Member of GHM GROUP

Operating manual

EN

CONDIX | 4213 | 4613 | 4623

Conductivity converter

CONDIX4213 CONDIX4613 CONDIX4623

Members of GHM GROUP:

GREISINGER
HONSBERG
Martens
IMTRON
DeltaOHM
VAL.CO

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1 About this documentation

1.1 Foreword

Read this document carefully and familiarise yourself with the operation of the product before you use it. Keep this document ready to hand and in the immediate vicinity of the product so that it is available to the personnel/user for reference at all times in case of doubt.

The product was developed according to the state of the art and fulfils the requirements of the applicable European and national Directives. All corresponding documents are available from the manufacturer.

Only technically qualified persons are permitted to carry out installation, commissioning, operation and decommissioning. The qualified personnel must have carefully read and understood the operating manual before beginning any work.

1.2 Purpose of the document

- This document describes the assembly or installation, operation and maintenance of the product.
- Provides important information for working safely and efficiently with the product.
- In addition to the quick reference guide with all relevant legal and safety content in hard copy, this document is a detailed reference option for the product.

1.3 Legal notices

The liability and warranty of the manufacturer for damages and consequential damages are voided with misuse, disregarding this operating manual, disregarding safety notices, assignment of inadequately qualified technical personnel and arbitrary modifications of the product.

Only carry out the maintenance and service tasks on this product that are described in this documentation. In the process, adhere to the specified steps. For your own safety, only use original spare parts and accessories of the manufacturer. We assume no liability for the use of other products and resulting damage.

This document is entrusted to the recipient for personal use only. Any impermissible transfer, duplication, translation into other languages or excerpts from this operating manual are prohibited.

The manufacturer assumes no liability for print errors.

1.4 Correctness of content

The contents of this document were checked for corrected and are subject to a continuous correction and updating process. This does not rule out potential errors. In the event that errors are discovered or in case of suggestions for improvement, please inform us immediately via the indicated contact information in order to help us make this document even more user-friendly.

1.5 Further information

- Modbus interface description
- GHM*ware* operating manual
- MODBUS application protocol specification http://www.modbus.org
- MODBUS over serial line specification and implementation guide http://www.modbus.org

https://www.ghm-group.de

2 Safety

2.1 Explanation of safety symbols

DANGER

This symbol warns of imminent danger which can result in death, severe bodily injury, or severe property damage in case of non-observance.

CAUTION

This symbol warns of potential dangers or harmful situations which can cause damage to the device or to the environment in case of non-observance.

CAUTION

This symbol warns of electrical voltage.

NOTE

This symbol indicates processes which can have a direct influence on operation or can trigger an unforeseen reaction in case of non-observance.

2.2 Foreseeable misuse

The fault-free function and operational safety of the product can only be guaranteed if generally applicable safety precautions and the device-specific safety instructions for this document are observed.

If these notices are disregarded, personal injury or death, as well as property damage can occur.

DANGER

Incorrect area of application!

In order to prevent erratic behaviour of the product, personal injury or property damage, the product must be used exclusively as described in the chapter Description in the operating manual.

- Do not use in safety / Emergency Stop devices!
- The product is not suitable for use in explosion-prone areas!
- The product must not be used for diagnostic or other medical purposes on patients!
- Not suitable for use with requirements on functional safety!

2.3 Safety instructions

CAUTION

Impaired function

Errors during installation, assembly or configuration of GHM products can result in impaired function or damage in the downstream process. Severe danger, however, does not emanate directly from our products.

- Proper and correct installation, assembly and programming and configuration of the product!
- Provide independent safety devices!
- Settings must be made by qualified personnel only!

CAUTION

Auxiliary voltage

The maximum current strength, which is specified in the chapter Technical data, must not be exceeded.

- Use the correct mains adapter!
- Ensure that the wiring and connections are correct!

CAUTION

Erratic behaviour!

On suspicion that the product can no longer be operated without danger, it must be decommissioned and prevented from recommissioning with appropriate labelling. The safety of the user can be impaired by the device if, for example, if it shows visible damage, it no longer works as specified or if it was stored for an extended period of time under unsuitable conditions.

- Visual inspection!
- In case of doubt, send the product to the manufacturer for repair or maintenance!

NOTE

This product does not belong in children's hands!

2.4 Intended use

Refer to the chapter Product description [▶ p. 11]. for detailed specifications for the area of application.

Intervention beyond the actions described in the operating manual may only be carried out by personnel authorised by the manufacturer for safety and warranty reasons.

Conversions or modifications made on one's own authority are expressly prohibited.

Application-specific dangers can emanate from this device when used improperly or not as intended.

2.5 Qualified personnel

This document contains the necessary information for the intended use of the product described herein. It is intended for technically-qualified personnel who are specially trained or possess relevant knowledge in the field of automation technology or measuring, control and regulation technology. The knowledge and technically correct implementation of the safety notices and warnings in this manual are requirements for safe assembly, installation and commissioning, as well as safety during operation of the described device.

Only qualified personnel have the necessary technical knowledge to correctly interpret and apply the safety notices and warnings in this manual in the specific case.

3 Description

3.1 Scope of delivery

Please check to ensure the completeness of the product after opening the package. You should find the following components:

- Operating manual
- Conductivity converter
- Union nut for flow fitting DFA32 or standard screw-in part d32 from PVC-U (only CONDIX4213)

3.2 Product description

The CONDIX digital conductivity converter measures the specific conductivity of liquid media. The temperature influence on the media conductivity is compensated with the separately measured media temperature relative to the reference temperature of 25 °C. The conductivity and temperature measurements and the system status are provided via MODBUS RTU interface.

The parameterisation can be carried out in the application or with the EYY220 program adapter and GHM*ware* PC software.

Sensors and electronics are accommodated in space-saving housing.

CONDIX uses a conductive measuring cell for measurement of the specific conductivity. These are available in 2-pin or 4-pin versions.

