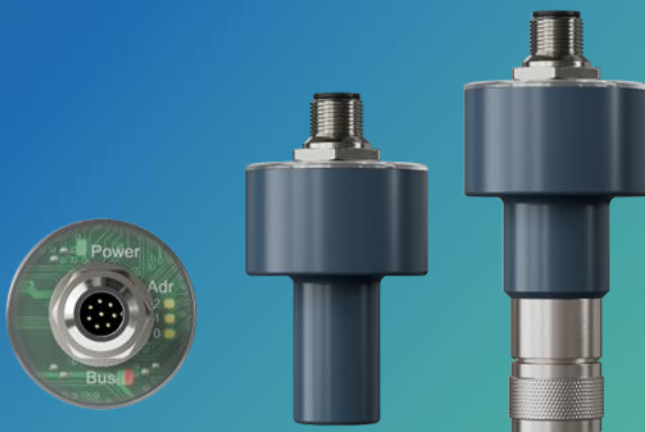


OPERATING MANUAL

PHIX | pH and Redox Converter (FW-V1.0.1)



umn_fam_phix_vs1.00_en
06/2025



Contents

1	About this documentation	5
1.1	Foreword	5
1.2	Purpose of the document	5
1.3	Legal information	6
1.4	Accuracy and correctness of content	6
1.5	Further information	6
2	Security	7
2.1	Explanation of the safety symbols	7
2.2	Foreseeable misuse	8
2.3	Safety instructions	8
2.4	Intended use	9
2.5	Qualified personnel	9
3	Description	10
3.1	Scope of delivery	10
3.2	Product description	10
3.3	Functional description	11
4	Product at a glance	12
4.1	Product overview	12
4.2	Block diagram	12
4.3	Type plate	13
4.4	Optical signals	14
5	Assembly	15
5.1	Design and dimensions	15
5.2	Assembly	16
5.3	Installation position	16
5.4	Electrical installation	17
5.5	Modbus connection	18
6	Operate and parameterize	19
6.1	Operate	19
6.2	Parameterization	19

6.2.1	Parameterization using the SENSware configuration software	19
6.2.2	Parameterization via MODBUS RTU	20
6.2.3	Parameterization with MULTICON-H	20
7	Functions	21
7.1	Identification.....	21
7.2	Measured values	21
7.2.1	Process value	21
7.2.2	Temperature.....	22
7.2.3	Glass impedance	22
7.2.4	Input voltage	22
7.2.5	Internal electronics temperature.....	22
7.2.6	Internal supply voltage.....	22
7.3	Temperature compensation.....	23
7.4	Calibration	24
7.4.1	Calibration routine	24
7.4.2	Error messages during calibration.....	25
7.4.3	Calibration interval.....	26
7.4.4	ORP adjustment.....	26
7.5	Time.....	27
7.6	Log book.....	27
7.6.1	Operating hours.....	27
7.6.2	Calibration log	27
7.6.3	Process log	27
7.6.4	Temperature log.....	27
7.6.5	Commands	28
8	Maintenance	29
8.1	Operating and maintenance instructions.....	29
8.2	Repair.....	29
9	Error and system messages.....	30
9.1	Optical signals	30
9.2	Status messages	31

10 **Waste disposal** 32

11 **Technical data** 33

12 **Ordering Code**..... 34

12.1 Spare parts and accessories 34

13 **Modbus registers and data types** 35

13.1 Measured values 35

13.2 Identification..... 35

13.3 Paramerter 36

13.4 Status register 39

1 About this documentation

1.1 Foreword

Read this document carefully and familiarize yourself with the operation of the product before using it. Keep this document within easy reach or easy to read, preferably in the immediate vicinity of the product, so that you or the personnel/users can refer to it at any time in case of doubt.

The product has been developed according to the current state of the art and meets the requirements of the applicable European and national directives. All relevant documents are available from the manufacturer.

Installation, commissioning, operation, maintenance and decommissioning may only be carried out by professionally qualified personnel. The qualified personnel must have carefully read and understood the operating instructions before starting 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 safe and efficient handling of the product.

In addition to the quick guide with all relevant legal and safety-related content in printed form, this document serves as a detailed reference guide to the product.

