to the measuring mode.

6.9 Data logging

The Data logging optional software function expands the capabilities of the signal converter by allowing the user to record over time the status of the instrument. It consists of two separate sections, live trending and SD card data logging, which together will help the user to analyse and improve the performance of their application. It can be unlocked by your local distributor at the time of order or through purchasing an unlock code.



INFORMATION!

By default this function is locked.

Live trending

Live trending provides the user with 3 separate live trend screens adjacent to the front screen with each showing 2 readings; these enable the user to instantly view the last 50 samples of each reading. The live trend screen also features a review mode where by the user can further analyse the last 200 samples of each reading, If the user finds something of note the software provides a facility to save those 200 readings to an excel compatible file on the SD card. Further analysis is provided by optionally displaying the minimum, maximum and average value of the 200 samples. The number of readings, the source of the readings, the displayed scale and the sample interval rate are all configurable by the user.

You are on the main menu level. **DATA LOGGING** is highlighted.
Press **↵** to enter the chosen menu.

DATA LOGGING

Select the live trend you wish to setup.
Press **↵** to enter the chosen menu.

SETUP LIVE TRENDING

Select the number of traces to display. By selecting none the live trend is disabled and no longer visible from the front screen.

CONFIGURE TREND 2 TRACES

Select the number of traces to display. By selecting none the live trend is disabled and no longer visible from the front screen.

TRACE 1 (--)

Select which measurement trace 1 (left hand side axis) is to be associated with. The options shown depend on the configuration of the instrument.

RANGE 1

If the trace's associated measurement is currently configured to use auto ranging then a fixed range will need to be assigned to the trace.

TRACE 1 MIN

Enter the trace's minimum displayed value. Adjust in conjunction with the maximum displayed value to increase the measurements displayed resolution.

TRACE 1 MAX

Enter trace's maximum displayed value. Adjust in conjunction with the minimum displayed value to increase the measurements displayed resolution.

TRACE 2 (--)

Select which measurement trace 2 (right hand side axis) is to be associated with. The options shown depend on the configuration of the instrument. Then configure trace 2's min and max as before with trace 1.

TREND INTERVAL

Enter the time interval between samples for both trace 1 and trace 2.

Press **EXIT** several times to return to the measuring mode.

6.10 Live trend screen

Once configured the live trend screens can be found by moving right from the front screen. In addition the live trend screens will not “time out” back to the front screen. The screen operates in two modes “Live Mode” and “Review Mode”, in Live Mode screen shows the last 50 sampled readings whilst in Review Mode the user can scroll back through the last 200 readings.



INFORMATION!

When in review mode the screen will no longer update with live readings, however the live readings are still being recorded and will be restored when review mode is exited.

READ/ MIN/ MAX/ AVG	Indicates the status of the trace readings at the bottom of the screen when in live mode. Press to cycle between the available options: READ - Current reading MIN - The minimum value of the last 200 readings MAX - The maximum value of the last 200 readings AVG - The average value of the last 200 readings
LINE / PAGE	When in review mode toggles between the cursor moving a line at a time or at a page at a time.
Value	Press to enter the live trend review mode. Review mode allows the user to scroll back through the last 200 readings.
Exit	When in review mode, press to exit and return to the live mode.
← or →	When in Live Mode – return to the front screen or move on to the next live trend. When in Review Mode - moves the cursor across the screen. The pointed to value will be displayed at the bottom of the screen and the time at the top.
MENU	Enter the instruments main menu screen
SAVE	When in review mode and a SD card is present, saves a copy of the current 200 readings as a time stamped excel compatible file to the live trend folder on the SD card.

6.11 SD card data logging

The SD card data logging part of the data logging software enables the user to log over long periods the status of the instrument direct to the SD card. Variables logged include: the primary sensor readings, any secondary readings, the status of the setpoints, the current output readings, the status of the digital inputs and any error messages. This data can then be viewed either inside the instrument or removed and viewed in Microsoft Excel on a PC. Which channels are logged and logging interval are configurable by the user.