CONDIX with a 4-pole measuring cell is described in this manual. It is distinguished by the special resistance to dirt and polarisation effects in media with high conductivity.

CONDIX4213, CONDIX4613 And CONDIX4623 differ in their execution with respect to the process material and the cell constant.

3.3 Functional description

An AC voltage having a specific sequence is connected to electrodes for the measurement, wherein the measured current is a measurement for the specific conductivity. With a 4-pin sensor, the voltage drop occurring in the medium is also evaluated.

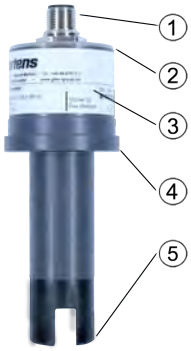
The area of application of a CONDIX depends on the electrode material and the number of pins of the sensor. 2-pin sensors are suitable for measurement of small conductivities. By contrast, 4-pin sensors are characterised by their large measuring range up to a high conductivity.

The integrated electronics determine the specific conductivity of the medium and outputs this in the unit µS/cm and/or mS/cm. The conductivity is compensated to the reference temperature of 25°C by means of an integrated temperature measurement. Various compensation functions are available for this purpose.

Measurements, parameters and system information are stored in internal registers and are organised according to the MODBUS RTU protocol.

4 The product at a glance

4.1 The CONDIX



CONDIX4213

CONDIX4613

CONDIX4623

Description

1. Electrical connection M12x1, 8-pin
2. Clear view lid for reading the status LEDs
3. Type plate
4. Process connection
5. Electrode body with electrodes

4.2 Block diagram

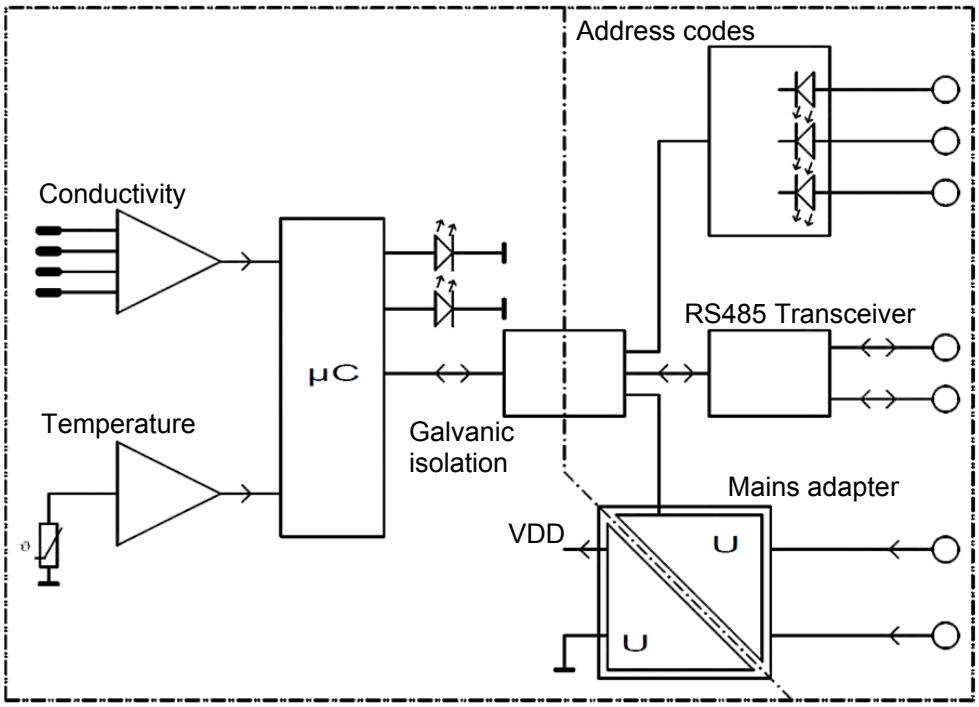


Fig. 4: **Block diagram**

4.3 Type plate

Fig. 5: **CONDIX4213 type plate**

1) Manufacturer
2) Product description
3) Product
4) Cell constant
5) Voltage supply
6) Flow direction
7) Serial number
8) Document included
9) CE mark

Fig. 6: **CONDIX4613 type plate**

1) Manufacturer
2) Product description
3) Product
4) Cell constant
5) Voltage supply
6) Flow direction
7) Serial number
8) Document included
9) CE mark

Fig. 7: **CONDIX4623 type plate**

1) Manufacturer
2) Product description
3) Product
4) Cell constant
5) Voltage supply
6) Flow direction
7) Serial number
8) Document included
9) CE mark