1.3 Legal information

The manufacturer's liability and warranty for damage and consequential damage expires in the event of improper use, non-compliance with this document, non-compliance with safety instructions, use by inadequately qualified specialist personnel and unauthorized modifications to the product.

Only carry out maintenance and servicing work on this product as described in this documentation. Follow the specified steps when doing so. For your own safety, only use original spare parts and accessories from the manufacturer. We accept no liability for the use of other products and any resulting damage.

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

The manufacturer accepts no liability for printing errors.

1.4 Accuracy and correctness of content

The content of this document has been checked for accuracy and correctness and is subject to a continuous correction and maintenance process. This does not exclude the possibility of errors. Should you discover any errors or have any suggestions for improvement, please inform us immediately using the contact information provided so that we can continue to make this document more user-friendly.

1.5 Further information

- Modbus interface description
- Operating instructions SENSware
- MODBUS application protocol specification <http://www.modbus.org>
- MODBUS over serial line specification and implementation guide <http://www.modbus.org>

2 Security

2.1 Explanation of the safety symbols



Danger! Type and source of danger

Symbol warns of imminent danger, death, serious bodily injury or serious damage to property if not observed.



Warning! Type and source of warning

Symbol warns of imminent danger, death, serious bodily injury or serious damage to property if not observed.



Caution! Type and source of caution

Symbol warns of possible dangers or harmful situations which, if ignored, will cause damage to the appliance or the environment.

Note

Field indicates processes which, if not observed, can have an indirect influence on operation or trigger an unforeseen reaction.

2.2 Foreseeable misuse

The proper functioning and operational safety of the product can only be guaranteed if the generally applicable safety precautions and the device-specific safety instructions in this document are observed during use.

Failure to observe any of these instructions may result in personal injury or death as well as material damage.



Danger! Incorrect area of application!

To prevent product malfunction, personal injury or material damage, the product is designed exclusively for use as described in the operating instructions.

- Do not use in safety / emergency stop devices!
- The product is not suitable for use in potentially explosive atmospheres!
- The product must not be used for diagnostic or other medical purposes on patients!
- Not suitable for applications with functional safety requirements!

2.3 Safety instructions

This product is built and tested in accordance with the safety regulations for electronic measuring devices. The product must be used in accordance with the technical data. Technical data.



Caution! Functional impairment

Errors during the installation, assembly or configuration of our products can impair the proper functioning of the subsequent process or lead to damage. However, serious risks do not necessarily emanate directly from our products.

- Ensure proper and correct installation, assembly, programming and configuration of the product!
- Provide independent safety devices!
- Only have settings carried out by qualified personnel!

**Caution! Misbehavior!**

If it can be assumed that the product can no longer be operated safely, it must be taken out of service and secured by labeling before further use. The safety of the user may be impaired by the appliance if, for example, it shows visible damage, no longer works as prescribed or has been stored for a long time under unsuitable conditions.

- Visual inspection!
- If in doubt, send the product to the manufacturer for repair or maintenance!

2.4 Intended use

Detailed information on the area of application can be found in the product description chapter.

For safety and warranty reasons, only personnel authorized by the manufacturer may intervene beyond the operations described in the operating instructions.

Unauthorized conversions or modifications are expressly prohibited.

This product may present application-specific hazards if used improperly or not as intended.

2.5 Qualified personnel

This document contains the necessary information for the intended use of the product described in it. It is intended for technically qualified personnel who are specially trained or have relevant knowledge in the field of automation technology or measurement and control technology. Knowledge and technically correct implementation of the safety instructions and warnings contained in this manual are prerequisites for safe assembly, installation and commissioning as well as for safety during operation of the device described.

Only qualified personnel have the specialist knowledge required to correctly interpret and implement the safety instructions and warnings in these instructions in specific cases.

3 Description

3.1 Scope of delivery

Please check that your product is complete after opening the packaging. You should find the following components:

- Operating instructions
- pH / redox converter

3.2 Product description

PHIX records the voltage of a combination electrode and provides the pH or ORP measured value as a digital signal.

Both combination electrodes with and without integrated temperature measuring element can be connected (depending on design).

The measured temperature value is used for temperature compensation and can be output as a secondary process value.

The converter has a 1- or 2-point calibration procedure for regular checking of the electrode parameters - slope and zero point.