You are on the main menu level. DATA LOGGING is highlighted. Press ↵ to enter the chosen menu.		
DATA LOGGING		
Select SETUP SD CARD DATA LOGGING . Press ↵ to enter the chosen menu.		
SETUP SD CARD DATA LOGGING		
LOG INTERVAL	Enter the time interval of the SD card data logging. If logging at 1 sample per second, 1GB of space on the SD card will provide at least 40 Days of logging.	
CHANNEL 1/2/3 LOG	Enables / Disables the SD card data logging of the channel and any setpoints, current outputs, digital inputs and error messages associated with the channel.	
	CH1/2/3 RANGE	If the associated measurement is currently configured to use auto ranging then a fixed range will need to be assigned to the log.
LOOP RECORDING	If enabled, when the SD card becomes full the instrument will automatically delete the oldest data log file and then continue to log. If loop recording is disabled the instrument will automatically stop recording if the SD card becomes full and set an error message.	
DATA LOGGING	Shows the current status of the data logging (Stopped / Recording) and allows the logging to be started and stopped. When the data logging is active the SD card active symbol will be shown at the top of the screen. If a large number of files are present on the SD card there may be a delay whilst the software is searching the card for a clear space. Whilst the card is being searched the SD card active symbol will flash.	
Press EXIT several times to return to the measuring mode.		

6.12 View SD card data logging

You are on the main menu level. **DATA LOGGING** is highlighted.
Press **↵** to enter the chosen menu.

DATA LOGGING	
Select VIEW SD CARD DATA LOGGING . Press ↵ to enter the chosen menu.	
VIEW SD CARD DATA LOGGING	
SELECT TIME&DATE	Enter the time and date of the data to be viewed. If the SD card contains no data at the selected time and date then the configure graph shows *No Data*. Set the time&date with the help of ↓ or ↑ and → Press ↵ to save the selction.
CONFIGURE GRAPH	Select how many traces to show on the graph. Press ↵ to save the selction.
TRACE CHANNEL	Select which channel the trace is assigned to. Available channels depend upon which channels have been recorded in the selected log. Press ↵ to save the selction.
TRACE 1(--)	Select which measurement trace 1 (left hand side axis) is to be associated with. The options shown depend on the configuration of the instrument. Press ↵ to save the selction.
TRACE MIN	Enter the trace's minimum displayed value. Adjust in conjunction with the maximum displayed value to increase the measurements displayed resolution. Press ↵ to save the selction.
TRACE MAX	Enter the trace's maximum displayed value. Adjust in conjunction with the minimum displayed value to increase the measurements displayed resolution. Press ↵ to save the selction.
TRACE 2 (--)	Select which measurement trace 2 (right hand side axis) is to be associated with. The options shown depend on the configuration of the instrument. Then configure trace 2's min and max as before with trace Press ↵ to save the selction.
VIEW GRAPH	View the configured graph.
Press EXIT several times to return to the measuring mode.	

6.13 SD card data logging graph

Once configured the SD card data logging graph starts by showing the closest reading to the one selected by the time and date. The user can then use the cursor to scroll backwards and forwards in time through the log on the SD card. Each screen shows 50 readings. For faster scrolling the user can turn on page mode where by the screen jumps a page at a time through the readings. Where a break occurs in the trace you have reached the end of one file and the beginning of the next.

LINE / PAGE	When in review mode toggles between the cursor moving a line at a time or at a page at a time.
Exit	When in review mode, press to exit and return to the live mode.
← or →	When in Live Mode – return to the front screen or move on to the next live trend. When in Review Mode - moves the cursor across the screen. The pointed to value will be displayed at the bottom of the screen and the time at the top.

6.14 Viewing the SD card data log on a PC



CAUTION!

Beware the file is not protected; changes can be made and may be irreversible. If any changes are made it may affect the ability for the instrument to read the file if it is placed back into the instrument.

Before the user removes the card from the instrument they must first stop the SD Card data logging and the SD card active symbol must not be present at the top of the screen. Once removed place the SD card in the card reader connected to the pc.



- Open the SD card in the file explorer and browse to either the data logging folder to view the SD card data logging or the live trend folder to view the live trend log saves.