5 Assembly

5.1 Mechanical design and dimensions

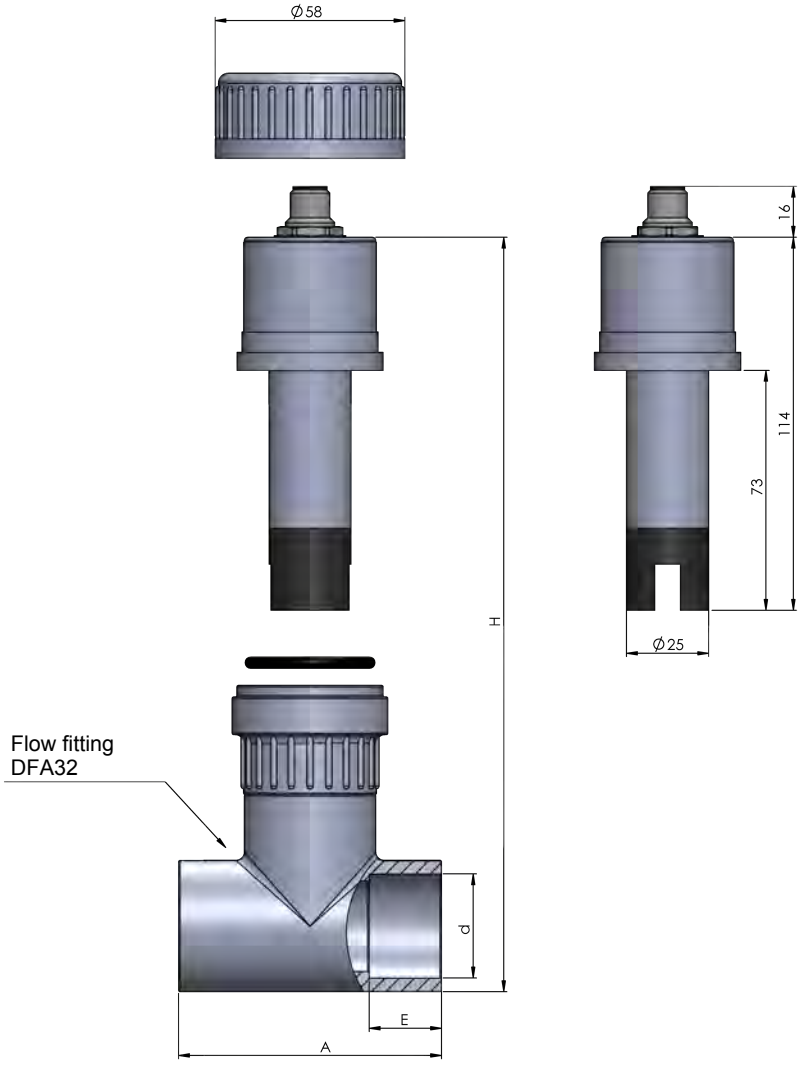


Fig. 8: **CONDIX4213 dimensional drawing**

D	H	A	E
20	135	78	16
25	135	78	19
32	135	78	22
40	140	98	26
50	155	118	31
65	169	144	38

Tab. 1: CONDIX4213 size table

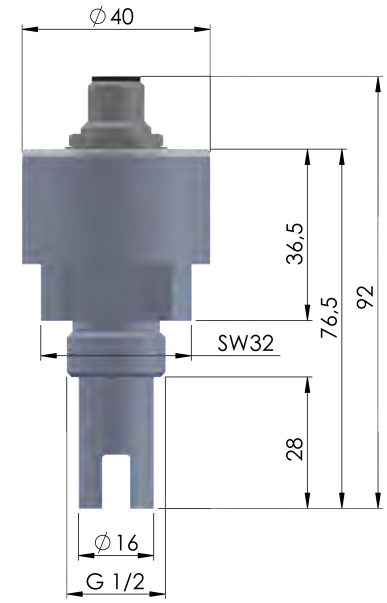


Fig. 9: **CONDIX4613 dimensional drawing**

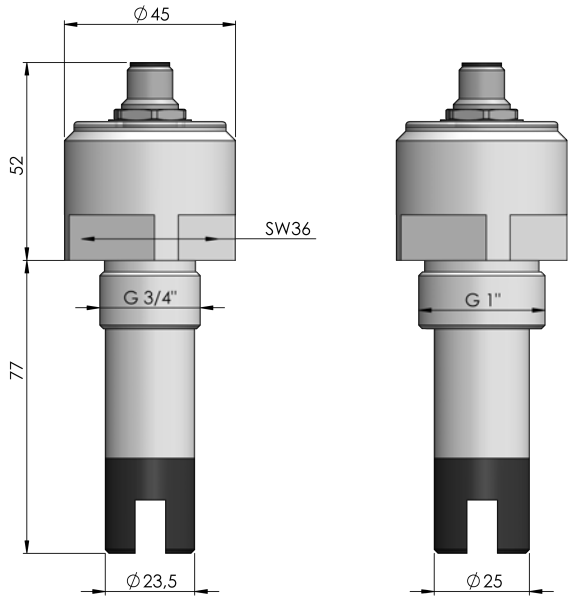


Fig. 10: **CONDIX4613 dimensional drawing**

5.2 Mechanical assembly

The following must be observed for assembly.

- The measuring tube must always be filled in measuring mode. There must be no air bubbles in the sensor area.
- The mark of the flow direction on the sensor should match flow direction of the pipeline.
- The converter must not be exposed to direct sunlight.
- The converter must be suitable for the application conditions with respect to temperature, pressure and chemical resistance.
- Deposits, also called sediment formation, on the electrodes of the sensor must be avoided.

5.2.1 CONDIX4213

Installation takes place by means of flow fitting DFA32, which is an optional accessory, or with the aid of a standard screw-in part of a renowned manufacturer, such as +GF+ or ASV.

Description

In order to install the CONDIX correctly, proceed as follows.

Prerequisite

– System is off.
– There is no longer any media in the system.

Instruction

1. Insert the CONDIX in the DFA32 and align the sensor in the flow direction corresponding to the flow mark.
2. Fix the sensor with the union nut.
3. A seal test should take place prior to commissioning.

Outcome of an action

The CONDIX is now installed correctly.

5.2.2 CONDIX4613 / 4623

Description

In order to install the CONDIX correctly, proceed as follows.

Prerequisite

– System is off.
– There is no longer any media in the system.

Instruction

1. Seal.
2. Screw the CONDIX into a suitable sleeve.
3. Align in the flow direction according to the flow mark.
4. A seal test should take place prior to commissioning.

Outcome of an action

The CONDIX is now installed correctly.

5.3 Application limits

5.3.1 Fittings made of PVC-U

The following dependencies with respect to the max. process temperature / max. process pressure apply for installation of the CONDIX4213 and CONDIX4613 into a fitting, e.g. flow fitting DFA32.

