Edition 22/11

Operating Instructions Manual

Intelligent Controller MV 5000

for pH, redox (ORP), ISE, conductivity, oxygen, chlorine, turbidity and active/passive sensors (current signals)

MV 5010	MV 5010-Fx	MV 5010 CAN
MV 5020	MV 5020-Fx	MV 5020 CAN
MV 5025	MV 5025-Fx	MV 5025 CAN
MV 5030	MV 5030-Fx	MV 5030 CAN
MV 5060	MV 5060-Fx	MV 5060 CAN

valid from firmware verison V 6.xx

xylem
Let's Solve Water

1 Overview

The intelligent controllers are excellent components for continuous measurement and controlling of several analytical parameters. They are separated self-sufficient devices, which transform, display, save and provide for further processing the signals of the connected electrochemical sensors. The series of the MV 50xx and of the MV 50xx CAN in an IP65 aluminium case and the series MV 50xx-F in a plastic case for front panel mounting have a big OLED-display and an intuitive pain text menu structure. This warranted a comfortable handling. All data will be stored in the integrated data logger. Each controller features measurement of the corresponding parameter and the temperature, if a sensor with integrated temperature probe or a separated temperature sensor is used, two isolated outputs for current 0(4)…20 mA or voltage 0…5 V DC, three floating limit or alarm relay output as well as a RS485/RS232/USB interface almost for documentation and configuration purposes.
pH, redox potential (ORP) and ISE (ion selective electrodes) controllers are suitable for direct connection with combination electrodes and separated measuring chains. Conductivity cells and membrane covered amperometric oxygen sensors for connection with the accompanying conductivity and oxygen controller should be equipped with an integrated temperature sensor. The controllers accept temperature sensors Pt 1000. The chlorine controller is suitable for direct connection with sensors for measurement of disinfectants (free and total chlorine, chlorine dioxide, ozone) if these sensors feature a 2-wire analogue current output.

2 Safety

This Operating Instructions Manual contains fundamental information that should be observed in connection with the installation, start-up, operation and maintenance of the MV 50xx Measuring System. Therefore, it is absolutely vital for the user to read this Manual completely prior to working with it.

The Symbol ⚠ "General Warning" indicates special warnings in the manual.

User qualification

The single-parameter controller and the entire measuring system have been designed for analytical-parameter measurements. It is assumed that the user/operator and the maintenance personnel have the proper professionals skills and experience to know the specific properties of analytical measuring systems, master the safe handling of chemicals, for example, in the maintenance of electrodes/sensors, and can assess any dangers and risks resulting thereof. The user must ensure that the national legislation and procedures concerning the protection of labour, the prevention of accidents and the handling of chemicals are observed.

Electrical installation work

The single-parameter controller comes ready for operation together with a power supply cable. Do not insert the plug into sockets other than shock-proof. Do not use an extension cable without any protective conductor, as this would eliminate the protective function. Any interruption of the protective conductor inside or outside the unit may result in the latter becoming

dangerous if another fault occurs. It can be fire hazard or an electric shock there. Check the power cable regularly. If the power cable is damaged, it must be replaced.
For a fixed cable installation must be used mandatory connection module "Festverkabelung". This module is pre-installed (when ordered) by the manufacturer and requires wiring in housing base! The demands on the power cord to be used for a permanent installation, please refer to chapter 13 TECHNICAL DATA. In addition, at a fixed wiring an external mains separation / circuit protection is required. This protection should be a maximum of 10A (slow). The external switch must be suitable in accordance with IEC 60947-1 and EN 60947-3 and marked for the instrument.
Opening the unit will expose live parts. The terminal box may only be opened for the connection of sensors and other peripheral units after the mains supply has been unplugged. Such work should be done by a skilled person who is familiar with the hazards associated therewith. Intervention into the unit will result in expiration of the warranty.

Installation and getting started

Install the device so that the conditions specified under 'Specifications' will be kept under any circumstances. The enclosures meet the IP 65 degree of protection requirements (MV 5000-F only in connection with installed transparent front cover!). A prerequisite to this, however, is the proper installation of the enclosure cover of the terminal box and of the seals (Important: Distinguish between the inside and outside.). Also, properly install the cables in the glands and tightly seal all cable glands not used. For outdoor application of the MV 50xx controller the use

of a stand and a weather-proof roof is recommended. Information about drill hole spacing, see chapter 13 (Specifications). Do not use any sensor and bus cables other than recommended by the manufacturer. For the sensors and accessories, the instructions and regulations in the respective operating instructions manuals and specification sheets shall apply. To prevent relay damage, the load circuit must be fused for the maximum permissible current!

Proper usage

The controllers are intended for measuring, controlling and regulating analysis parameters in a Not-Ex-area. The control and regulating outputs must not be used for protective or safety circuits. Taking into consideration the 'Specifications' paragraph in Chapter 14 operating and using the unit for this application is the proper usage. Any application beyond this and individual modifications or extensions are improper and will lead to loss of entitlement to the warranty. When connecting the unit with electrochemical sensors, always take into account their life and natural wear as this may result in malfunctioning of the measuring system and the regulation or control associated therewith. The user must take suitable measures to limit harmful effects of such malfunctioning.

General safety instructions

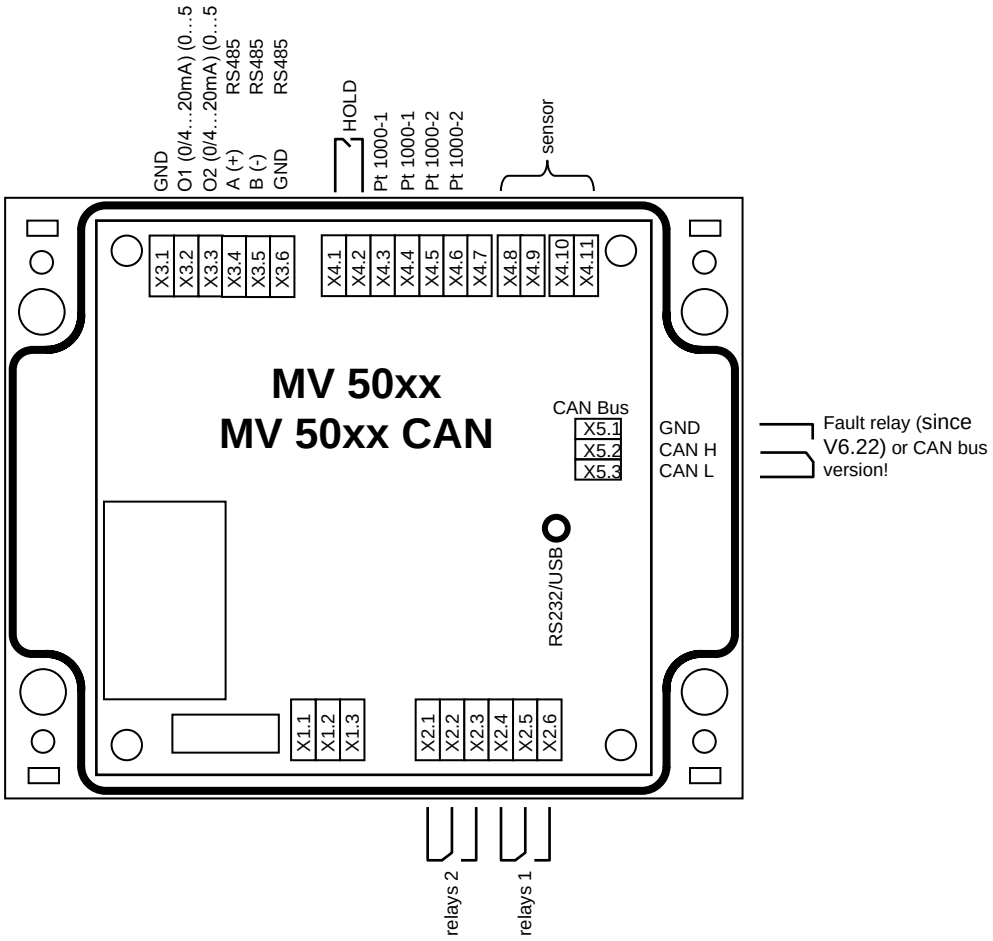
The controllers have been manufactured and tested in accordance with the relevant guidelines and standards for electronic measuring equipment. They have left the factory in technically unobjectionable condition. The unit must be opened for repair by proprietary workshops only.
The proper functioning and the operational reliability of the controllers will only be guaranteed if the generally usual safety precautions and the specific safety instructions given in this operating instructions manual and in the operating instructions manuals of the components are observed. If it is assumed that safe operation of the unit or of its components is no longer possible, remove the unit and its components from service and protect it against unintentional operation. Safe operation will no longer be possible if the unit or its components:

- show any transport damage
- has/have been stored under unsuitable conditions for a longer time
- show any apparent damages
- does/do no longer work as described in this Operating Instructions Manual

If in doubt, please contact your supplier.

3 Connection Diagram, Measurand

Terminals Connection



The measuring inputs must be potential-free and must have no connection to mains voltage potentials. All inputs must be operated with the appropriate sensors only. Connect directly from foreign signals is not allowed.

Terminal	pH / redox(ORP) / ISE*	conductivity 2-electrode-cell	conductivity 4-electrode-cell	oxygen	chlorine
X4.11	guard	screen	measuring electrode	anode	sensor -
X4.10	measuring electrode	signal wire	supplying electrode	cathode	sensor +
X4.9	n.c.	n.c.	supplying electrode	n.c.	n.c.
X4.8	screen/reference electrode		measuring electrode		
X4.7	free**	free**	free**	free**	free**
X4.6	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2
X4.5	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2
X4.4	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1
X4.3	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1
X4.2	HOLD	HOLD	HOLD	HOLD	HOLD
X4.1	HOLD	HOLD	HOLD	HOLD	HOLD

* ISE: ion concentration measurement with an ion-selective electrode

** Connection Pt1000 to M*V50xxFx* → *separate connection plan*!

Terminal	Description
X3.6	GND
X3.5	B (-) RS485
X3.4	A (+) RS485
X3.3	output 2: 0/4…20mA or 0…5 V refer to GND
X3.2	output 1: 0/4…20mA or 0…5 V refer to GND
X3.1	GND

X2.6	Relay 1 n. c. contact
X2.5	Relay 1 changeover contact (max. 250 V AC / 5 A)
X2.4	Relay 1 n. o. contact
X2.3	Relay 2 n. c. contact
X2.2	Relay 2 changeover contact (max. 250 V AC / 5 A)
X2.1	Relay 2 n. o. contact

Only for AC version:		Only for DC version:
X1.3	Mains supply L2-conductor	GND (24V DC)
X1.2	Mains supply PE-conductor	PE-conductor
X1.1	Mains supply L2-conductor	+ 24V DC

Available since V6.22:

X5.1	Fault relay n. c. contact
X2.2	Fault relay changeover contact (24 V AC/DC 0,3A)
X5.3	Fault relay n. o. contact

Only for MV 50xx FR:

X4.5	Fault relay n. c. contact
X4.4	Fault relay changeover contact (24 V AC/DC 0,3A)
X4.3	Fault relay n. o. contact

Only for MV 50xx FM:

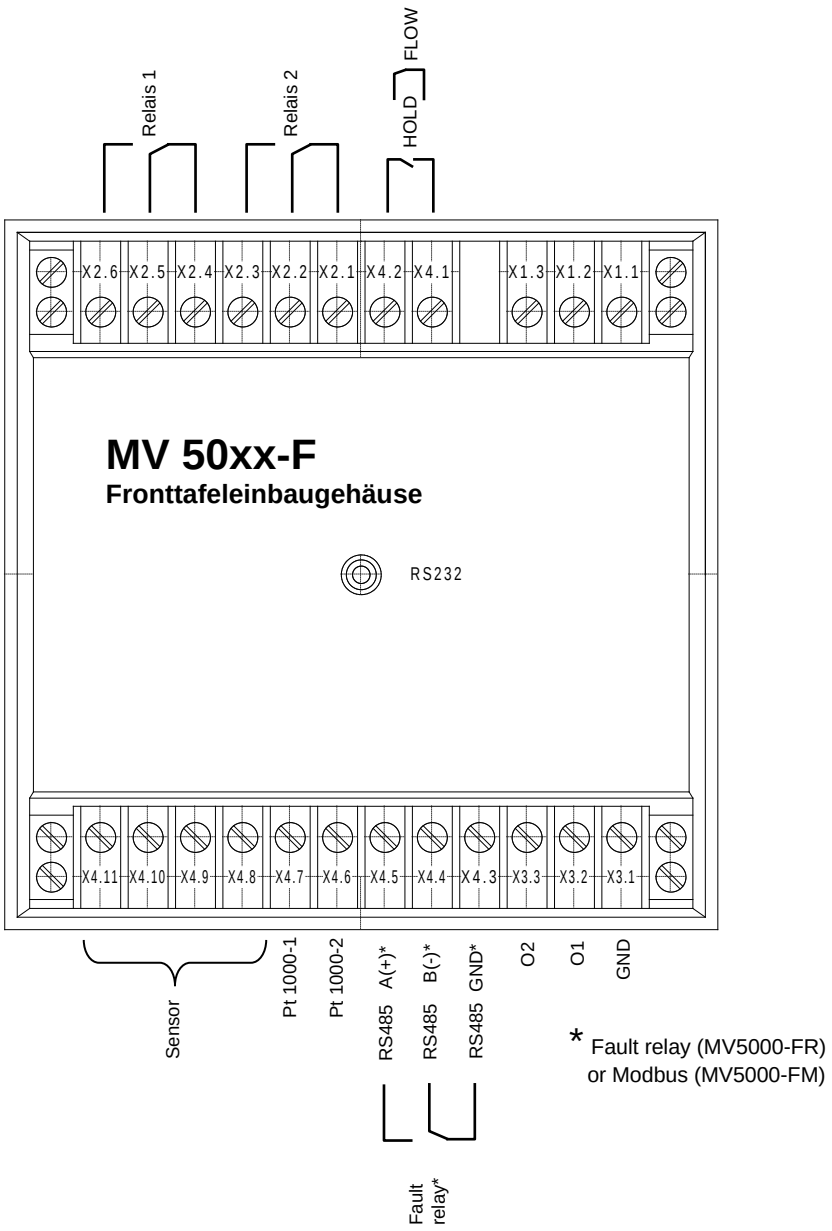
X4.5	A (+) RS485
X4.4	B (-) RS485
X4.3	GND