The temperature value required for temperature compensation of the pH measured value can be measured or specified manually.

Up to 5 completed calibrations (zero point and slope) are stored in the device with a time stamp.

The pH and temperature operating times are also recorded in the device.

Parameterization can be carried out in the application or using the EYY220 programming adapter or MULTICON and SENSware PC software.

3.3 Functional description

The digital pH and redox converter PHIX measures the potential of a connected combination electrode according to the potentiometric measuring principle.

Depending on the type of combination electrode, the potential recorded is a measure of the pH or redox value of an aqueous solution.

The measuring circuit consists of the measuring system (glass diaphragm, internal buffer and internal drain) and the reference system (diaphragm, electrolyte, reference drain) at the plug contacts.

If the PHIX works as a pH converter, a pH scale is assigned to the measured voltage value. Taking into account the parameters slope and zero point of the electrode, the measured value is output in the range 0...14 pH.

The zero point and slope can be specified manually by the user or determined by means of calibration.

For this purpose, 1-point (correction of zero point) or 2-point calibrations (correction of zero point and slope) are available. The parameters of the combination electrode are recalculated using buffer reference solutions.

If the combination electrode has an integrated Pt1000 temperature sensor, the temperature of the measured medium can be measured and automatically used to compensate the pH measured value, but can also be used as a process value.

If no temperature sensor is available, the temperature can be entered manually (e.g. from a hand-held measuring device or an estimate).

When operating as a redox converter, the process value is output in mV.

Measured values, parameters and system information are stored in internal registers and are organized according to the MODBUS RTU protocol.