Sketch

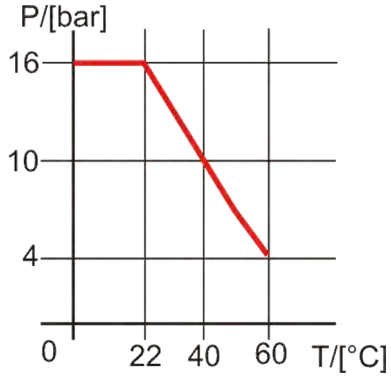


Fig. 11: **PVC-U diagram**

5.3.2 Fittings made of PVDF

The following dependencies with respect to the max. process temperature / max. process pressure apply for installation of the CONDIX463 into a fitting.

Sketch

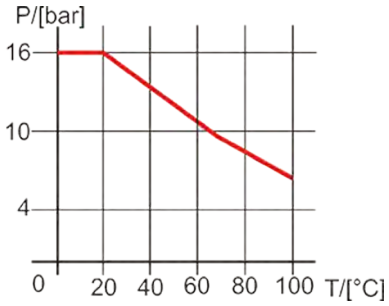


Fig. 12: **PVDF diagram**

5.4 Installation instructions for the M12 device plug connector

Fig. 13: **CONDIX installation instructions**

1. Basically, it is not absolutely necessary to remove the threaded protective cap for the installation. In the event of a return shipment, the protective cap must be re-mounted.
2. The plug must be installed in order to maintain the protection rating during operation of the plant, even if the product is not used in the process.
3. Operation without protective measures can result in damage to the electronics due to the penetration of moisture.

5.5 Installation position

Arbitrary, as long as the electrodes are subjected to an adequate flow of medium. Gas bubbles and/or sediment formation cause measuring errors and must be avoided.

5.6 Electrical installation

The product must be installed by an electrician only. Compliance with the national and international regulations for installation of electrical and electronic systems applicable in the respective country of use is mandatory.

5.7 Connection of a digital measuring transducer

The products have an 8-pin round plug connector with the following pin assignment:

Pin assignment

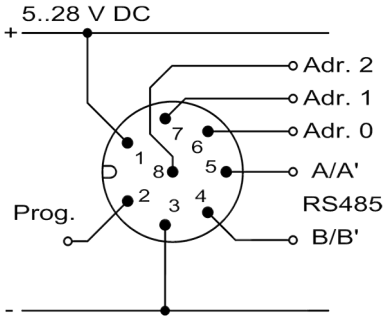


Fig. 14: **RS485 connection**

PIN	Signal	Cable colour
1	+ Supply voltage	White
2	Prog. Connection	Brown
3	- Supply voltage, C/C dimension	Green
4	Bus line B/B'	Yellow
5	Bus line A/A'	Grey
6	Addr. 0	Pink
7	Addr. 1	Blue
8	Addr. 2	Red

Tab. 2: Cable colour assignment

6 Operation

6.1 Commissioning

6.1.1 Explanation of the optical signals

Correct parameterisation and interface configuration are necessary for use of the CONDIX digital measuring transducer. Parameterisation takes place optionally via GHM*ware* and EYY220 programming adapters, or by the MODBUS Master via RS485.

With correct setup, the CONDIX delivers temperature, conductivity measurement and system values to the MODBUS master. The LED voltage supply illuminates green; the green bus LED signalises active communication.

The operating status of the product is signalled by the 5 LEDs.

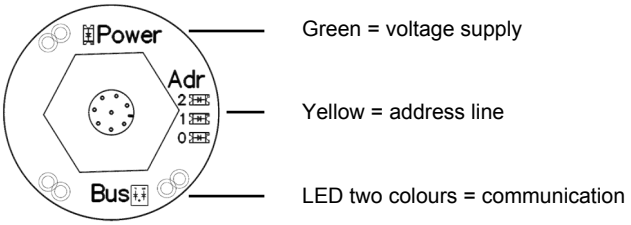


Fig. 15: **Operating status LED**

LED	Description	Meaning
Green	Voltage supply	Permanently illuminated = all OK Blinking = send in for maintenance immediately
Yellow	Address line	Illuminates as soon as the address line is connected to the supply voltage
Two colours	Bus	Off = bus communication not active Green = all OK Red = error in the communication

6.2 Function

6.2.1 GHM*ware configuration software*

Description

Alternatively, the product can be parameterised for configuration via the RS485 interface use with the GHM*ware* configuration software.

Further information on the software and programming adapter is available on our home page: https://www.ghm-group.de.

Prerequisite

– EYY220 programming adapter
– GHM*ware*

Instruction

1. Plug the USB type A plug connector of the EYY220 programming adapter into your PC or hub. If the LED permanently illuminates green on the programming adapter, it is ready for operation.
2. Connect the M12 plug connector with the socket on the converter.
3. Start GHM*ware*.
4. Execute the ***Data from the device*** function.

5. The ***Device selection*** dialogue field opens. Enter the MODBUS parameter of the product is entered here. Enter the address 80, baud rate 19200 and even for the parity. Confirm this with OK.
6. Select the desired sensor from the dialogue and confirm with OK.

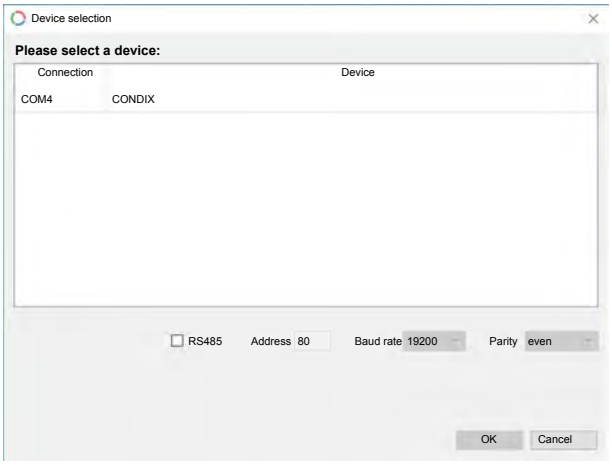


Fig. 16: **GHMware**

7. Select the desired parameter value in the right window and open the parameter dialogue for adjustment by clicking on ... .
8. Enter the desired value or choose it from the selection list and confirm with OK.
9. With the ***Data to the device*** function, the changed value is transferred to the product after the target product has been selected in the device ***Device selection dialogue***.
10. Then you are prompted to save the data permanently in the product. Confirm with Yes or No.