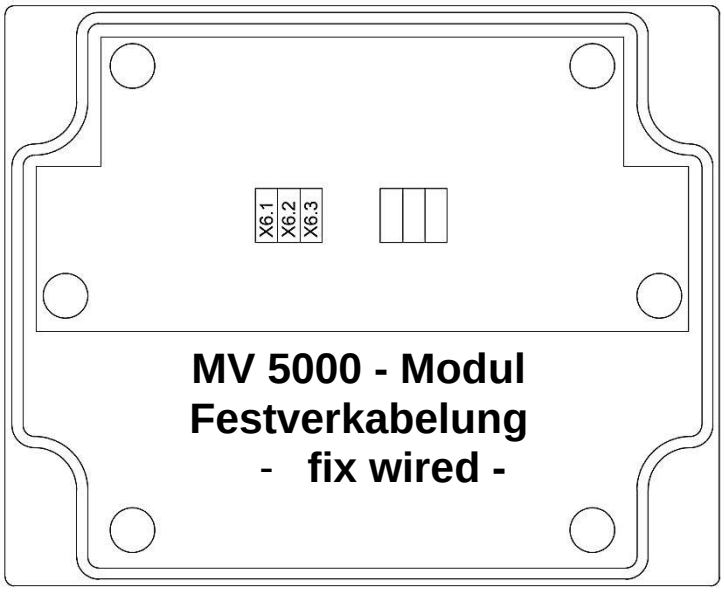
Only in MV 50xx CAN:

X5.1	GND
X2.2	CAN H
X5.3	CAN L

Modul „Festverkabelung“ – fix wired

Only for AC version		Only for DC version	
X6.3	Mains supply L2-conductor	X6.3	GND (24V DC)
X6.2	Mains supply PE-conductor	X6.2	PE-conductor
X6.1	Mains supply L1-conductor	X6.1	+ 24V DC


Relais 1
Relais 2
HOLD
FLOW
X2.6 X2.5 X2.4 X2.3 X2.2 X2.1 X4.2 X4.1 X1.3 X1.2 X1.1
MV 50xx-F
Fronttafeleinbaugehäuse
RS232
X4.11 X4.10 X4.9 X4.8 X4.7 X4.6 X4.5 X4.4 X4.3 X3.3 X3.2 X3.1
Sensor
Pt 1000-1
Pt 1000-2
RS485 A(+)*
RS485 B(-)*
RS485 GND*
O2
O1
GND
Fault relay*
* Fault relay (MV5000-FR) or Modbus (MV5000-FM)


X6.1
X6.2
X6.3
MV 5000 - Modul
Festverkabelung
- fix wired -

Measurement categories

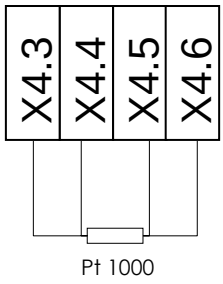
In addition to the main measurement category (i.e. pH, conductivity, etc.) each controller delivers the measured temperature and several so-called second measuring values. The main and second measurement values are directly related to each other and will be calculated or derived internally The configuration menu makes possible to put the following measurement categories to the outputs of the relevant controller.

	main measurement value	**second measurement value**	**temperature**
MV 5010 (pH)	pH value	electrode voltage in mV	temperature in °C
MV 5010 (Redox)	redox potential (ORP) as absolute voltage in mV	redox potential (ORP) referred to the standard hydrogen electrode in mV	temperature in °C
MV 5010 (ISE)	ISE voltage in mV	ion concentration in concentration units	temperature in °C
MV 5020	conductivity in mS/cm or µS/cm	resistance in ohms	temperature in °C
MV 5025	conductivity in mS/cm or µS/cm	salinity in g/kg	temperature in °C
MV 5030	oxygen saturation index in %	oxygen concentration in mg/l	temperature in °C
	or selective:		
	oxygen concentration in mg/l	oxygen saturation index in %	temperature in °C
MV 5060	Concentration in mg/l	sensor output current in mA	temperature in °C
MV5060 A/B	Turbidity in NTU	sensor output current in mA	temperature in °C

4 Sensor Connection Diagrams

4.1 Temperature Sensor

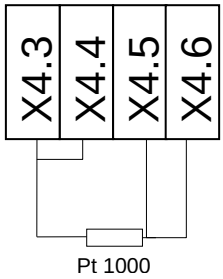
Four-wire circuit



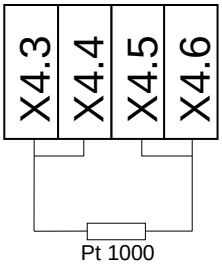
	X4.3 PT1000-1	**X4.4** PT1000-1	**X4.5** PT1000-2	**X4.6** PT1000-2
measuring cable K 43-PT/…	cable core	cable core	shield	shield

→ *MV50xxFx separate connection plan*!

Three-wire circuit

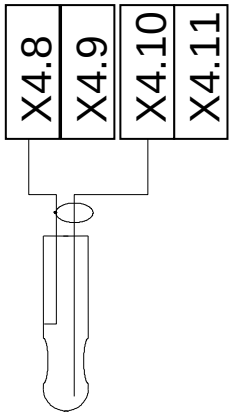


Two-wire circuit



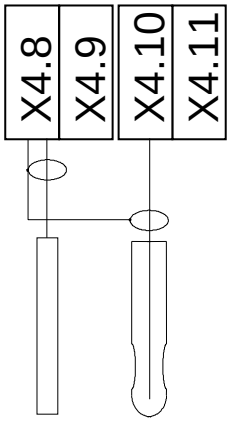
4.2 pH/redox (ORP) and Ion-Selective (ISE) Electrode

Combination electrode



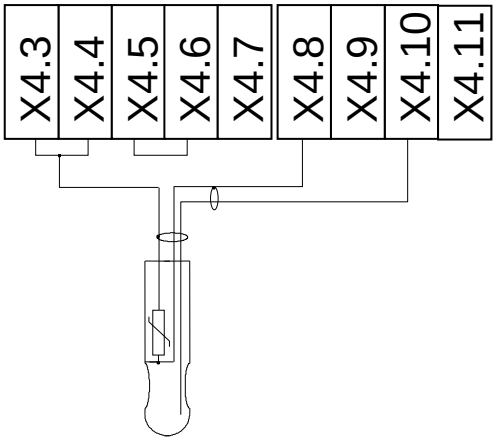
	X4.8 reference	**X4.9** guard	**X4.10** pH-signal	**X4.11** guard
measuring cable K 43/…	shield	-	cable core	-

Separated measuring and reference electrode

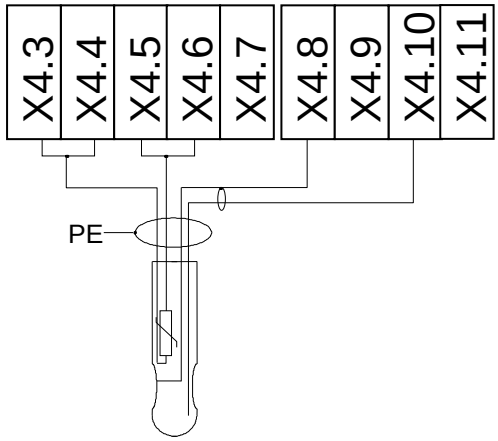


	X4.8 reference	**X4.9** guard	**X4.10** pH-signal	**X4.11** guard
pH-sensor	shield	-	cable core	-
reference electrode	cable core	-	-	-

pH combination electrode with integrated temperature sensor (K 54 triaxial cable)



pH combination electrode with integrated temperature sensor (K 19 multi wire measuring cable)

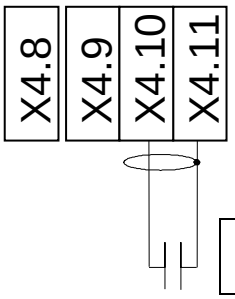


	X4.3 PT1000-1	**X4.4** PT1000-1	**X4.5** PT1000-2	**X4.6** PT1000-2	**X4.7**	**X4.8** reference	**X4.9** guard	**X4.10** pH-signal	**X4.11** guard
measuring cable K 54/…	bridge circuit to X4.4	bridge circuit to X4.3	bridge circuit to X4.6	outer shield (grey)	-	inner shield (red)	-	cable core (blue)	-
measuring cable K 19/…	green	brown	yellow	white	-	shield	-	cable core	-
measuring cable K-VP/…	grey	white	green	pink	-	shield (red)	-	cable core	-
measuring cable K19-VP/…	green	green	brown	brown	-	shield (red)	-	cable core	-

Connection Pt1000 to M*V50xxFx* → *separate connection plan*!

4.3 Conductivity Measuring Cell, Oxygen and Chlorine Sensor

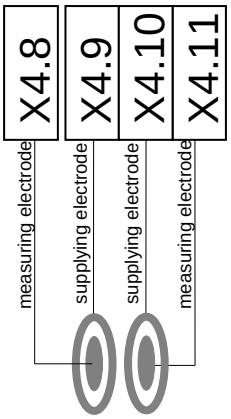
conductivity
2-electrode-cell



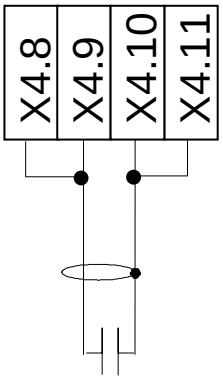
	X4.3 PT1000-1	**X4.4** PT1000-1	**X4.5** PT1000-2	**X4.6** PT1000-2	**X4.7** -	**X4.8** -	**X4.9** -	**X4.10** measuring electrode	**X4.11** measuring electrode
measuring cable K 43/…	-	-	-	-	-	-	-	cable core	shield
measuring cable K 18/…	grey	green	brown	pink	-	-	-	white	shield
measuring cable K-VP/…	grey	white	green	pink	-	-	-	cable core	blue
measuring cable K19-VP/…	green	green	brown	brown	-	-	-	cable core	blue

Connection Pt1000 to M*V50xxFx* → *separate connection plan*!

conductivity
4-electrode-cell



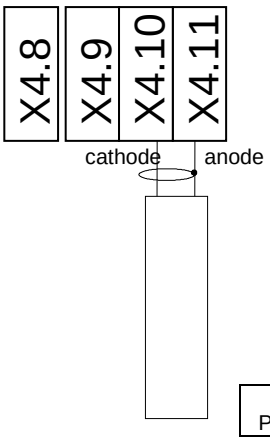
conductivity 2-electrode-cell
to MV5025



	X4.3 PT1000-1	**X4.4** PT1000-1	**X4.5** PT1000-2	**X4.6** PT1000-2	**X4.7** -	**X4.8** measuring electrode	**X4.9** supplying electrode	**X4.10** supplying electrode	**X4.11** measuring electrode
measuring cable K 17/…	shield	white	yellow	blue	-	pink	brown	green	grey
measuring cable K-VP-LF4/…	white	white	green	pink	-	cable core	shield (red)	blue	grey
measuring cable K19-VP/…	green	green	brown	brown	-	cable core	shield (red)	white	yellow

Connection Pt1000 to M*V50xxFx* → *separate connection plan*!

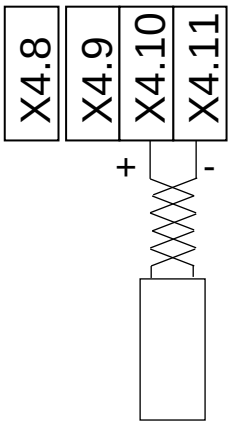
Membrane covered amperometric oxygen



	X4.3 PT1000-1	**X4.4** PT1000-1	**X4.5** PT1000-2	**X4.6** PT1000-2	**X4.7** -	**X4.8** -	**X4.9** anode	**X4.10** cathode	**X4.11** anode
measuring cable K 39/…	grey	brown	green	pink	-	-	-	white	shield
MF 41-N, MF 441 fix cable	grey	green	brown	yellow	-	-	-	white	shield
measuring cable K-VP/…	grey	white	green	pink	-	-	-	cable core	shield (red)
measuring cable K19-VP/…	green	green	brown	brown	-	-	-	cable core	shield (red)

Connection Pt1000 to M*V50xxFx* → *separate connection plan*!