Each file is limited to 65535 logs; when this limit is reached the instrument will automatically create a new file. The instrument will also automatically create a new file if the configuration of the instrument is changed whilst the data logging is active.

Each file name contains the date and time of when it was created. The data is stored as a comma separated variable (CSV), which can be read by Microsoft Excel.

The first column of data contains the date and time of each sample. By default Excel hides the seconds value, to display this you need to apply a custom format to the column as follows: dd/mm/yyyy hh:mm:ss.

The proceeding columns contain:

- The main sensor reading and units,
- Any secondary readings and units i.e. temperature.
- The status of any setpoints associated with the logged channels, where 0 = off, 100 = fully on. When using a proportional control mode this number represents the setpoint output as a percentage of the proportional band.
- The output level of any current output associated with the logged channels.
- The status of any digital input associated with the logged channels, where 0= inactive and 1= active.
- Any active error messages.

6.15 Error messages

If the internal diagnostics have detected an error condition then the error LEDs will illuminate. This is accompanied by an alarm bell either next to the associated channel or in the unit status area. By pressing the left arrow on the front screen or by selecting the errors option in the main menu, the list of currently active errors can be seen. By selecting an error and pressing the help button a more detailed description of the error is shown along with suggested solutions to the possible causes of the error.

You are on the main menu level. Errors is highlighted. Press ← to enter the chosen menu.	
	ERROR MESSAGES
For more information regarding each error message select the required message and press the help button.	
Press EXIT several times to return to the measuring mode.	

6.16 Save, Restore and Reset

The signal converter features the ability to save and restore the current configuration of a channel and its associated setpoints, current outputs, and digital inputs, into either one of two save slots inside the instrument. Alternatively the configuration can be saved and restored via an SD card inserted into the unit, which allows the instruments configuration to be backed up. It also provides the ability to copy the configuration from one instrument to another, providing that the input card type for each channel is the same on the second instrument.

The save and restore menu also features the ability to reset either the whole instrument or each channels configuration, user calibration; and it's associated setpoints, current outputs and digital inputs, back to their factory settings.

You are on the main menu level. **SAVE / RESTORE** is highlighted.
Press **↵** to enter the chosen menu.

SAVE / RESTORE

Select the operation you wish to carry out.
Press **↵** to enter the chosen menu.

SAVE SETUP

Select which channel or alternatively the whole unit.
For example
CHANNEL 1 → SUSPENDED SOLID
CHANNEL 2 → pH
CHANNEL 3 → COND
ENTIRE UNIT

SELECT LOCATION

Select either SAVE A or SAVE B to access the instruments internal stores. Alternatively if inserted select SD Card A-H to use one of the 8 saves on the SD card.
If a save location is already being used, as indicated by a time - date stamp, then information about that save can be accessed by selecting it and pressing the INFO button.

Press **EXIT** several times to return to the measuring mode.

7.1 Maintenance and repair

The device is maintenance free. Also note the following admonition concerning malfunctions:



DANGER!

In case of a malfunction only the technical service is allowed to repair the device. Never try to repair the device on your own, otherwise it may come to fatal injuries, destruction or damage of the device or measuring errors.

7.2 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

7.3 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.



INFORMATION!

For more precise information, please contact your local sales office.

7.4 Returning the device to the manufacturer

7.4.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.



CAUTION!

Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*



CAUTION!

If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that it is safe to handle and stating the product used.*

7.4.2 Form (for copying) to accompany a returned device



CAUTION!

To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:	
Department:		Name:	
Tel. no.:		Fax no. and/or Email address:	
Manufacturer's order no. or serial no.:			
The device has been operated with the following medium:			
This medium is:	☐	radioactive	
	☐	water-hazardous	
	☐	toxic	
	☐	caustic	
	☐	flammable	
	☐	We checked that all cavities in the device are free from such substances.	
	☐	We have flushed out and neutralized all cavities in the device.	
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.			
Date:		Signature:	
Stamp:			

7.5 Disposal



CAUTION!

Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:



According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**. The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

8.1 Measuring principle

Depending on the measurement principal of the sensor different sensor input cards need to be installed. The compatibility to the relevant sensor has to be checked. The signal converter is used for classic non smart sensors.

8.2 Technical data table



INFORMATION!

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).

Measuring system

Measuring principle	The measuring principle depends on the used sensor(s), for further information refer to the sensor manual(s).
Application range	Continuous measurement of analytical parameters in various applications.
Measuring range	The measuring range depends on the used sensor(s), for further information refer to the sensor manual(s).

Design

Construction	A typical measuring system consists of: • MAC 300 multiparameter signal converter • 1 (or up to 3) sensors of the OPTISENS series • Sensor cables • Mounting assemblies
Input Expansion Slots	3 slots, user configurable with any combination of available input add-in cards.
Output Expansion Slot	1 slot, user configurable with an additional output option add-in card.
Sensors	For further information refer to the manual of the relevant sensor.
Alarm LED's	2 Yellow LED's located above the main display area for instrument's alarm status, lit = active.
Setpoint and control relays options	2 change over relays as standard, expandable up to a total of either 4 change over relays, or 4 change over relays + 2 normally open relays depending on the number of current outputs.
Setpoint and control relays specification	Fully configurable setpoints with volt free contacts for each relay. Rated at 5A @ 30V DC / 5A @ 250V AC.
Setpoint LED's	6 Red LED's located above main display area for setpoint status indication, lit = relay energised.
Setpoint modes	On/Off, Time Proportioning, Pulse Proportioning, Band and Latch.
	Delay timer adjustable from 00:00 to 59:59 mm:ss.
	Hysteresis 0 to 9.9%.
	Dose alarm timer, with supplementary initial charge function. Both adjustable from 00:00 to 59:59 mm:ss.
	Adjustable cycle time and proportional band in proportional modes.
Setpoint cleaning	Cleaning mode with adjustable duration (max 10m) and interval times (max 24h), auto offline function with recovery timer.
Setpoint Alarm	Unit or channel alarm mode, whereby the relay can be energised under certain set conditions.

Protection category acc. to IEC 529 / EN 60529:	IP66
Display and user interface	
Graphic display	3 3/4" QVGA back lit LCD module.
Operating elements	5 tactile feedback, micro-switched, silicone rubber.
Operating menu	Menu mode: variety of main and submenus that allow to customise the device according to the demands of the measuring point.
Operating and display languages	English, French, Italian or Spanish
Units	The measuring unit depends on the used sensor(s), for further information refer to the sensor manual(s).

Measuring accuracy

Reference conditions	Temperature: 20°C / 68°F
	Pressure: 1 bar / 14.5 psi
Total suspended solids	<2% of reading after linearisation
	Repeatability: $\pm 0.1\%$ of range
Dissolved oxygen	$\pm 3 \mu\text{A}$ (Galvanic Mode)
	$\pm 1.0 \text{ nA}$ (Polarographic Mode)
	Repeatability: $\pm 0.1\%$ of range
Auxiliary input	$\pm 0.1\%$ of reading.
	Repeatability: $\pm 0.1\%$ of range
Conductivity	$\pm 0.1\%$ of range
	Repeatability: $\pm 0.1\%$ of range
pH / Redox	$\pm 0.05 \text{ pH}$ / $\pm 3 \text{ mV}$
	Repeatability: $\pm 0.1\%$ of range
Maximum measuring error	For further information refer to the manual of the relevant sensor.
Resolution	Temperature: 0.1°C / 0.1°F
	For further information refer to the manual of the relevant sensor.
Long-term stability	24 hours: tested within accuracy definition
Temperature drift	Tested within accuracy definition
Cable length variation	Tested within accuracy definition

Operating conditions

Temperature	
Ambient	-20...+50°C / +4...122°F for full specification.
	Note: the manufacturer strongly recommends to protect the signal converter from external heat sources such as direct sunlight as higher temperatures reduce the life cycle of all electronic components!
Storage	-40...+70°C / -40...+158°F

Installation conditions

Installation	Wall or rack mounting is possible, always assure a vertical mounting orientation!
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Materials

Signal converter housing	Polycarbonate (PC) / Acrylonitrile Butadiene Styrene (ABS) blend
Sensor	For housing materials, process connections, liners, grounding electrodes and gaskets, see the technical documentation for the sensor.