4 Product at a glance

4.1 Product overview

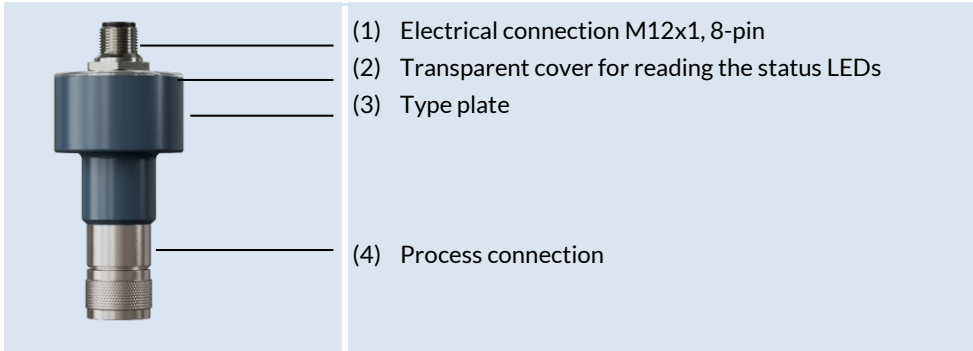


Figure 1 PHIX-VP-00

4.2 Block diagram

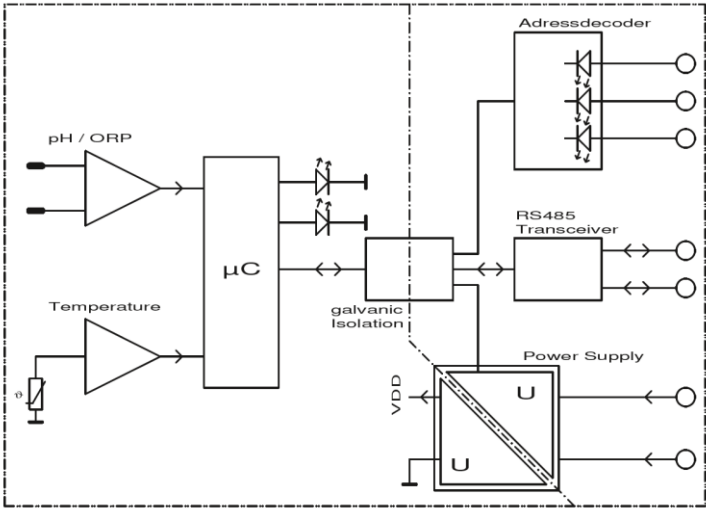


Figure 2 Block diagram

4.3 Type plate

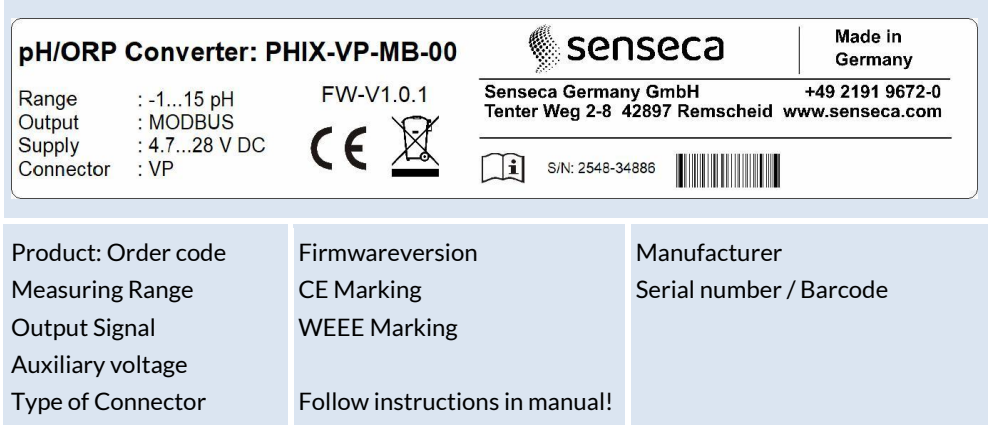


Figure 3 Type Plate

4.4 Optical signals

The operating status, address offset and bus communication of the product are signaled by 5 LEDs.

If the power supply and communication light up green, the device is ready for operation and is exchanging data.