Sensor for disinfectants (chlorine, chlorine dioxide, ozone)



An integrated or separated temperature sensor connected as per para. 4.1

4.4 Cable Length Influence

If no impedance converter is used, the wiring for potentiometric sensors should not exceed 10 m. For conductivity and amperometric sensors and measuring cells, limit the maximum wiring length to 20 m. For detailed information, please refer to the specification sheets of the sensors and to the technical information thereto.

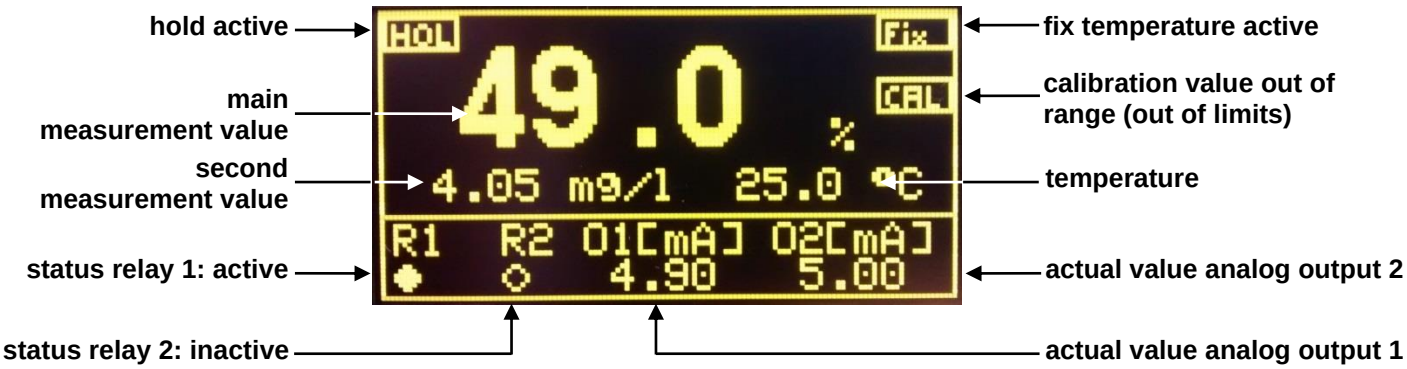
5 Button, Display, Menu structure, Password protection

Button

	CAL	CONF	LOG	INFO	
opens the menu:	Calibration	Configuration	24h-data record-er	Information	
navigation in the menu	Cursor left	Cursor up	Cursor down	Cursor right	selection / ENTER
input / change values	Cursor left	position value +1	position value -1	Cursor right	confirm / save value

Display

☞ **The Display changes after 20 min automatically in the energy-save-modus / screen-saver-modus. By touching of any button (key) the display will be switched on for the next 20 min.**

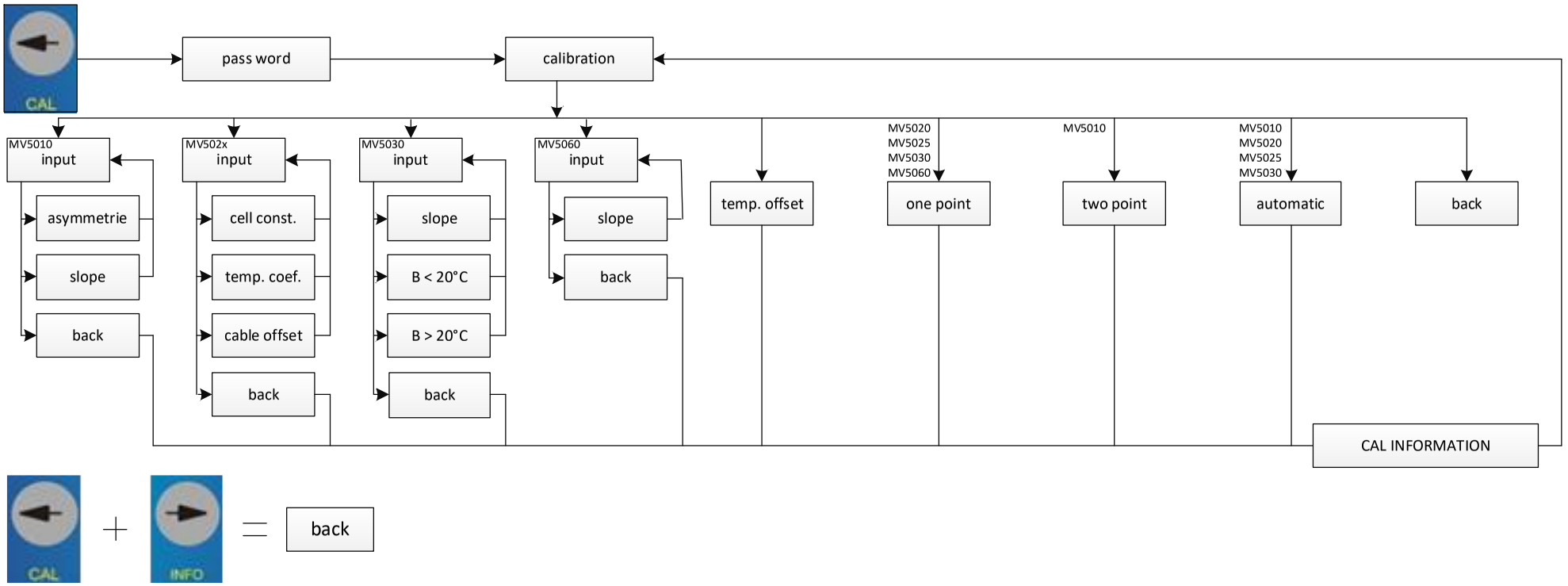


Password-protection

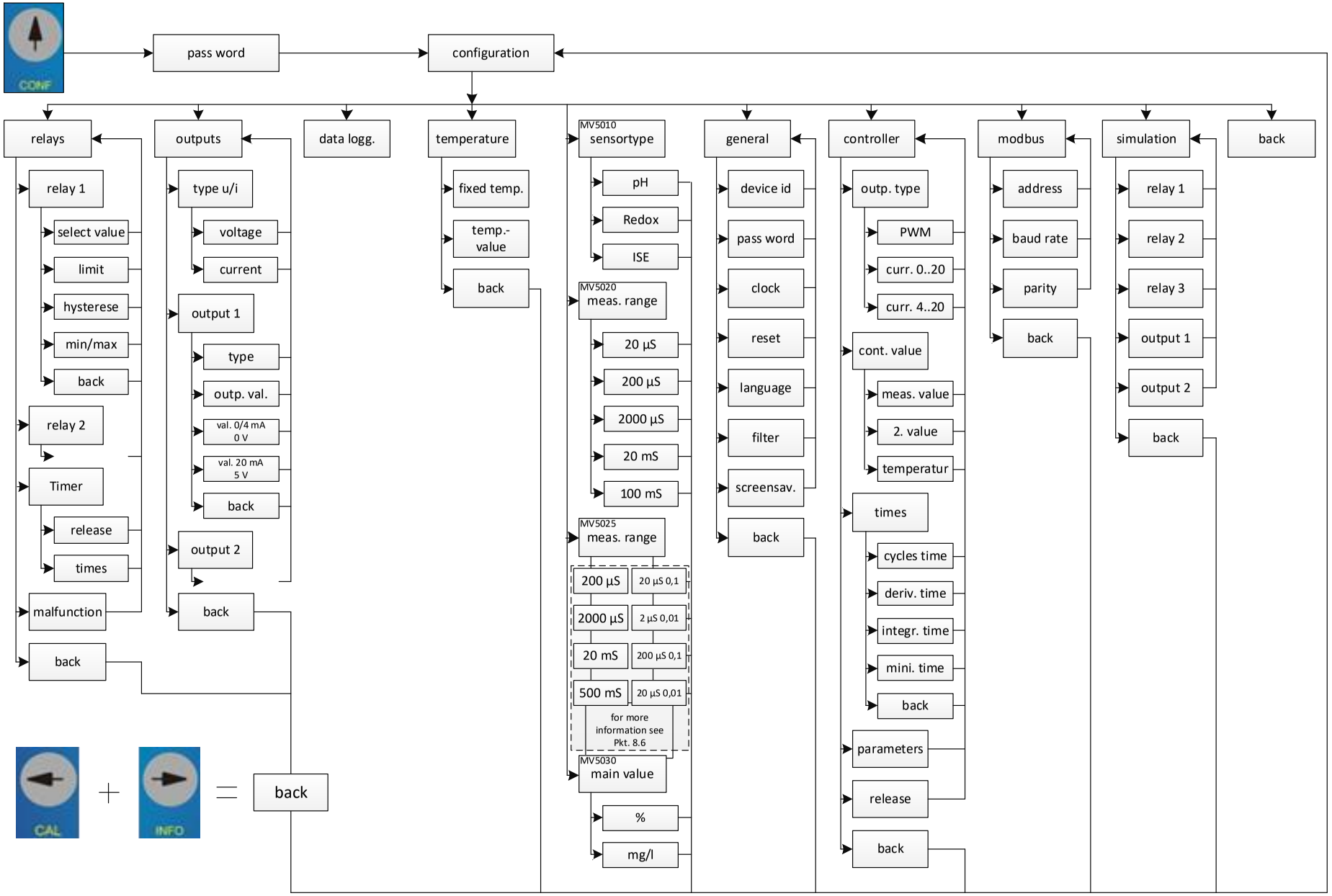
The calibration menu (CAL) and the configuration menu (CONF) are password-protected.