Electrical connections

General	Electrical connection is carried out in conformity with the VDE 0100 directive "Regulations for electrical power installations with line voltages up to 1000 V" or equivalent national regulations.
Modbus RS485 Interface (Optional)	Supports RTU and ASCII formats
	Node Address: 1 to 247
	Baud Rates (Bits Per Second) : 300, 600, 1200, 2400, 4800, 9600, 19200, 31250, 38400
	Parity Options: Even, Odd, None
SD Card Interface	Enables backing up and restoring of instrument configuration, log the sensor readings (optional extra) and on site upgrading of instrument software. SD, SDHC and SDXC-FAT32 cards supported.
Power supply	
Voltage	85...265 V AC/DC Power connections, 15W max.
	18...32 V AC/DC Power connections, 20W max.

Inputs and outputs

General	All in- and outputs are electrically isolated from each other and from all other circuits.
	All operating data and output values can be adjusted.
Description of used abbreviations	U_{ext} = external voltage R_L = load + resistance; U_o = terminal voltage I_{nom} = nominal current
Inputs	
Digital inputs	8 contact closures for remote activation of user defined operations. Can be configured to operate in either normally open or normally closed modes.
Outputs	
Current output options	1 as standard, expandable up to a total of 4 or 6 depending on the number of relays.
Current Output Specification	Each selectable 0-20mA or 4-20mA into 750 ohms max, fully isolated to 2kV. Expandable up to 5% of any operating range and offset anywhere in that range.
Current Output Adjustment	± 0.01 mA, 3 point 0-4-20 mA for remote monitor calibration.
Relay outputs	Three electro-mechanical relays that can work as alarm relays or limit switches
	Possible conditions: NO (normally open) or NC (normally closed)
	Contact ratings: - Relays for low voltages: $U \leq 30$ VDC, $I \leq 1$ A, resistive load (PELV / SELV) or $U \leq 50$ VAC, $I \leq 4$ A, resistive load (PELV / SELV) - Relays for high voltages: $U = 100...230$ VAC, $I \leq 4$ A, max. 1000 VA resistive load