Outcome of an action

NOTE

By confirming with YES, the last valid parameter values are overwritten and the new values are permanently set to active.

By confirming with NO, the data remains in the product temporarily. After the supply voltage is re-established, the last saved parameter values will be active again. This is intended for the testing of parameters.

NOTE

Data from the sensor area becomes active immediately after transfer to the converter. By contrast, changes to parameters from the MODBUS area do not take effect until after a restart when the product is de-energised, insofar as they were saved permanently.

6.2.2 Data exchange and recording

Current measurements can be loaded from the product and recorded with GHM*ware*.

Display current measurements according to the active configuration

In order to display the measurement of the product on the PC, start the ***Measurement read mode*** function. The values are displayed in the measurements window.

Example values

Sensor	Value
Conductivity	347 µS/cm
Temperature	23.3 °C
Int. temperature	21.3 °C
Int. voltage	24.32 V

Record measurements

It is possible to save measurements in a .csv file in a local folder with the ***Record*** function. A dialogue for specification of the file name and the target folder opens when the function is activated. The recording begins after confirmation with the Save button. Stop the recording by confirming the ***Record*** function again.

NOTE

The ***Record*** function is only possible if the ***Measurement read mode*** is activated.

6.2.3 GHM*ware* parameters

The following parameters are available for selection.

Menu level 1	Menu level 2	Parameters level			
		Editor type	Dimension	Value range	Factory setting
Sensor	Conductivity unit	Selection table		S7/m, mS/cm, µS/cm	mS/cm
	Time constant	Number entry	s	0.10 .. 10.00	1.00
	Cell constant	Number entry	1/cm	0.001 .. 20.000	Measured value
	Temperature unit	Selection table		°C, °F	°C
	Temperature offset	Number entry	°C	-5.0 .. 5.0	0.0
	Temperature compensation	Selection table		No temperature compensation Linear temperature coefficient Natural water ASTM-D1125 purest water NaCl diluted solution ASTM-D5391 acidic impurity ASTM-D5391 alkaline impurity	
	Temperature coefficients	Number entry	%/K	0.000 .. 10.000	2.160

Tab. 3: GHM*ware* sensor parameters

Menu level 1	Menu level 2	Parameters level			
		Editor type	Dimension	Value range	Factory setting
MODBUS	Address	Number entry		1 .. 247	80
	Baud rate	Selection table	Baud	1200 2400 4800 9600 19200	19200
	Parity	Selection table		none odd even	even

Tab. 4: GHM*ware* MODBUS parameters

Menu level 1	Menu level 2	Parameters level			
		Editor type	Dimension	Value range	Factory setting
Measure-ments	Conduct-ivity	Number out-put	According to the 'Conductiv-ity unit' parameter		
	Temper-ature	Number out-put	According to the 'Temperat-ure unit' parameter		
	Internal temperat-ure	Number out-put	According to the 'Temperat-ure unit' parameter		
	Internal voltage	Number out-put	V		

Tab. 5: GHM*ware* measurements parameters

6.2.4 Parameterisation / communication via MODBUS RTU

The reading of measurements and parameters or adjustment thereof requires active MODBUS communication. This takes place when the master and slave have matching communications parameters, such as address, baud rate and parity, which correctly address the register in the sensor (register address or function code) and correct wiring is provided.

If the register address is not defined, the values are outside of the value range or there is a defective function code and an error message is returned in the answer and the bus LED blinks red.

Greater details are provided in the MODBUS interface description.

6.2.4.1 Communication

The device has standard preconfigured factory settings. Therefore, it must be adapted to the specific application.

Parameter	Standard setting	Comment
Device address	80 dec	The address of a slave may only be specified once in the bus system.
Baud rate Parity check	19200 baud Straight	These parameters must be set up identically for all devices in the bus system, master and slaves.

Tab. 6: Communication

The following points must be observed in the process:

– If the bus is parameterised according to this standard setting, only the device address has to be adapted with multiple equivalent sensors. The address assignment can take place by writing to the register via MODBUS, by means of GHM-*ware* and via the address lines on the device.

– If this takes place via the address lines, the device can communicate without additional configuration with the system. Configuration of the further parameters can take place in the system.

– To ensure that the communication is not disturbed by interference on the address lines, the status of the address lines is only loaded with a restart of the device.

6.2.4.2 Change of the device address with the external address lines

Line			Offset	Address in the bus system, e.g. 80 + offset
Addr. 2	Addr. 1	Addr. 0		
Low	Low	Low	0	80
Low	Low	High	1	81
Low	High	Low	2	82
Low	High	High	3	83
High	Low	Low	4	84
High	Low	High	5	85
High	High	Low	6	86
High	High	High	7	87

Tab. 7: Device address

Low: Connection to earth or not connected

High: Connection to the supply voltage

6.2.4.3 Storage of parameters

The recording of the parameters loads them to the RAM of the product. Changes that do not pertain to the bus take effect immediately. Changes which pertain to the bus are do not take effect until after the next reset. The possibility of a communication interruption is thereby prevented.

If the changes should be saved permanently, it is not necessary to send a command for this purpose. With this mode of operation, adjustments, e.g. the cell constant for the calibration, can be tested. Unnecessary saving processes are avoided as a result. After initiation of a saving process, communication with the product should not take place for 100 msec.

Representation of floating comma numbers, float

For correct processing of floating comma numbers, the word sequence must be adjusted for the master. The product uses MODBUS-compliant representation of float numbers: first the high word, then the low word. This format is often called CDAB.