☞ **The default password for opening these menus is 1.**

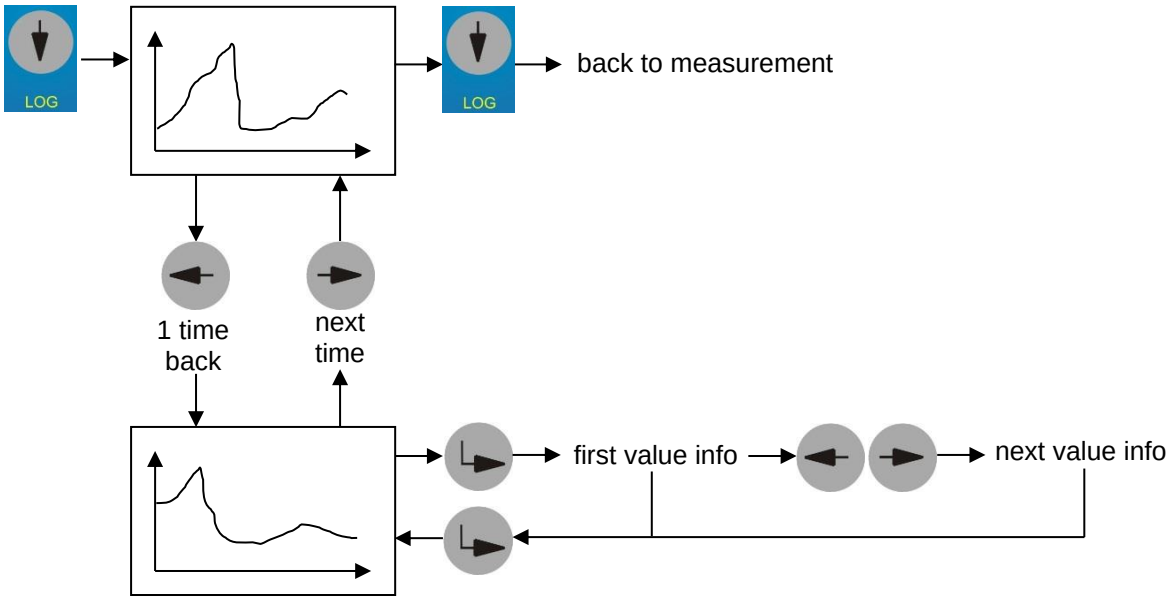
Menu structure Calibration



Menu structure Configuration



Menu structure Data recorder

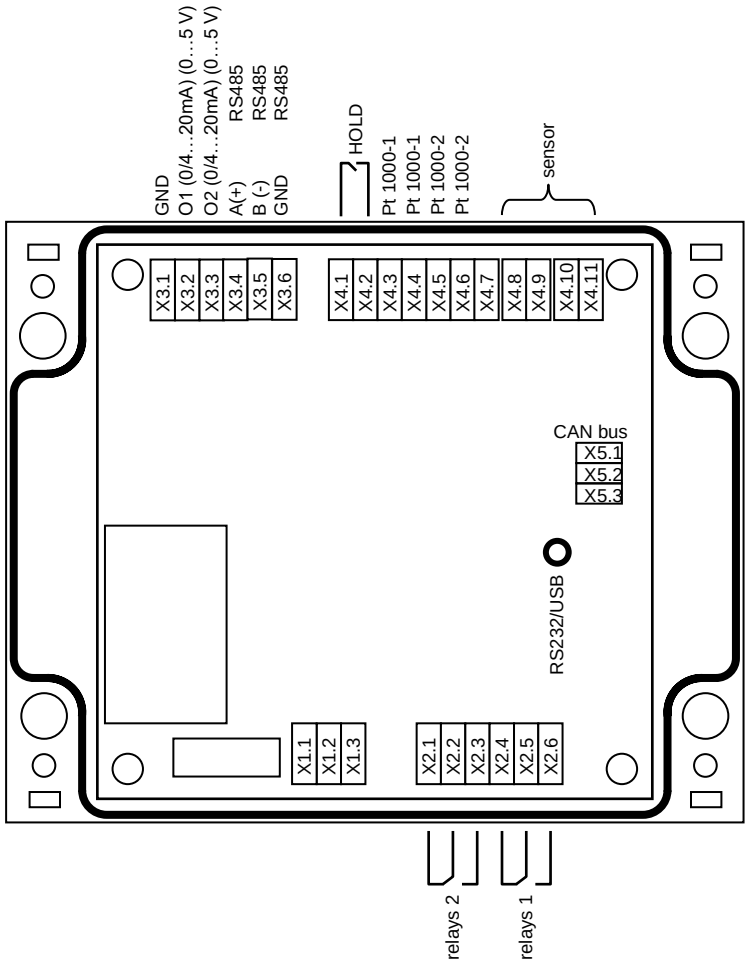


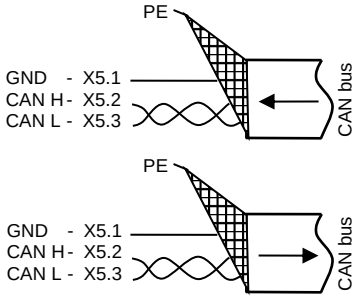
Menu structure Info

6 MV 50xx CAN

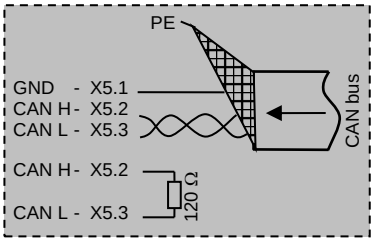
The version MV 50xx CAN provides the possibility to integrate the controllers in a bus-network with the multiparameter system KM 3000. In this case the KM 3000 is the master. Each controller (slave) must get a separate free ID-number. This slave ID-number is factory-pre-adjusted or can be changed in the KM 3000 (see also manual KM 3000 / para. „Change the slave-number (ID)“). It is extremely important that this number is assigned on the bus only once. Otherwise conflicts are possible and the correct function of the whole system cannot be guaranteed.

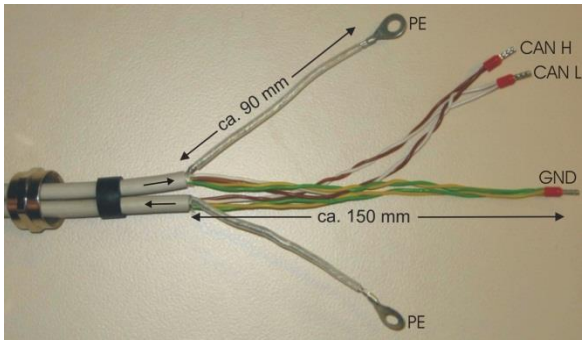
The layout of the bus system necessitates series connection of the slaves (external KM 3000-modules or MV 50xx), the bus line (special CAN-bus-cable) being looped through the module.



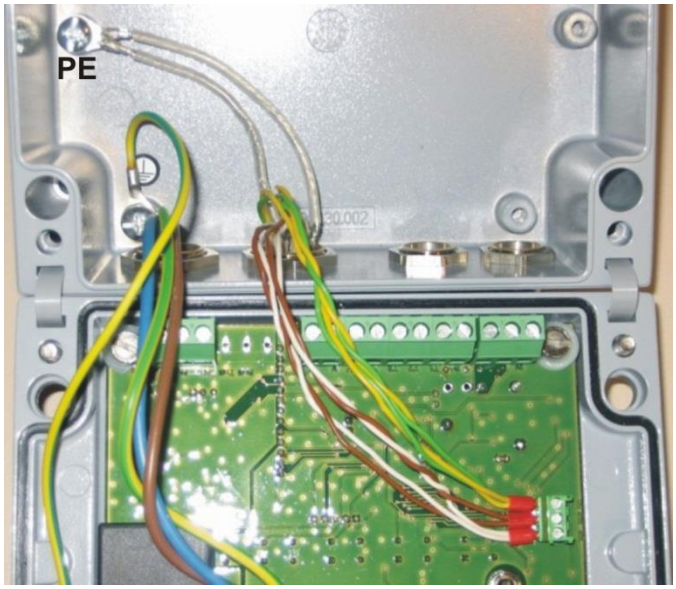


resistor 120 Ω in the last slave in the CAN-bus!





CAN bus cable



☞ **At powering on measuring system it is very important that all MV 50xx CAN already started before or powering on simultaneously with the KM 3000. Never later! Only than an error-free CAN-bus-communication is guaranteed**

☞ **Please note that the configuration of the controllers and the calibration of the measuring points can be done directly at the MV 50xx CAN as well as at the KM 3000. See also manual KM 3000!**

☞ **The desired temperature compensation must be adjusted separately in the KM 3000 and in the MV 50xx CAN. Booth adjustments can be different! In the KM 3000 always the measured temperature is displayed (by enabled temperature display)! In the MV 50xx CAN always the temperature used for compensation (measured or fixed) is displayed.**

☞ **The PID-controller function is not available in the version MV 50xx CAN. Please use the bidirectional PID-controllers in the KM 3000.**

☞ **The fault relay is not available in version MV 50xx CAN.**

7 Calibration

Open with 

+ password the calibration menu.
Select the calibration method.
All possible calibration methods for the respective measuring point type will be displayed.
Open your desired calibration method by selecting the corresponding menu item. The individual calibration methods are explained in the next para. (7.1 Calibration methods).

7.1 Calibration methods

Take account of temperature compensation for all calibration methods. This means, if measured values are compensated by temperature measurement, the associated temperature sensor must also be dipped into the calibration medium to be able to determine the exact temperature.

7.1.1 Data „input“

Data input stands for the input of the specific ratings of the sensor connected that have, for example, been determined at the laboratory before.
Select the corresponding calibration value whose settings you wish to change by. An input dialogue will now enable you to change the values within corresponding limits. If you exceed these you will get an error message to prompt you to enter a value within the fixed limits.

Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.

By the conductivity controller MV 5020 and MV 5025 the cable offset calibration value is included. That allows the entry of a value (offset) for the compensation of the cable resistance. For this purpose, enter the cable resistance in Ohms for the 20 mS/cm and 100 mS/cm measuring ranges.

7.1.2 Setting the Temperature Offset „temp.offs.”

This menu item enables you to set a temperature value offset. For this purpose open the menu item “temp.offs.”. Now, an input dialogue will be displayed which facilitates the setting. The offset can be positive or negative.

Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.

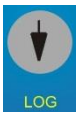
7.1.3 Single-Point Calibration „one point“

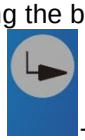
Calibrate the measuring signal at this one point using a defined calibration solution or a known set point value, e. g. determined by a separate method or by means of a laboratory/field instrument. At first, you will be prompted to dip the sensor into the corresponding calibration medium. After this step press 
to accept the dialogue. Now, the currently measured value will be displayed. After the measured value has attained a stable state, accept the dialogue again by pressing 
. You will now be prompted to enter the set point value.

Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.
As a result, you will now be given the new calibration values that will be save in the device.

For calibration of Controller MV 5060 (linear characteristic for measurement of free or total chlorine) in conjunction with corresponding chlorine measuring sensors, a single-point calibration as comparison with a known set point value determined by a means of a photometric laboratory method is recommended. Chlorine measuring sensors feature automatic temperature compensation integrated in the sensor. The temperature value shown during calibration is not taken into account.

7.1.4 Two-Point Calibration „two point“

Calibrate the sensor at two separate points using two different defined calibration solutions or known set point values. The calibration points are supposed to include the measuring range or the measured values to be expected, respectively. You can choose any sequence of the calibration solutions or set point values.

At first, you will be prompted to dip the sensor into the first calibration medium. After this step press 
to accept the dialogue. Now, the currently measured value will be displayed. After the measured value

has attained a stable state, press  to accept the dialogue. You will now be prompted to enter the associated set point value.

Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.
The next dialogue field will now prompt you to dip the sensor into the second calibration medium. After you have accepted this, the currently measured value will, again, be displayed. Press  again to accept the stabilised measured value, before you will be prompted to enter the associated set point value. As a result, you will now be given the new calibration values that will be save in the device.

7.1.5 Automatic Calibration „automatic“

For this method of calibration, the unit automatically recognises the value of the calibration solution used, taking into account the temperature of the calibration solutions. Automatic calibration may be single-point or two-point and is limited to the calibration solutions stored in the unit. This calibration method is applied to pH, conductivity and oxygen content measurements only.

MV 5010 / pH-value

The automatic calibration of the pH measurement is of two-point type and requires knowledge of what buffer solutions you wish to use. The KM 3000 multi-point controller offers the following buffer solutions for calibration:

NBS standard buffer solution as per DIN 19266:	pH value at 25 °C 1.68 / 4.01 / 6.86 / 9.18 / 12.45
Technical buffer solution as per DIN 19267:	pH value at 25 °C 1.09 / 3.06 / 4.65 / 6.79 / 9.23
Knick/Mettler-Toledo laboratory buffer solution:	pH value at 25 °C 2.00 / 4.01 / 7.00 / 9.21
Technical buffer solution:	pH value at 25 °C 2.00 / 4.01 / 6.98 / 8.95 / 11.88

You must take a choice in the first dialogue box. Again, you can choose any sequence of the buffer solutions. For further conditions and tips, please refer to the sensor specifications.

A subsequent dialogue will prompt you to dip the sensor into the first buffer solution. Press  to confirm. Now, the current measured value will be displayed. After the display reads a stabilised value, confirm this. Now, the same procedure as for the first buffer solution will follow (dip sensor into buffer solution 2, wait for value stabilisation) for the second one.
As a result, you will now be given the new calibration values that will be save in the device.

MV 502x / Conductivity

The automatic calibration of the conductivity measurement is of single-point type and requires either a 0.01 molar (1.41 mS/cm at 25 °C) or a 0.1 molar (12.9 mS/cm at 25 °C) KCl solution. The temperature coefficients of these two calibration solutions are stored in the unit. The unit will automatically recognise which calibration solution you are using (observe the measuring range). For further conditions and tips, please refer to the sensor specifications.

At first, you will be prompted to dip the sensor into the calibration solution. Press  to accept this dialogue. Now, an output window will appear reading the current measured value. After this value has stabilised, confirm with  .
As a result, you will now be given the new calibration values that will be save in the device.

MV 5030 / Oxygen Content

The automatic calibration of the oxygen content measurement is a single-point calibration in the ambient air. Take the sensor out of the measuring medium and expose it to the ambient air. When doing so, make sure that neither considerable air flows nor direct sun radiation onto the sensor will affect calibration. For further conditions and tips, please refer to the sensor specifications. Now, the current measured value will be displayed. After the display reads a stabilised value, touch the  button. In this connection, temperature compensation calls for particular attention and may require a setting time of up to 30 minutes.
As a result, you will now be given the new calibration values that will be save in the device.

7.2 Calibration error

In each controller predefined ranges for the calibration values are stored. If the determined calibration value is out of the range the message **!Out of limit!** appears in the calibration information CAL INFORMATION. Additional the message **CAL** will be displayed in the right upper corner in the measuring display. The determined calibration value will be stored nevertheless, so that the measuring and controlling is secured. As the case a new calibration or a replace of the sensor / sensor part (membrane head, electrolyte) is necessary.

8 Configuration

Open with 

+ password the configuration menu.
Select the menu item you would like to configure.

limits	→	relay outputs
output	→	analogue outputs 0/4…20 mA or 0…5 V
data logg.	→	data logger
temperatur	→	fix temperature
sensortype (MV 5010)	→	sensor type
meas.range (MV 502x)	→	measuring range
main value (MV 5030)	→	main value
general	→	general settings
controller	→	PID-controller
Modbus	→	Modbus setup
simulation	→	Relay/anloque output set/reset
back	→	back

8.1 Configuration of the relay as Timer or Limit output

Each controller of the MV 5000-serie has 2 floating relay outputs (changeover contact).
These can be configured either for 2 x limit- /alarm relays **or** for 1 x bidirectional PID-controller-relays.

☞ **If the relays are used for limits → the PID-controller must be either configured as analogue controller (0/4…20mA) or switched off (Disable).** (see also para 8.9)

For configuration of the relay outputs do the following steps:

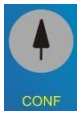
1. open the menu „limits“
2. select the relay
3. open the menu item „select value“ and select the measured value it shall assign to the limit

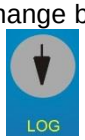
measure value	=	main measurement value
2. value	=	second measurement value
temperatur	=	temperature

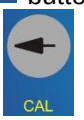
4. enter the limit value in the menu item „ limit“

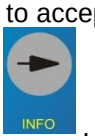
   Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.
5. enter the limit hysteresis in the menu item „ hysterese“
6. select the limit type in the menu item „ Min / Max“

Configure the relay output as Timer:

1. open menu “relay”
2. open “Timer” menu
3. set the “on” and “off” time (1…10000 min)
4. to activate the timer function choose “ON”.

Relay 1 and 2 are driven inverted by the timer. In measurement screen, you see the message HOLD.