Approvals and certifications

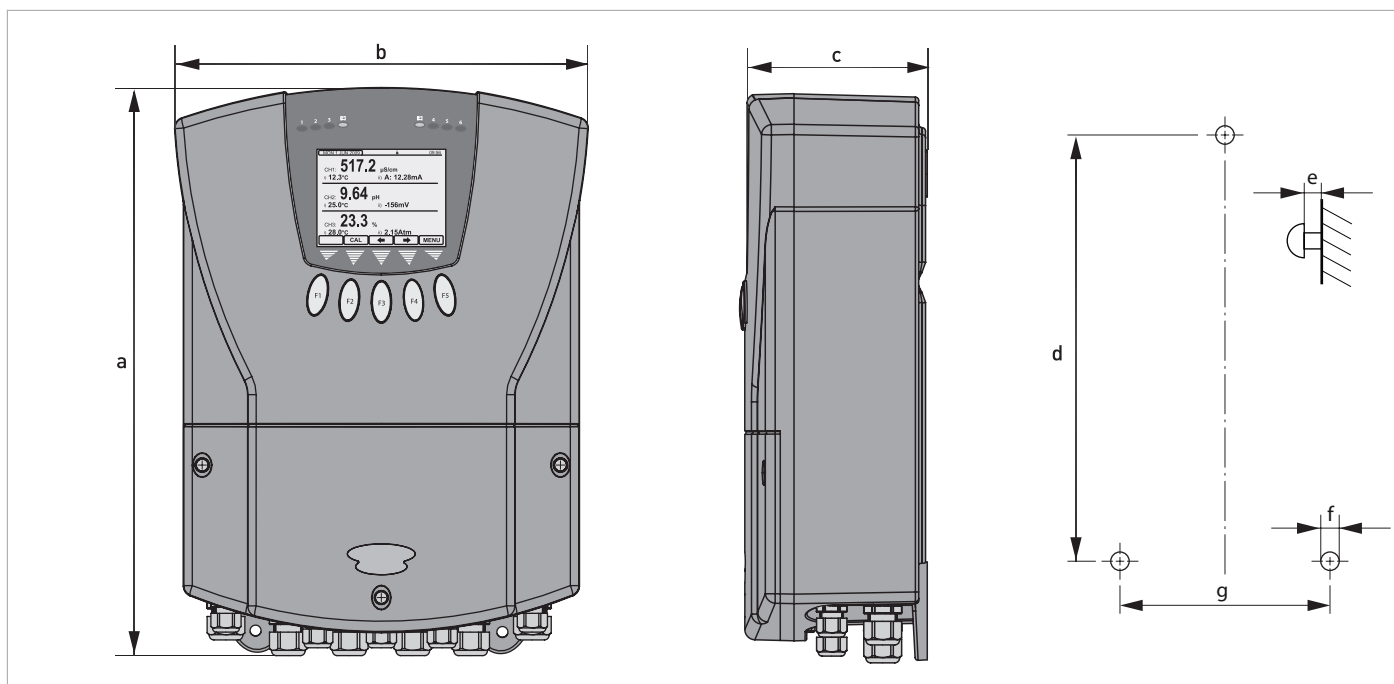
CE

This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.

For full information of the EU directives and standards and the approved certifications, please refer to the EU declaration or the website of the manufacturer

8.3 Dimensions and weight

Wall mount



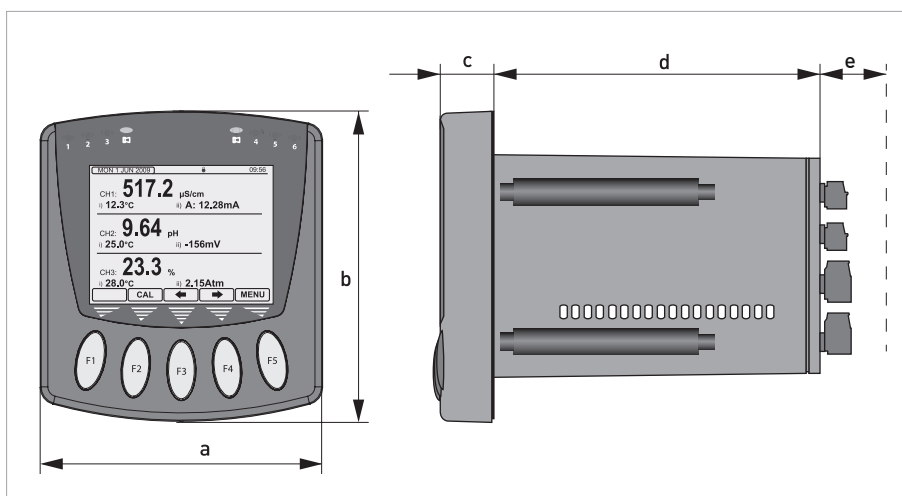
Dimensions and weights in mm and kg

Dimensions [mm]							Weight [kg]
a	b	c	d	e	f	g	
331	242	110	300	8	6 x 3	148	2.5

Dimensions and weights in inches and lb

Dimensions [inch]							Weight [lb]
a	b	c	d	e	f	g	
13.03	9.53	4.3	11.81	0.31	0.24 x 0.12	5.83	5.5

Rack mount



Dimensions and weights in mm and kg

Dimensions [mm]					Weight [kg]
a	b	c	d	e	
116	128	23	134	25	0.8

Dimensions and weights in inch and lb

Dimensions [inch]					Weight [lb]
a	b	c	d	e	
4.57	5.04	0.91	5.28	0.98	1.8

**INFORMATION!**

The panel cut-out for the instrument should be 92 mm x 92 mm / 3.62" x 3.62" (+1.0 / -0.0)







KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

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