6.2.4.4 Overview of parameters

The following applies for all tables.

- [r/w] Read access and write access
- [r] Read access
- [w] Write access

Holding register parameters table

Address register	Heading	Parameter name	Date type		Default	Value range
40001	Input	Conductivity measurement unit	UNIT16	r/w	1302	1299: S/m 1552: µS/cm 1302: mS/cm
40002		Input filter (time constant)	FLOAT	r/w	1	0.1 .. 10.0 s
40004		Cell constant	FLOAT	r/w	0.5	0.001 .. 20 [1/cm]
40006		Temperature unit	UNIT16	r/w	1001	1001: °C 1002: °F
40007		Temperature offset	FLOAT	r/w	0	-5.0 .. +5.0 °C
40009		Temperature compensation	UNIT16	r/w	4	0: No compensation 1: Linear temperature coefficient 2: Natural water compensation 3: Purest water ASTM-D1125 4: NaCl diluted solutions 5: Acidic clean water ASTM-D5391 6: Alkaline clean water ASTM-D5391
40010		Temperature coefficient	FLOAT	r/w	2, 16	0 ... 10.0 [%/K]
40050	Bus	Address	UNIT16	r/w	80	1 .. 247
40051		Baud rate	UNIT16	r/w	6	2: 1200 Baud 3: 2400 Baud 4: 4800 Baud 5: 9600 Baud 6: 19200 baud
40052		Parity	UNIT16	r/w	2	0: None 1: Odd 2: Even

Tab. 8: Holding register parameters table

Actual values table

Address register	Heading	Parameter name	Date type		Default	Value range
30001	Measurement	System Status	UNIT16	r		0 ... 65535
30002		Conductivity measurement	FLOAT	r		0 ... 5000000
30004		Temperature measurement	FLOAT	r		-50 ... +200 °C
30006		Internal electronics temperature	FLOAT	r		-50 ... +200 °C
30008		Internal supply voltage	FLOAT	r		-100 .. +100 V
30100	System	Device code	UNIT16	r		0 ... 65535
30101		Version number	UNIT16	r		0 ... 65535

Tab. 9: Actual values table

Commands

Address register	Heading	Parameter name	Date type		Default	Value range
35001	System	Saving to the EEPROM	UNIT16	w		5001

Tab. 10: Commands

6.2.4.5 GHMware / MODBUS parameter description

Description of the parameters that can be accessed and/or read and edited with GHM-*ware* or MODBUS.

Conductivity measurement unit

The parameter describes the unit of the conductivity measurement. 1S/m = 0,01S/cm = 10mS/cm = 10000µS/cm.

Register address	40001
Date type	UNIT16
Delivery status	1302
Value range	1299 = S/m; 1302 = mS/cm; 1552 = µS/cm
Access	Read and write

Input filter

The input filter specifies the attenuation of the conductivity measurement. The filtering has an exponential time curve.

Example
Input filter: 1 s
Change in conductivity: 0 ... 10 s
The value after 1 sec is 63%
The value after 5 sec is 95%

Register address	40002
Date type	FLOAT
Delivery status	1 s
Value range	0.1 .. 10 s
Access	Read and write

Cell constant

The cell constant describes the influence of the sensor on the conductivity measurement. This parameter is adapted in case of an adjustment. The cell constant is determined by means of a comparison measurement, e.g. in a reference solution.

Register address	40004
Date type	FLOAT
Delivery status	Measured cell constant of the sensor
Value range	0.001…20 1/cm
Access	Read and write

Temperature unit

The parameter describes the unit of the temperature measurement. The temperatures are output in degrees Celsius or Fahrenheit depending on the setting.

Register address	40006
Date type	UNIT16
Delivery status	1001
Value range	1001 = °C; 1002 = °F
Access	Read and write

Temperature offset

The parameter is used for adjustment of the temperature measurement.

Register address	40007
Date type	FLOAT
Delivery status	0 °C
Value range	-5.0 .. +5.0 °C
Access	Read and write

Temperature compensation

No temperature compensation: The conductivity is not compensated to the reference temperature.

Linear temperature coefficient: Compensates the conductivity at a working point according to a linear even. This function is suitable, for instance, for salt solutions and highly ionic solutions.

Natural water compensation: Compensation according to the non-linear function of natural water in accordance with EN27888. This compensation is suitable for natural surface and groundwater and is defined for the temperature range 0 ... 36°C.

ASTM-D1125 purest water: Compensates the temperature dependency of purest water close to the intrinsic conductivity of water according to the standard ASTM-D1125 in the temperature range 0 ... 100 °C.

NaCl diluted solutions: Compensates the temperature dependency of a diluted NaCl solution in the range 0 ... 140 °C in accordance with IEC746 part 3. This function is covered in the range 0 ... 36 °C with low error with the compensation for natural water.

ASTM-D5391 acidic impurity: Compensates the temperature dependency of clean water with acidic impurities, hydrochloric acid according to the standard ASTM-D5391 in the temperature range 0 ... 100 °C.

ASTM-D5391 alkaline impurity: Compensates the temperature dependency of clean water with alkaline impurities, morpholine according to the standard ASTM-D5391 in the temperature range 0 ... 100 °C

If the temperature range of the temperature compensation is left, the characteristic curve is expanded by a tangent. The error is low in the first 5 °C outside of the compensation range. Leaving the compensation range is signalled in a status register.

Register address	40009
Date type	UNIT16
Delivery status	4
Value range	0 = No temperature compensation 1 = Linear temperature coefficient 2 = Natural water compensation 3 = ASTM-D1125 purest water 4 = NaCl diluted solutions 5 = ASTM-D5391 acidic impurity 6 = ASTM-D5391 alkaline impurity
Access	Read and write

Temperature coefficient

This parameter is only active if the temperature compensation: linear temperature coefficient was selected. The temperature coefficient is dependent on the medium, its concentration and the temperature. This compensation must be applied around a working point.