8.2 Configuration of the current / voltage „outputs“

Each controller of the MV 5000-serie has 2 analogue outputs.
These can be configured either for 2 x 2 x 0/4…20 mA **or** 2 x 0…5 V **or** for 1 x bidirectional PID-analogue-controller.

☞ **If the analogue outputs are used for 2 x 0/4…20 mA or 2 x 0…5 V → the PID-controller must be either configured as PWM-controller (pulse length controller) or switched off (Disable).** (see also para 8.9)

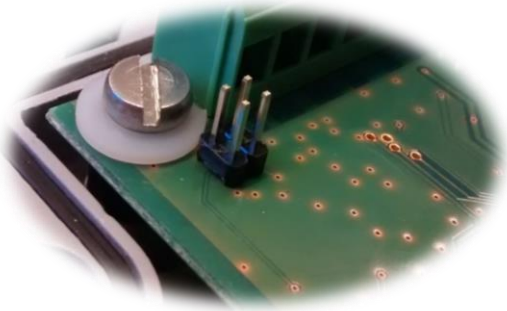
☞ **The configuration of the analogue output type „type u/i“ (described following) as 2 x 0/4…20 mA or 2 x 0…5 V must always agree with the actual coding (jumper) in the device.**

All necessary hard- and software configuration for the desired type of the analogue outputs – current or voltage – will be made by factory-provided.

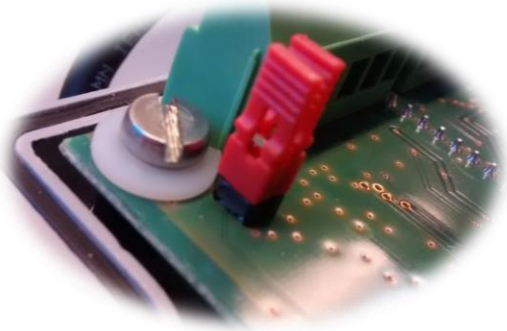
MV 50xx	=	2 x 0/4…20 mA
MV 50xx-U	=	2 x 0…5 V

If after delivery the alternation of the analogue output type (type u/i) is necessary, do the following steps:

1. disconnect the device from supply voltage
2. disconnect all at the analogue output terminals connected wires
3. open device
4. do the device coding on the main board
   the jumper on the main board have the following coding:



0/4…20 mA



0…5 V (Jumper)

5. close the device (reconnect the wires to the analogue output terminal not before the hole configuration is done!)
6. open the configuration menu with 

+ pass word
7. open menu „output“
8. open menu „type u/i“
9. select the correct analogue output type

current	=	2 x 0/4…20 mA
voltage	=	2 x 0…5 V

10. configure the analogue outputs (described following)

☞ **In case of the PID-controller will be configured as analogue-controller (2 x 0/4…20 mA) the analogue outputs will be configured <u>automatically</u> as current outputs (menu** „type u/i“ **= current)!**

For configuration of the analogue outputs do the following steps:

1. open the menu „ output “
2. select the analogue output
   → *only by current outputs* measure value open menu item„type“ and select **0…20mA** or **4…20mA**
   The type setting is always relevant for booth analogue outputs (2 x 0…20mA or 2 x 4…20mA).
3. open the menu item „outp. val.“ and select the measured value it shall assign to the analogue output

measure value	=	main measurement value
2. value	=	second measurement value
temperatur	=	temperature

4. enter the 0/4mA-start-value in the menu item „ val. 0/4mA“
   Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.
5. enter the 20mA-end-value in the menu item „ val. 20mA“

8.3 Configuration of the data logger „data logg.“

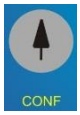
Each controller of the MV 5000-serie has an integrated data logger with real-time clock. So it is possible to save about 4.000 data sets (date, time, main measurement value, second measurement value, temperature).
The saved data can be either displayed directly in the device display or transferred by an USB-interface.

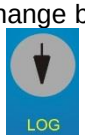
For configuration of the data logger do the following steps:

1. open the menu „data logg.“
2. enter the time interval in the menu item „ interval“

   Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.

Important for the correct function of the data logger is the right setting of the real-time clock (see para. 0)

8.4 Configuration of the fix temperature „temperature“

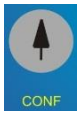
For calculating the analysis parameter pH und O_2 a temperature compensation is always necessary. The conductivity value can be displayed real or temperature compensated (refer to 25 °C).
For that the temperature of the measuring and of the calibration fluid must be measured or a fix temperature must be configured. If the fix temperature is activated this will be used for the temperature compensation. In this case the message **Fix** appears in the right upper display corner.

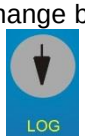
For configuration a fix temperature do the following steps:

1. open the menu „temperatur“
2. activate / deactivate the fix temperature in the menu item „fixed temp.“
3. enter the fix temperature value in the menu item „ temp.-value“

   Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.

8.5 MV 5010 – Configuration of the „sensortype“

The controller MV 5010 can be connected with pH-, ORP- or ISE-electrodes. The used sensor type has to be configured in the device.

For configuration of a sensor type do the following steps:

1. open menu „sensortype“
2. select the parameter for the used electrode

pH	=	pH-electrode
Redox	=	ORP-electrode
ISE	=	IonenSelectiveElectrode

8.6 MV 502x – Configuration of the measuring range „meas. range“

For measuring the conductivity with the controller MV 502x in a proper accuracy the actual conductivity measuring range has to be configured. The useful measuring ranges depend on the cell constant and on the measuring cell used.

For configuration of the measuring range do the following steps:

1. open the menu „meas.range“
2. select the actual measuring range

MV 5020	**MV 5025**	**conductivity technology**
20 µS	200 µS	2 & 4 cell
200 µS	2000 µS	2 & 4 cell
2000 µS	20 mS	2 & 4 cell
20 mS	500 mS	4 cell
100 mS	20 µS 0,1	2 cell
	2 µS 0,01	2 cell
	200 µS0,1	2 cell
	20 µS0,01	2 cell

8.7 MV 5030 – Configuration of the „main value“

It is possible to replace the main measuring value and the second measuring value (see also para. 5). If not different ordered in the factory-provided version the main measuring value is the oxygen saturation in % and the second measuring value is the oxygen concentration in mg/l.

For configuration of the main measuring value do the following steps:

1. open the menu „main value“
2. select the main measuring value

	main measuring value	**second measuring value**
%	oxygen saturation in %	oxygen concentration in mg/l
mg/l	oxygen concentration in mg/l	oxygen saturation in %

☞ **The scaling of the analogue outputs is dimensionless. Therefore it can be necessary to readjust the configuration of the analogue outputs!** (see also para. 8.2)

8.8 Configuration the basic settings „general“

In the menu „**general**“ you can configure the following basic device settings:

device id	=	*Currently not available*
pass word	=	Changing pass word
clock	=	Setting date and time
Reset	=	Restart
Language	=	Setup language
Filter	=	Filter sensor input
Screensave	=	Screensaver
Back	=	Back

☞ **The default password for opening menus is 1.**

8.9 Configuration of the PID „controller“

For complex control tasks, a bidirectional PID controller is integrated. This controller works as analogue or pulse length (PWM) controller by using the analogue current outputs or the relay outputs of the MV 50xx.

The control and regulating outputs must not be used for protective or safety circuits.

☞ **The PID-controller function is not available in the version MV 50xx CAN. Please use the bidirectional PID-controllers in the KM 3000.**

☞ **If the PID-controller is used as pulse length controller (PWM) this function has priority. Both relay outputs will be reserved automatically for this. An additional use of the relays for 2 x limit output is not possible.**

☞ **If the PID-controller is used as analogue-controller (2 x 0/4…20 mA) this function has priority. Both analogue outputs will be reserved automatically for this. An additional use of the analogue outputs for 2 x 0/4…20 mA or 0…5 V is not possible.**

☞ **For using the PID controller as analogue controller (0/4…20 mA) the actual coding (jumper) in the device must agree.**

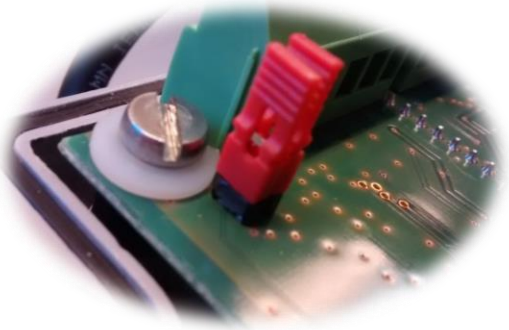
All necessary hard- and software configuration for the desired type of the analogue outputs – current or voltage – will be made by factory-provided.

MV 50xx	=	2 x 0/4…20 mA
MV 50xx-U	=	2 x 0…5 V

If after delivery the alternation of the analogue output type (type u/i) is necessary, do the following steps:

1. disconnect the device from supply voltage
2. disconnect all at the analogue output terminals connected wires
3. open device
4. do the device coding on the main board
   the jumper on the main board have the following coding:

0/4…20 mA
(PID controller)

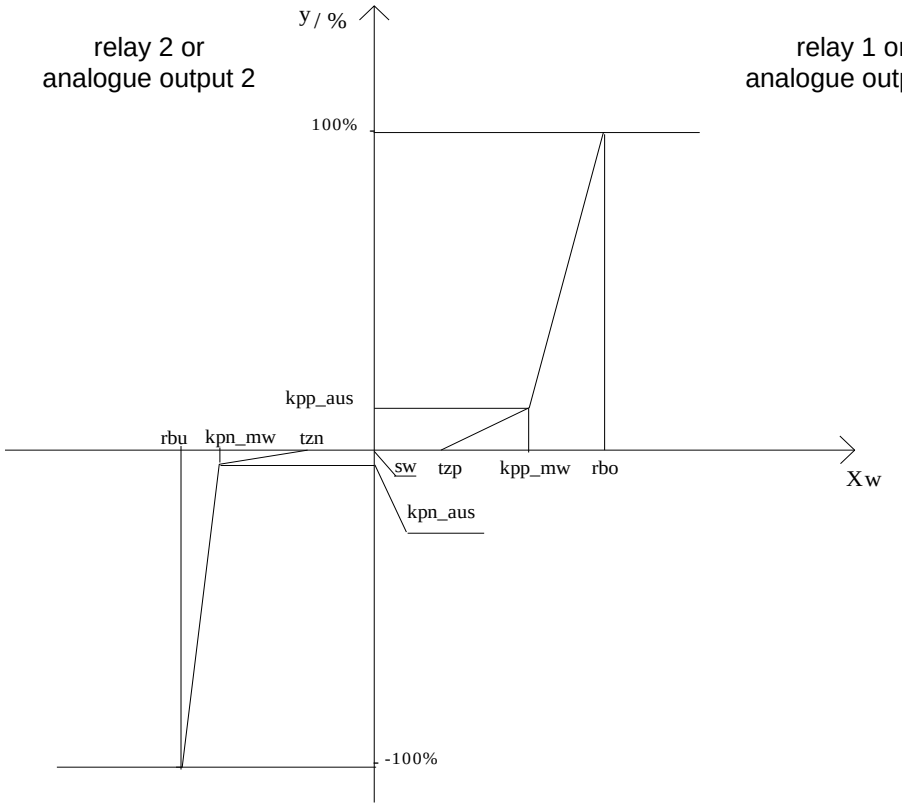


0…5 V (Jumper)

5. close the device (reconnect the wires to the analogue output terminal not before the hole configuration is done!)

The PID-controller must be used as quasi-continuous controller. For simple control tasks, the integrated controller can be set as single proportional controller. You can also set a controller with a differential and/or integral portion. If you define an integral action time of 0 the controller will be used without an integral portion. The same applies to differential time.
Processes for controlling the pH value are non-linear. The transmission constant of the system in the set point value range is often higher by some orders of magnitude as at the limits of the control range. The use of the controller with fixed setting values will result either in an instability of the control loop near the set point value or in extremely long settling times (for batch processes), or in high deviations (for continuous processes with greater disturbance variations), respectively. The controller integrated in the MV 50xx can be matched to such distinctive features of the process. The general static characteristic curve of the controller is shown below. It facilitates the realisation of different transmission responses for certain parts of the control range.

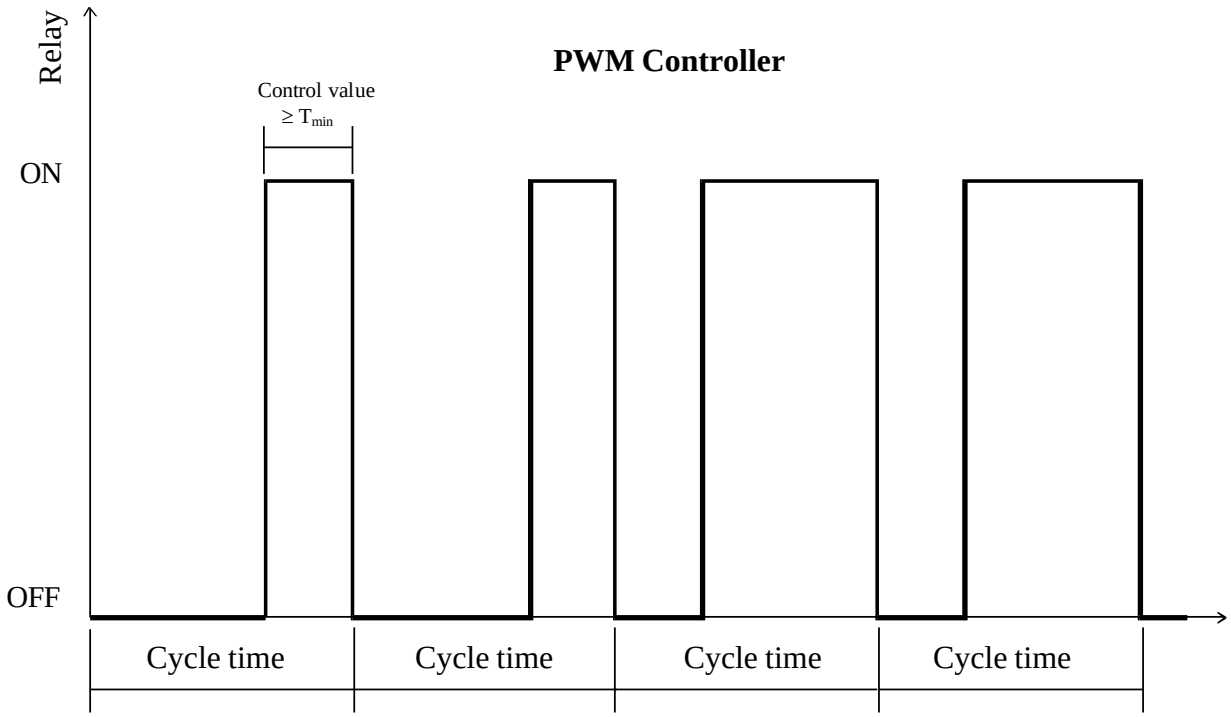
☞ **The integral action time works only within the break point.**



rbu	→	lower range limit	→	upper limit
rbo	→	upper range limit	→	lower limit
sw	→	set-point	→	target value
tzp	→	dead band, positive range	→	dead band +
tzn	→	dead band, negative range	→	dead band -
kpp_mw	→	break point + x (input value)	→	break point x+
kpn_mw	→	break point – x (input value)	→	break point x-
kpp_aus	→	break point + y (output value)	→	break point y+
kpn_aus	→	break point – y (output value)	→	break point y-

8.10 Configuration of a pulse length controller (PWM)

The pulse length controller is firmly linked with the two relay outputs (refer to the characteristic curve). Within the cycle time, a switching pulse that intervenes into the control process is calculated, depending on the deviation from the set point. The control value is re-calculated at the beginning of each cycle time. The minimum time - the shortest period of a control action - can be set for adaptation to different active modules. It is to prevent switching processes that are too fast for the active module. If it is undercut, and if the controlled quantity is out of the dead band, the active module will be triggered with the minimum time. If the turn-off time is shorter than the minimum time the relay will continuously stay turned on.



For configuration of a pulse length controller do the following steps:

1. open menu „controller“
2. open menu item „outp. type “
3. select „PWM“

PWM	=	pulse length controller
current 0 . .20	=	analogue controller 0…20 mA
current 4 . .20	=	analogue controller 4…20 mA

4. open the menu item „cont. val.“ and select the measured value it shall assign to the controller

measure value	=	main measurement value
2. value	=	second measurement value
temperatur	=	temperature

5. open the menu item „times“ and enter the times response of the controller

cycle time	=	time for 1 period (on + off)
derivative time	=	derivative time
integral time	=	integral time
minimal time	=	shortest time of 1 control action

Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.

6. open the menu item „parameters“ and enter the parameter how the controller should work

lower limit	=	lower range limit	rbu
upper limit	=	upper range limit	rbo
target value	=	set-point	sw
dead band +	=	dead band, positive range	tzp
dead band -	=	dead band, negative range	tzn
break point x+	=	break point + x (input value)	kpp_mw
break point x-	=	break point – x (input value)	kpn_mw
break point y+	=	break point + y (output value)	kpp_aus
break point y-	=	break point – y (output value)	kpn_aus

7. open the menu item „release“ and activate the controller

Disable	=	blocked
Enable	=	active

8.11 Configuration of an analogue controller

The analogue controller is firmly linked with the two analogue outputs (refer to the static characteristic curve). After the sampling rate has elapsed, the controller is re-calculated and the resulting current provided at the output. This current will be kept constant for the period of the sampling rate.

☞ **If the PID-controller is configured as analogue-controller the analogue outputs will be configured automatically as current outputs (menu** „type u/i“ **= current)! Pay attention of the correct hardware coding (jumper) of the device!** (see para. 8.2)

For configuration of an analogue controller do the following steps:

1. open the menu „controller“
2. open the menu item „outp. type“
3. select the desired type of the analogue controller

PWM	=	pulse length controller
current 0 . .20	=	analogue controller 0…20 mA
current 4 . .20	=	analogue controller 4…20 mA

4. open the menu item „cont. val.“ and select the measured value it shall assign to the controller

measure value	=	main measurement value
2. value	=	second measurement value
temperatur	=	temperature

5. open the menu item „times“ and enter the times response of the controller

cycle time	=	sampling rate (I = constant)
derivative time	=	derivative time
integral time	=	integral time
minimal time	=	*in case of analogue controller not used*!

Select the position you would like to change by using the buttons 

or 

. Adjust the corresponding position with 

(+1) or 

(-1). Press the 
-button to accept and save the entry. To cancel the input dialogue without saving the value press 

+ 

.

6. open the menu item „parameters“ and enter the parameter how the controller should work

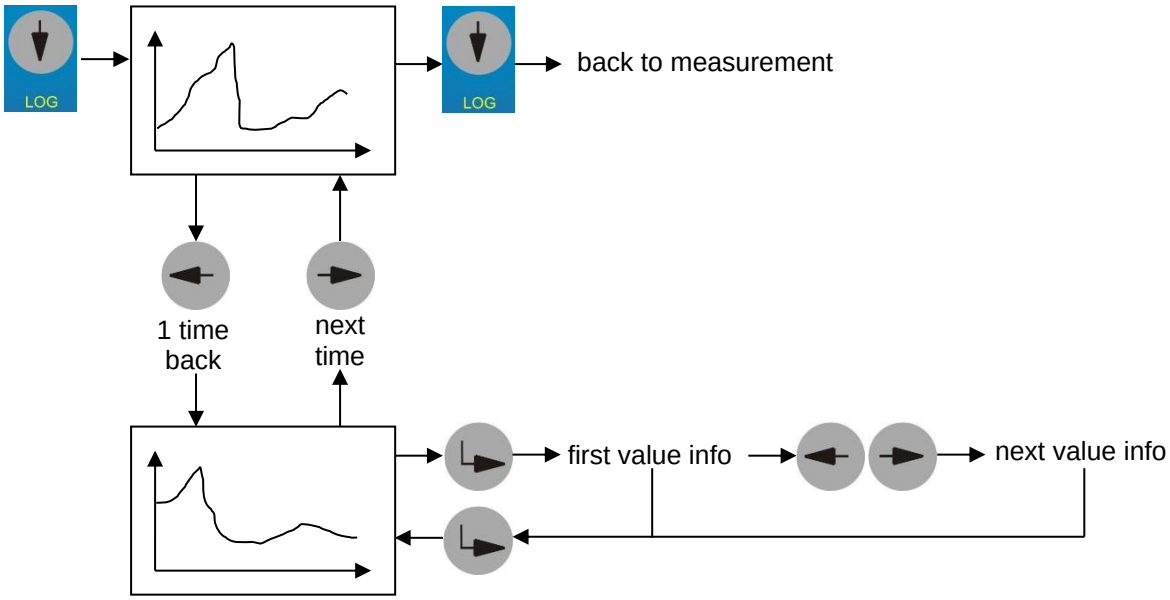
lower limit	=	lower range limit	rbu
upper limit	=	upper range limit	rbo
target value	=	set-point	sw
dead band +	=	dead band, positive range	tzp
dead band -	=	dead band, negative range	tzn
break point x+	=	break point + x (input value)	kpp_mw
break point x-	=	break point – x (input value)	kpn_mw
break point y+	=	break point + y (output value)	kpp_aus
break point y-	=	break point – y (output value)	kpn_aus

7. open the menu item „release“ and activate the controller

Disable	=	blocked
Enable	=	active

9 Data logger

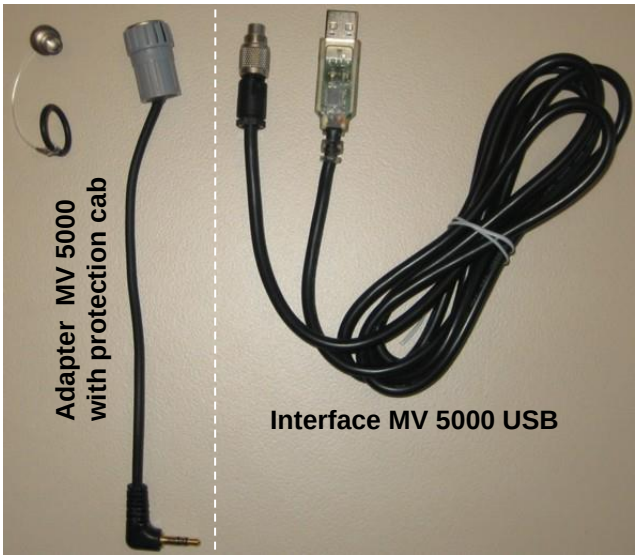
Each controller of the MV 5000-serie has an integrated data logger with real-time clock. So it is possible to save about 4.000 data sets (date, time, main measurement value, second measurement value, temperature).
The saved data can be either displayed directly in the device display:



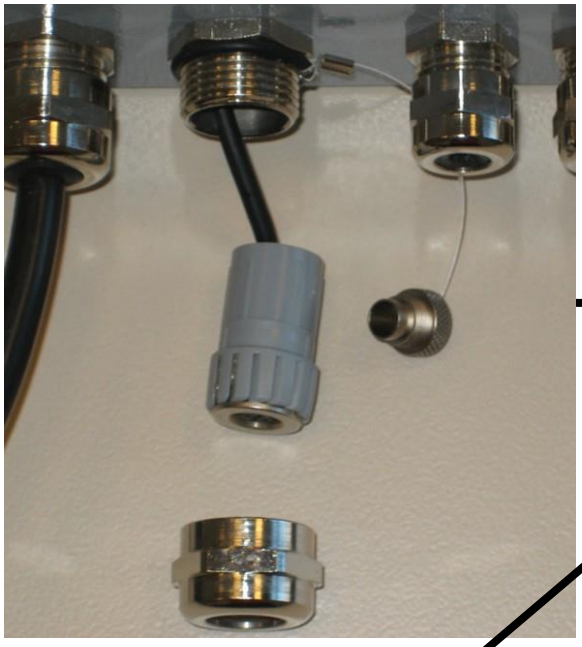
or transferred by an USB-interface (refer to manual: Software „DinModule“).
The interval will be adjusted in the MV 50xx device in the menu item “Configuration” → “data logg.” (see para. 8.3).

9.1 Interface MV 5000 USB

For comfortable reading out of the data logger, the internal interface can be connected to the outside of the enclosure by the accessory „Adapter MV 5000“.



For this it is required to replace the inner part of the free cable gland M20 (2. from the left) by the “Adapter MV 5000 USB“.

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34.51.7.012.0010
12V 6A 250V

10 Modbus RTU / RS485

The MV5000 is capable for integration in Modbus systems. Modbus communication allows using the interface RS485 as transmitting medium. The sensor data information is made available in a sensor data block. The data communication is based on request and reply frames. The format of the frames is defined by Modbus RTU protocol. The Modbus master sends one request frame via Modbus command to the Modbus slave. Then the Modbus slave answer with a frame according to register list.
The Modbus protocol of the MV5000 is compatible to the Modbus protocol of KM 2000 and KM3000. That means that existing application can be easily implemented into KM 3000 system.