Register address	40010
Date type	FLOAT
Delivery status	2, 16 %/K
Value range	0 ... 10 %/K
Access	Read and write

Device address

The device is addressed in the bus system with the device address. Each device address must be assigned in the bus system one time only. In order to integrate the device without prior configuration in the bus system, you can generate an offset to the device address with the address coding connections.

Example 1	Device address: 80 Address lines: Unassigned Address offset: 0 Address in the bus system: 80
Example 2	Device address: 80 Address lines: Address line 0 and 1 connected to auxiliary voltage Address offset: 3 Address in the bus system: 83
Example 3	Device address: 88 Address lines: Address line 1 and 2 connected to auxiliary voltage Address offset: 6 Address in the bus system: 94

Register address	40050
Date type	UNIT16
Delivery status	80
Value range	1 .. 247
Access	Read and write

Baud rate

The baud rate corresponds to the transmission rate in the bus system. A baud rate of 19200 is suitable for normal industrial applications. It may be necessary to reduce the baud rate for installations or wiring subject to heavy EMC influence which deviate significantly from the line technology.

Register address	40051
Date type	UNIT16
Delivery status	6
Value range	2 = 1200 Baud; 3 = 2400 Baud; 4 = 4800 Baud, 5 = 9600 Baud, 6 = 19200 Baud
Access	Read and write

Parity

The parity is also used for the CRC check sum for recognition of transmission errors. The parity must be equal for all bus participants.

Register address	40052
Date type	UNIT16
Delivery status	2
Value range	0 = none 1 = odd 2 = even
Access	Read and write

6.2.4.6 Actual values

System status

The system status contains information about the status of the device.

Bit																Status
15	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	No error
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	1	Conductivity underflow
x	x	x	x	x	x	x	x	x	x	x	x	x	x	1	x	Conductivity overflow
x	x	x	x	x	x	x	x	x	x	x	x	x	1	x	x	Temperature underflow
x	x	x	x	x	x	x	x	x	x	x	x	1	x	x	x	Temperature overflow
x	x	x	x	x	x	x	x	x	x	x	1	x	x	x	x	Electronic temperature outside of the range -20 ... +85 °C
x	x	x	x	x	x	x	x	x	x	1	x	x	x	x	x	Internal supply voltage outside of the range 3.3. ... 3.6V
x	x	x	x	x	x	x	x	x	1	x	x	x	x	x	x	Compensation range left
1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Fatal error

x = Arbitrary status

Register address	30001
Date type	UNIT16
Value range	0 ... 65535
Access	Read

Conductivity measurement

The measurement of conductivity depends on the following parameters: Conductivity measurement, input filter, cell constant and temperature compensation unit.

Register address	30002
Date type	FLOAT
Value range	0 ... 5000000
Access	Read

Temperature measurement

The measurement of media temperature, measured by the Pt1000 probe of the sensor. The value is dependent on the parameters: Temperature unit and offset temperature.

Register address	30004
Date type	FLOAT
Value range	50 ... +200 °C
Access	Read

Internal electronics temperature

The temperature within the evaluation electronics. Due to the internal heating of the electronic circuit, this value is on average 5 ... 10 °C higher than the environmental temperature. This is used as an indicator for the level of the environmental temperature or whether there is an error in the electronics. The value is dependent on the parameter, temperature unit.

Register address	30006
Date type	FLOAT
Value range	50 ... +200 °C
Access	Read

Internal supply voltage

The evaluation electronics measures the internal supply voltage. This is normally stable at 3.4V. A fluctuating value is an indication that the supply voltage of the device is not in the specified range. Measurement errors cannot be ruled out.

Register address	30008
Date type	FLOAT
Value range	-100 .. +100 V
Access	Read

Device code

The device code is used for identification of the device type. Each version of a device with an unique order code receives a unique number. The device code can only be changed in the factory. Identification of the device type is also possible with the device code by means of remote maintenance.

Example Device code of a CONDIX4613-0,4-G1/2A-MB-00 = 3100

Register address	30100
Date type	UNIT16
Delivery status	e.g. 3000
Value range	0...65535
Access	Read

Version number

The version number is used for identification of the revision status of the device. The version number can only be changed in the factory. Identification of the device type is also possible with the version number by means of remote maintenance.

Register address	30101
Date type	UNIT16
Delivery status	e.g. 100
Value range	0...65535
Access	Read

Commands

By describing this parameter with the value 5001, the parameters are saved fail-safe to the EEPROM.

Register address	35001
Date type	UNIT16
Value range	5001
Access	Read

7 Maintenance

7.1 Operating and maintenance notices

NOTE

When cleaning, it must be ensured that the surface and seals of the housing are not corroded by cleaning agents. Moreover, deposits and cleansers must be prevented from collecting on the thread.

NOTE

Carefully clean the sensor and the auxiliary tool after removal and prior to re-installation with suitable tools and cleansers in order to maintain a tight seal.

NOTE

Depending on the application, scale (dirt) can form on the electrodes and influence the result. If the medium has a strong tendency towards fouling, regular cleaning is recommended. Material resistance must be taken into consideration in the process.

7.2 Repair

Repair on site is not possible for this product.

8 Error and system messages

LED	Meaning	Possible causes	Remedy
Bus LED off	No bus communication	Channel A and B transposed Adjusted address parameters are incorrect	Check wiring Compare MODBUS parameters (address, baud rate, parity) with master
Bus LED blinking red	Errors have occurred in the communication	Write-protected parameter, value range violation, parameter not available, unsupported function code	Evaluate error code. See MODBUS interface description document
Power LED blinking green	Fatal error	Internal error	Send in product for maintenance

Tab. 11: Error and system messages

9 Disposal

Separation by material and recycling of device components and packaging must take place at the time of disposal. The valid legal regulations and directives applicable at the time must be observed.