10.1 Protocol structure

Follow Modbus commands can be used:

Function	**Function number**
Read n (max. 16) Words, Read Input Register	0x04
Read n (max. 16) Words, Read Holding Register	0x03

The structure of the register is described as follows:

Slave ID	**Register**	**Describtion**	**Data type**
	0001 Bit 7…0	sensor number (Slave ID)	Byte
	0001 Bit 15…8	sensor status	Byte
	0002 Bit 7…0	sensor type	Byte
	0002 Bit 15…8	device status	Byte
	0003 Bit 31…16	temperature value	Float 32
	0004 Bit 15…0	temperature value	
	0005 Bit 31…16	main value	Float 32
	0006 Bit 15…0	main value	
	0007 Bit 31…16	secondary value	Float 32
	0008 Bit 15…0	secondary value	

Relay status: The bits 0…1 characterise the status of internal relays of MV 5000.
Device status: 0x00: Device operates normally
0x01: HOLD manual activated
0x02: HOLD by calibration activated
0x03: HOLD by timer activated
0x08: CAL Error

Sensor type	**hex**	**Sensor type**	**hex**
pH	01	CL2 free chlorine	0B
Redox	02	Conductivity 0…200µS(4-Pol)	15
Conductivity 0…200µS	03	Conductivity 0…2mS(4-Pol)	16
Conductivity 0…2mS	04	Conductivity 0…20mS(4-Pol)	17
Conductivity 0…20mS	05	Conductivity 0…500mS(4-Pol)	18
Conductivity 0…100mS	06	Conductivity 0…20µS cc=0,1cm-1	1F
O2 oxygen	08	Conductivity 0…2µS cc=0,01cm-1	20
Linear	09	Conductivity 0…200µS cc=0,1cm-1	21
ISE ion selektiv	0A	Conductivity 0…20µS cc=0,01cm-1	22

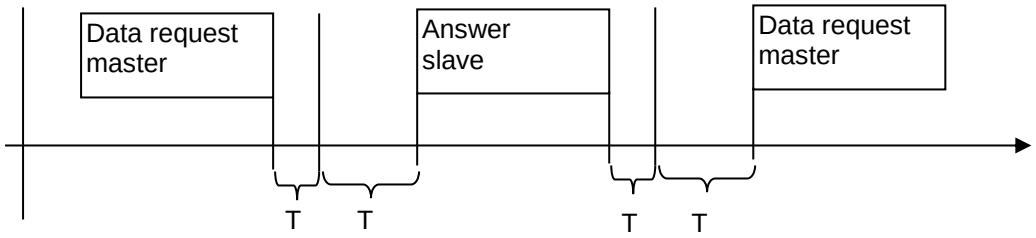
Number format:

Float 32 Format accord. to IEE 754:

BYTE Format (8 Bit):
Format: HHHHHHHH

Communication and Timeout:

Always data request from master is followed by reply from slave. This communication requires different times:



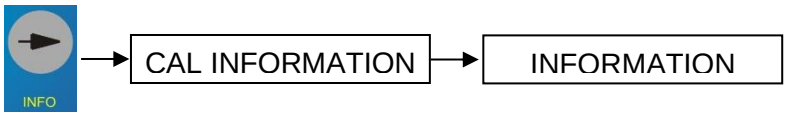
T1: end detection request protocol (Attention! depend on baud rate, always 3 character long)
T2: operating time of slave (max. 100mS), during this time another data request on the bus is not allowed.
T3: switching time from “send“ to “receive“ (only RS485) max. 10 mS

T1 for different baud rates:

Baud rate	T1 [mS] end detection
9600	4,2
19200	2,18
38400	1,15

11 Calibration information

In the menu „CAL INFORMATION“ the up-to-date calibration data (last calibration) as well as sensor specifically configuration settings can be recalled.
The menu "INFORMATION" displays the firmware version, the switch-on time of the device (Date / time) and the current device time (date / time).



12 Hold State

During maintenance work, e.g. Calibrating or cleaning a sensor, the controller does not display a real reading. Further processing of the measured value, e.g. to control processes, is not desirable in these situations.
To preclude further processing of the measured value, the current measured value is frozen.
The state HOLD is active.

In the state HOLD:

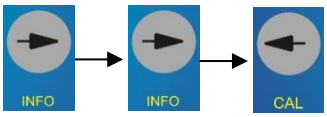
- ☞ the system does not react to the current measured value or the status of the sensor
- ☞ outputs are frozen
- ☞ Sensor errors do not changes in the status of the linked outputs

The HOLD state turns on automatically:

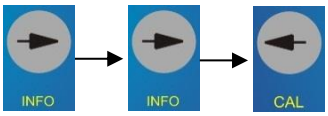
- ☞ during calibration
- ☞ timer function is active, if the switch-off time for relay 2 is active (relay 2 is open).

For other cases where the sensor cannot provide correct readings, please set the HOLD state manually.

The HOLD state manually:



☞ The HOLD state is activated. The display will show the message [HOL]



☞ The HOLD state is switched off. The display disappears [HOL] in the display.

13 Maintenance, Disposal

The device is almost maintenance-free. In the case of dirtying it is only allowed to clean the outsides with a wet drapery. For this the controllers must be disconnected from the power supply! Cleaning with aggressive detergent which contains solvents (e. g. acetone) is forbidden. Otherwise damaging of the case and the plastic foil keyboard may occur. Do not use hard brushes or metal objects. For maintenance and storage of the sensors / electrodes please observe the corresponding manuals of the sensors / electrodes.

Please send us the old measuring instruments and sensors for disposal. Sensortechnik Meinsberg GmbH takes it back free of charge and recycles/disposes the electronic scrap in a competent way. Do not dispose your old measuring instruments in household refuse, this is illegal. Please avoid the disposal at public collecting points. For more information: http://www.meinsberg.de/en/weee.pdf

14 Specifications

Configuration	directly in the device by 5 Keys and Display (plain text menu structure) or by means of the PC interface and corresponding configuration program
Display	graphic OLED display, 128 x 64 pixel, self-luminous, display for 3 values (value 1, value 2 and temperature value)
Output signals	2 x 0(4) … 20 mA or 2 x 0 … 5 V, isolated
Current output signal	load ≤500 Ω, accuracy ≤0.2 %
Voltage output signal	input resistance ≥2 kΩ, accuracy ≤0.2 %
Controller function	bidirectional PID controller with pulse length (PWM)- or analogue controller (not in MV 50xx CAN)
Interface	RS232 (USB with “Interface MV USB”), isolated RS485 / Modbus RTU
Relay output	2 x changeover contact max. 250 V AC, 5 A 1 x changeover contact max. 24 V AC/DC 0,3A (Fault relay not in CAN version) To prevent relay damage, the load circuit must be fused for the maximum permissible current. The cable cross-section (max. 2.5 mm²) must be adapted to the maximum output current (DIN VDE 0298 Part 4, 2013-06).
Power supply	(Please note the nameplate – 230 V AC or 24 v DC) 100 … 240 V AC (50/60 Hz), app. 9 VA 18 … 36 V DC, app. 9 VA
Fuse:	Fuse 5x20; slow range; 1,6 A
Modul „Festverkabelung“ (fix wired)	Rubber cable type H07RN-F, 3G1.0 Cable outer diameter depending on the cable gland used (clamping range) The external circuit capacity of the power supply in a hard-wiring should not exceed 10 A (slow).
Ambient temperature	-10 … 55 °C
EMC	EN 61326-1:2013, class B
Safety test:	EN 61010-1 Safety Class ll
Electrical connections	screw-terminals for wires cross section 0.2 … 2.5 mm² 3 pins stereo jack socket for stereo jack Cable gland M16x1,5 - max. torque 7 Nm - cable cross-section 4.5…10 mm Cable gland M20x1,5 - max. torque 12 Nm - cable cross-section 7…13 mm
Measuring range	MV 5010: pH -2 … 16; -2000 … 2000 mV; 0 … 9999 ppm MV 5020: 0 … 200(2000) µS 0 … 20(100) mS/cm 0 … 20µS/cm (K=0,1) MV 5025: 0 … 500 mS/cm 0 … 20(200) µS/cm (K=0,1); 0 … 2(20) µS/cm (K=0,01) MV 5030: 0 … 200 %; 0 … 20 mg/l MV 5060: 0 … 2 (10) mg/l

Recommended electrodes/sensors suitable for connection to the controller in accordance with the individual detailed technical data sheets.

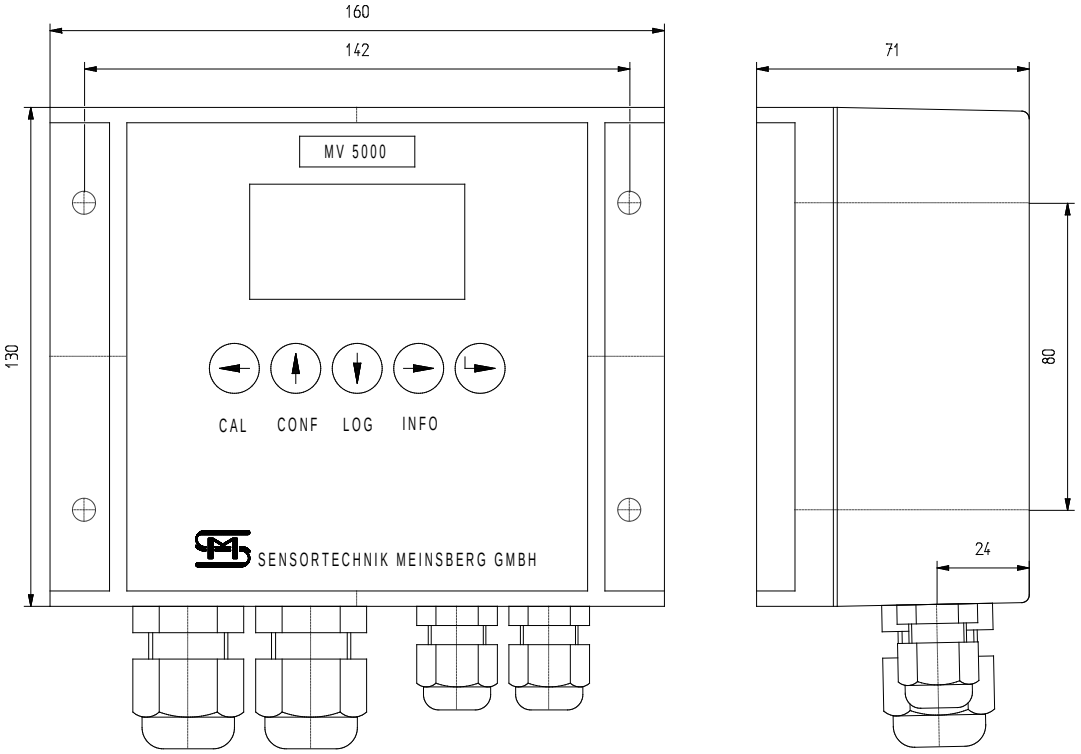
MV 50xx, MV 50xx CAN:

CAN-bus networking of up to 16 devices (slaves) with KM 3000 (master) via CAN-bus (only MV 50xx CAN)

Enclosure extremely rugged aluminium case for wall mounting, protection IP 65 (NEMA 4X)

Dimensions 160 x 130 x 70 mm (L x W x H), weight 1.4 kg

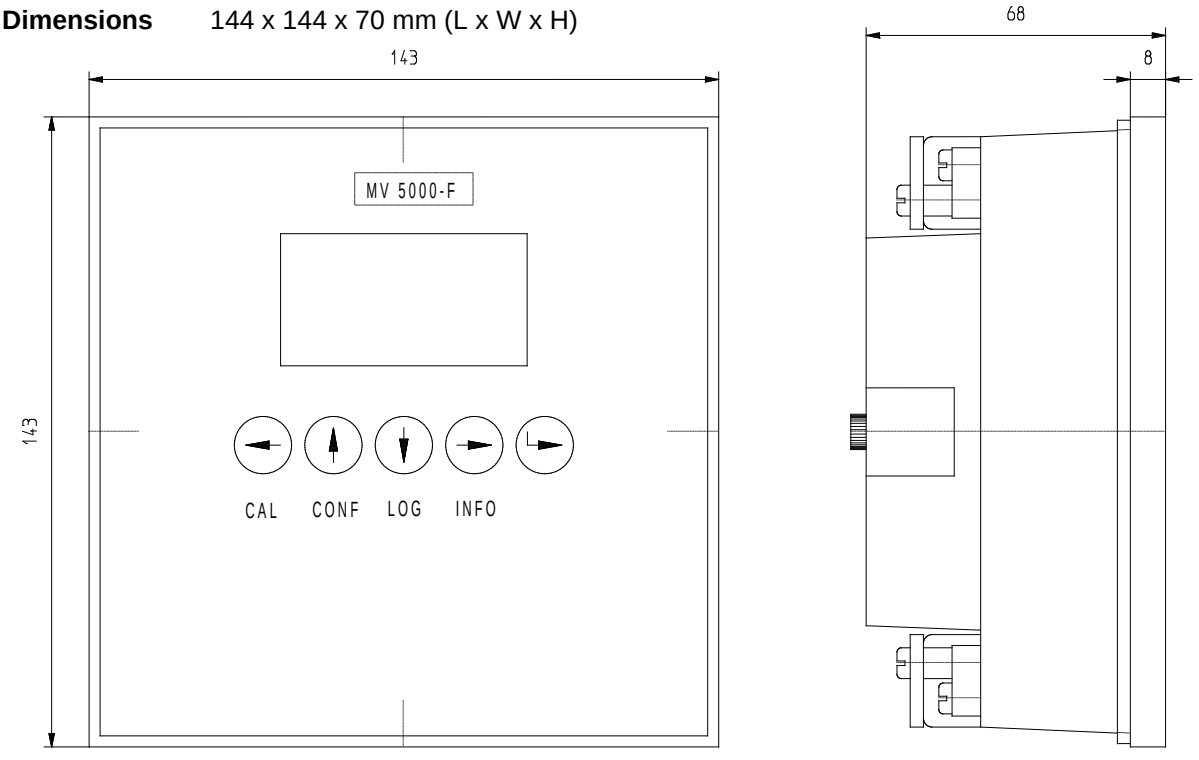
Cover screws (max. torque 3 Nm)



MV 50xx-F:

Enclosure Noryl (plastic) enclosure for front panel mounting, protection front side (mounted) IP 63 (IP65 with front cover MV 5000-F), protection rear side IP20

Dimensions 144 x 144 x 70 mm (L x W x H)



Ausschnitt nach DIN 43700

138 x 138

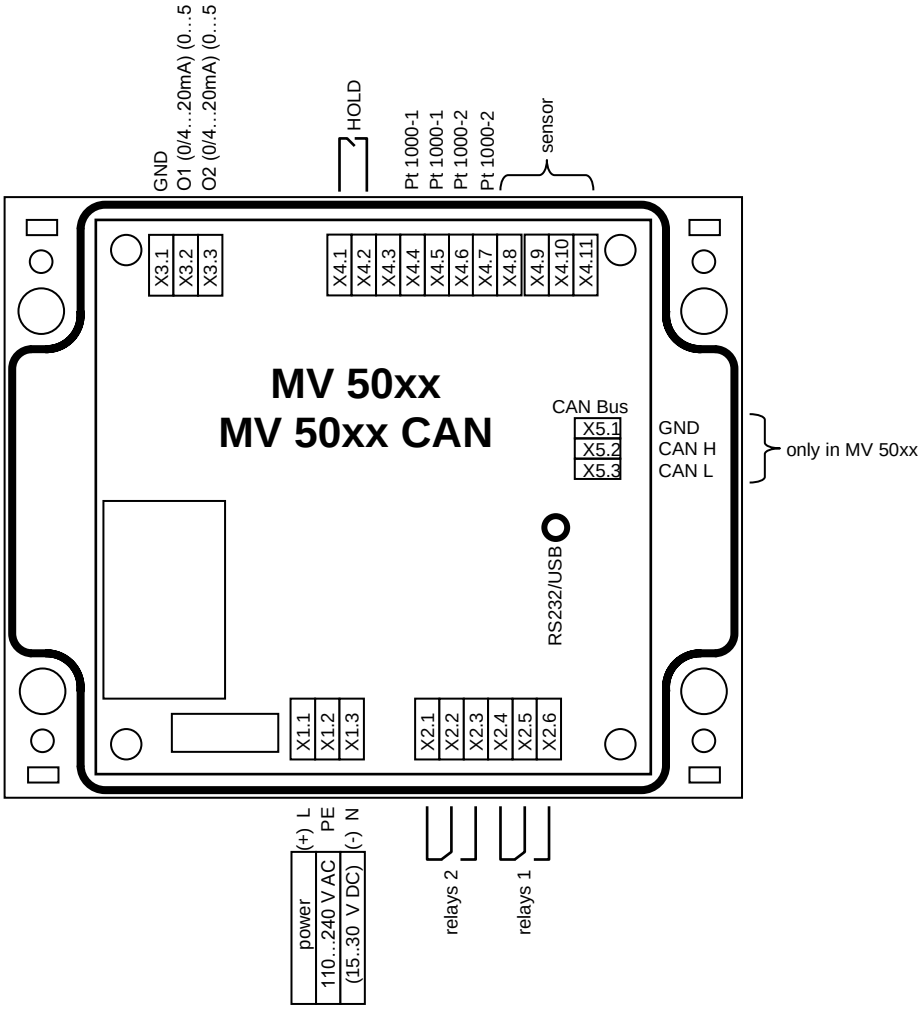
15 Accessory parts

Optional accessories and additional devices:

Interface MV USB	Interface cable 1.8 m for the USB connection (3 pins stereo jack / USB connector)
Adapter MV 5000	Adapter for Interface MV 5000 USB for internal installation - only for MV 50xx
Interface MV 5000 USB	Interface Cable 1.8 m for USB interface - Adapter MV 5000 is required - only for MV 50xx
Interface MV	Interface Cable 1.8 m for RS-232 interface
Front cover MV 5000-F	transparent cover for front side, gum, IP65 - only for MV 50xx-F
DinModule	PC-software program DinModule (for configuration and data transmission; CD-ROM) free download from http://download.meinsberg.de/en/
Modul Festverkabelung (fix wired)	Connection module for connecting inflexible lines (for example, hard wiring) in the lower part of the MV5000. This module may only be installed by the manufacturer-manufacturer in the device!

16 Annex – Part of the previous user manual

16.1 Terminals Connection (to device firmware V 5.xx)



The measuring inputs must be potential-free and must have no connection to mains voltage potentials. All inputs must be operated with the appropriate sensors only. Connect directly from foreign signals is not allowed.

Terminal	pH / redox(ORP) / ISE*	conductivity 2-electrode-cell	conductivity 4-electrode-cell	oxygen	chlorine
X4.11	guard	screen	measuring electrode	anode	sensor -
X4.10	measuring electrode	signal wire	supplying electrode	cathode	sensor +
X4.9	guard	screen	supplying electrode	anode	sensor -
X4.8	screen/reference electrode		measuring electrode		
X4.7	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2
X4.6	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2	Pt 1000-2
X4.5	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1
X4.4	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1	Pt 1000-1
X4.3	free	free	free	free	free
X4.2	HOLD	HOLD	HOLD	HOLD	HOLD
X4.1	HOLD	HOLD	HOLD	HOLD	HOLD

* ISE: ion concentration measurement with an ion-selective electrode

Terminal	Description
X3.3	output 2: 0/4…20mA or 0…5 V refer to GND
X3.2	output 1: 0/4…20mA or 0…5 V refer to GND
X3.1	GND

X2.6	Relay 1 n. c. contact
X2.5	Relay 1 changeover contact (max. 250 V AC / 5 A)
X2.4	Relay 1 n. o. contact
X2.3	Relay 2 n. c. contact
X2.2	Relay 2 changeover contact (max. 250 V AC / 5 A)
X2.1	Relay 2 n. o. contact

X1.3	Mains supply neutral conductor / GND (24V DC)
X1.2	Mains supply PE-conductor
X1.1	Mains supply L-conductor / + 24V DC

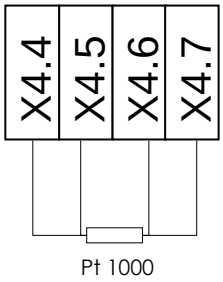
Only in MV 50xx CAN:

Terminal	Description
X5.1	GND
X2.2	CAN H
X5.3	CAN L

16.2 Sensor Connection Diagrams (to device firmware V 5.xx)

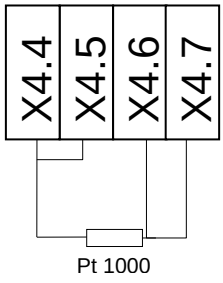
16.2.1 Temperature Sensor

Four-wire circuit

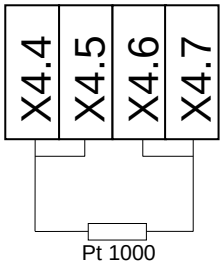


	X4.4 PT1000-1	**X4.5** PT1000-1	**X4.6** PT1000-2	**X4.7** PT1000-2
measuring cable K43Pt/…	cable core	cable core	shield	shield

Three-wire circuit

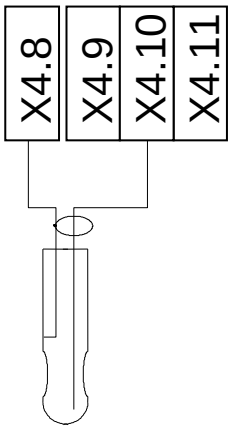


Two-wire circuit



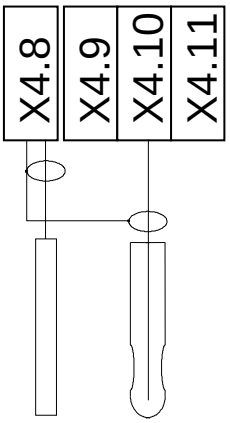
16.2.2 pH/redox (ORP) and Ion-Selective (ISE) Electrode

Combination electrode



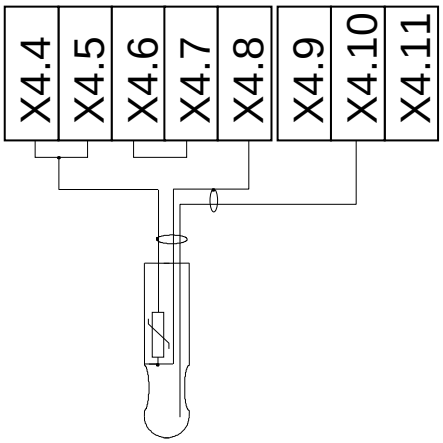
	X4.8 reference	**X4.9** guard	**X4.10** pH-signal	**X4.11** guard
measuring cable K43/…	shield	-	cable core	-

Separated measuring and reference electrode

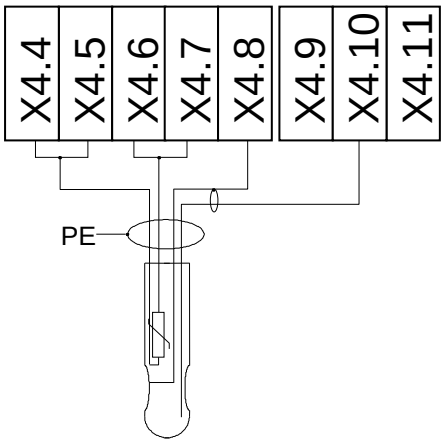


	X4.8 reference	**X4.9** guard	**X4.10** pH-signal	**X4.11** guard
pH-sensor	shield	-	cable core	-
reference electrode	cable core	-	-	-

pH combination electrode with integrated temperature sensor (K54 triaxial cable)



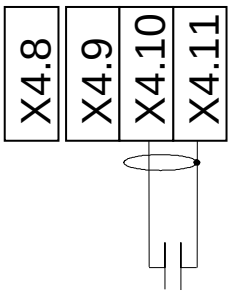
pH combination electrode with integrated temperature sensor (K19 multi wire measuring cable)



	X4.4 PT1000-1	**X4.5** PT1000-1	**X4.6** PT1000-2	**X4.7** PT1000-2	**X4.8** reference	**X4.9** guard	**X4.10** pH-signal	**X4.11** guard
measuring cable K54/…	bridge circuit to X4.5	bridge circuit to X4.4	bridge circuit to X4.7	outer shield (grey)	inner shield (red)	-	cable core (blue)	-
measuring cable K19/…	green	brown	yellow	white	shield	-	cable core	-
measuring cable KVP/…	grey	white	green	pink	shield (red)	-	cable core	-

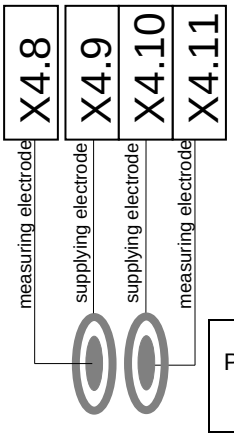
16.2.3 Conductivity Measuring Cell, Oxygen and Chlorine Sensor

conductivity
2-electrode-cell



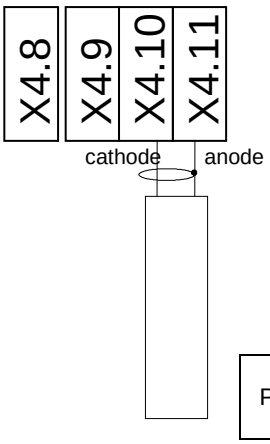
	X4.4 PT1000-1	**X4.5** PT1000-1	**X4.6** PT1000-2	**X4.7** PT1000-2	**X4.8** -	**X4.9** -	**X4.10** measuring electrode	**X4.11** measuring electrode
measuring cable K43/…	-	-	-	-	-	-	cable core	shield
measuring cable K18/…	grey	green	brown	pink	-	-	white	shield
measuring cable KVP/…	grey	white	green	pink	-	-	cable core	blue

conductivity
4-electrode-cell



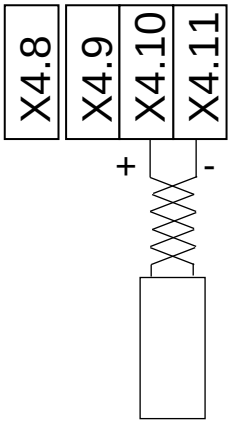
	X4.4 PT1000-1	**X4.5** PT1000-1	**X4.6** PT1000-2	**X4.7** PT1000-2	**X4.8** measuring electrode	**X4.9** supplying electrode	**X4.10** supplying electrode	**X4.11** measuring electrode
measuring cable K17/…	shield	white	yellow	blue	pink	brown	green	grey
measuring cable K-VP-LF4/…	white	white	green	pink	cable core	shield (red)	blue	grey

Membrane covered amperometric oxygen



	X4.4 PT1000-1	**X4.5** PT1000-1	**X4.6** PT1000-2	**X4.7** PT1000-2	**X4.8** -	**X4.9** anode	**X4.10** cathode	**X4.11** anode
measuring cable K39/…	grey	brown	green	pink	-	-	white	shield
MF41N, MF441 fix cable	grey	green	brown	yellow	-	-	white	shield
measuring cable KVP/…	grey	white	green	pink	-	-	cable core	shield (red)

Sensor for disinfectants (chlorine, chlorine dioxide, ozone)



An integrated or separated temperature sensor connected as per para. 15.2.1

17 Service and Returns

Manufacturer:

Xylem Analytics Germany GmbH

Am Achalaich 11
D-82362 Weilheim
Germany

Service and Returns:

Xylem Analytics Germany Sales GmbH & Co. KG

Sensortechnik Meinsberg
Meinsberg, Kurt-Schwabe-Straße 6
D-04736 Waldheim
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