NOTE

Fill in the return form available from the information base online at www.ghm-group.de and sent it in with the product.

NOTE

The device must not be disposed of with household waste. If the product is disposed of, please take it to a municipal collection point, where it will be transported to a disposal company in accordance with requirements of hazardous goods laws. Otherwise, return it to us, freight prepaid. We will then arrange for the proper and environmentally-friendly disposal. Please dispose of empty batteries at the collection points intended for this purpose.

10 Technical data

Auxiliary energy	
Auxiliary voltage	4.7 ... 28 V DC, max. 60 mA
Electrical connection	8 pin M12 plug connector, nickel-plated brass
CE Conformity	EN 61326-1:2013; EN 61326-2-3:2013
Environmental Conditions	
Environmental temperature	-10 ... +60 °C
Storage temperature	-10 ... +60 °C
Condensation	Not permitted
Climate classification	EN 60068-2-38:2010-6
Vibrations	EN 60068-2-6, GL Test 2
Sensor	
Conductivity measuring range	
CONDIX4213	0 ... 20µS/cm up to 0 ... 500mS/cm, cell constant 0.5
CONDIX4613	0 ... 20µS/cm up to 0 ... 500mS/cm, cell constant 0.4
CONDIX4623	0 ... 20µS/cm up to 0 ... 500mS/cm, cell constant 0.5
Basic accuracy	1 % of the measurement
Media temperature measuring range	-50 ... +200°C
Basic accuracy	0.2 K
Temperature linearisation error	0.1 %
Process connection	
CONDIX4213	Assembly with standard PVC fittings
CONDIX4613	Pipe thread G1/2A
CONDIX4623	Pipe thread G3/4A, G1A
Process temperature	0 ... +60 °C
Process pressure	-1 ... 16 bar (see also pressure-temperature diagram)
Process material	
CONDIX4213	PVC-U, casting resin, graphite
CONDIX4613	PVC-U, casting resin, graphite
CONDIX4623	PVDF, casting resin, graphite
Output	
Interface	RS485, 2-wire, half duplex
Protocol	Modbus RTU
Baud rates	300, 600, 1200, 2400, 4800, 9600, 19200
LED status message	Two LED two colours – communication status Green LED – system status Yellow LEDs– status on the address lines
Housing	
Material	
CONDIX4213, CONDIX4613	PVC-U
CONDIX4623	PVDF
Inspection window	Acrylic glass (PMMA)
Total weight	approx. 160 g
Protection rating	IP67

Tab. 12: Technical data

11 Spare parts and accessories

A selection of spare parts and accessories for this product is listed below.

Article

Number	Name	Description
-	GHM*ware*	Download: http://www.GHM-GROUP.de /Infothek/Soft-ware
475291	EYY220	Programming adapter
Various	DFA32	Flow fitting for CONDIX4213
476332	ACI113-00	Self-built 8-pin sensor plug connector, Belden RKC8/9, nickel-plated brass
476331	ACI113-VA	Self-built 8-pin sensor plug connector, Binder 713, stainless steel
476116	ACI113-005-0-00	8-pin M12 connection socket with unshielded cable and wire end ferrule in 5 m.
476117	ACI113-010-0-00	8-pin M12 connection socket with unshielded cable and wire end ferrule in 10 m.
476118	ACI113-025-0-00	8-pin M12 connection socket with unshielded cable and wire end ferrule in 25 m.

Contact

Internet: https://www.ghm-group.de

Tel: +49 2191 9672-0

12 Ordering code

CONDIX 4213

CONDIX 1 2 3 4

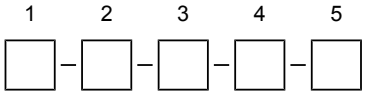
1.	Version	
	4213	
2.	Cell constant	
	C0.5	
3.	Interface	
	MB	RS 485, MODBUS RTU
4.	Options	
	00	Without option

CONDIX 1 2 3 4 5

CONDIX 4613

1.	Version	
	4613	
2.	Cell constant	
	C0.4	
3.	Process connection	
	G1/2A	G1/2A
4.	Interface	
	MB	RS 485, MODBUS RTU
5.	Options	
	00	Without option

CONDIX



CONDIX 4623

1.	Version	
	4623	
2.	Cell constant	
	C0.5	
3.	Process connection	
	G3/4A	G3/4A
	G1A	G1A
4.	Interface	
	MB	RS 485, MODBUS RTU
5.	Options	
	00	Without option

13 Service

13.1 Manufacturer

If you have any questions, please do not hesitate to contact us:

Contact

GHM Messtechnik GmbH
GHM GROUP - Martens
Kiebitzhörn 18
22885 Barsbüttel | GERMANY
Email: info@ghm-group.de

13.2 Repairs processing

Defective products are repaired professionally and quickly in our service centre.

Open hours and contact

Monday to Thursday from 8:00 to 16:00
Friday from 8:00 to 12:00
GHM Messtechnik GmbH
GHM GROUP - Martens
Kiebitzhörn 18
Service Centre
22885 Barsbüttel | GERMANY
Tel: +49 40 67073-143
service.martens@ghm-messtechnik.de

NOTE

Fill in the return form available from the information base online at www.ghm-group.de and sent it in with the product.

13.3 Sales offices

North Sales Office

Post code:	00000 – 25999 | 27000 – 34999 37000 – 39999 | 98000 – 99999
Email:	vertrieb-nord@ghm-messtechnik.de
Tel:	+49 4067073-0
Fax:	+49 4067073-288

West Sales Office

Post code:	26000 – 26999 | 35000 – 36999 40000 – 69999
Email:	vertrieb-west@ghm-messtechnik.de
Tel:	+49 2191 9672-0
Fax:	+49 2191 9672-40

South Sales Office

Post code: 70000 – 97999
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13.4 Sales subsidiaries

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