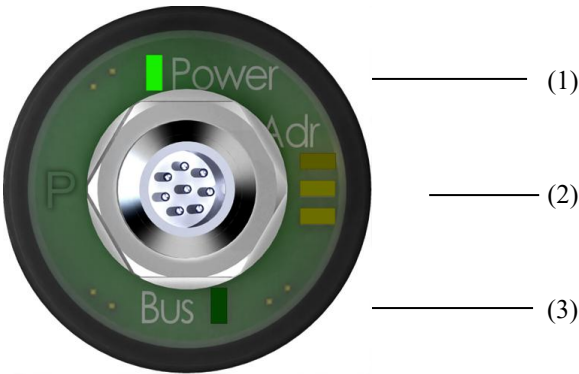


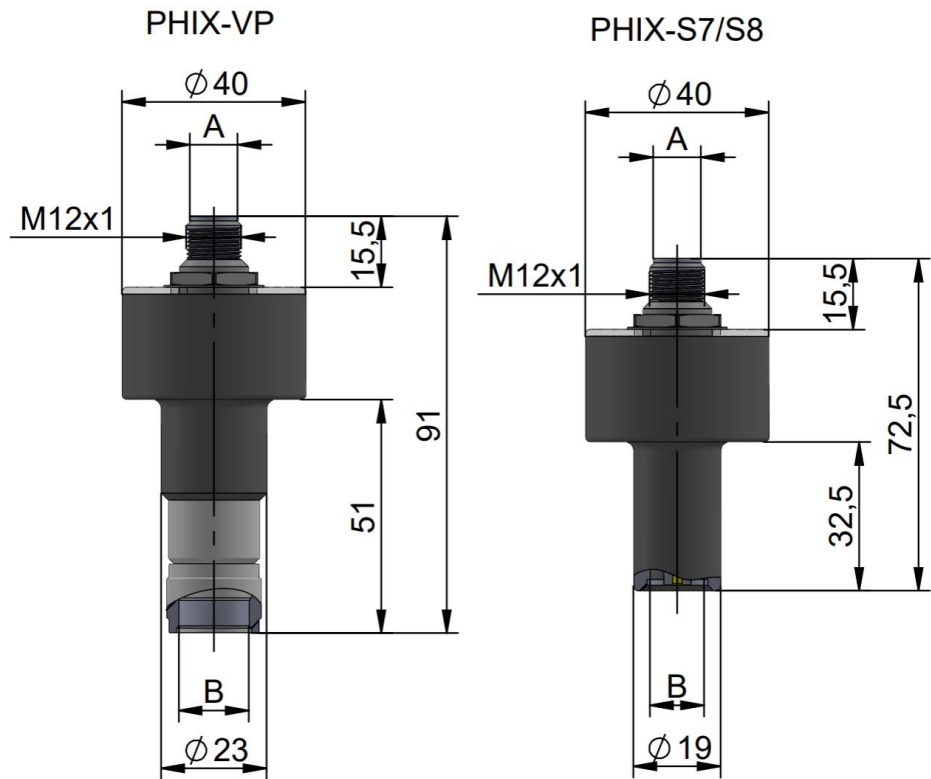
Figure 4 LED operating status

LED	Description	Condition	
(1) Green	Power supply	Off:	No or insufficient power supply
		Permanent:	Ready for operation
		Flashing:	Send in for maintenance
(2) Yellow	Address lines 0,1,2	Off:	Not active
		Permanent:	Address offset active
(3) Off/Red/Green	Communication	Off:	Communication not active
		Red:	Error during data exchange
		Green:	Successful data exchange

Table 1Standard with head

5 Assembly

5.1 Design and dimensions



5.2 Assembly

The PHIX transmitter is screwed onto a combination electrode with VarioPin (VP) or S7 or S8 plug-in head. Observe the maximum tightening torque of the combination electrode.

First make sure that the contacts on the transmitter and the combination electrode are dry and free of corrosion.

Note

As this is a high-impedance, potentiometric measuring method, corrosion or other deposits on the contacts are a significant factor influencing the measurement. They lead to incorrect measurements.

Use the protective cap supplied to protect the sensor from moisture and contamination during storage.

Note

When screwing the converter onto the electrode, observe the maximum tightening torque and the correct threaded approach.

Note

The zero point and slope of pH electrodes are individual. The converter must be parameterized to these. We recommend calibration when using new electrodes. As a minimum, however, the zero point and slope parameters must be entered.

5.3 Installation position

Any, but dependent on the combination electrode.

5.4 Electrical installation

The product may only be installed by a qualified electrician. The national and international regulations for the installation of electrical systems of the respective country of operation apply.

The products have an 8-pin M12 round plug connector with the following pin assignment:

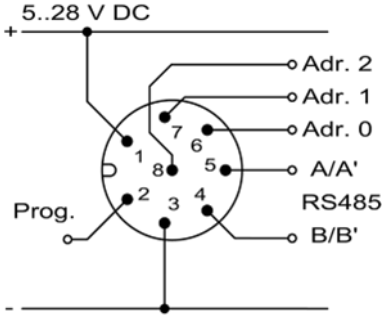


Figure 5 Sensor connection, RS485

PIN	Signal	Cable color (ACH113)
1	+ supply voltage	White
2	Prog. Connection	Brown
3	- Supply voltage, ground C/C	Green
4	Bus line B/B'	Yellow
5	Bus line A/A'	Gray
6	Addr. 0 (offset value 4)	Pink
7	Addr. 1 (offset value 2)	Blue
8	Addr. 2 (offset value 1)	Red

Table 2 Pin assignment

5.5 Modbus connection

Correct wiring, parameterization of the interface and addressing are required for successful communication.

The setting is made on the sensor using SENSware and the EYY220 adapter cable.

See also the supplementary interface description "Digital sensors"

The device settings individual address, baud rate and parity can be set in the device.

When operating several sensors in one system, addresses can also be conveniently assigned using wiring.

Depending on the wiring of PIN 6-8 to the supply voltage, an offset is applied to the base address set in the device (default 80).

This can be done both in the appliance plug and on a terminal strip in the switch cabinet or a branch.

Active address lines are indicated by a yellow LED.

This means that up to 8 sensors can be operated with one basic address without separate parameterization of the address. This enables sensors to be exchanged directly.

To integrate additional sensors, the basic address range must be changed accordingly.

Maximum possible participants 247, according to the Modbus specification.

Addr. 0	Addr. 1	Addr. 2	Device address
Low	Low	Low	$80+0 = 80$
Low	Low	High	$80+1 = 81$
Low	High	Low	$80+2 = 82$
Low	High	High	$80+3 = 83$
High	Low	Low	$80+4 = 84$
High	Low	High	$80+5 = 85$
High	High	Low	$80+6 = 86$
High	High	High	$80+7 = 87$

Table 3Address generation with base address 80

- Low: Connection to ground or not connected
- High: Connection to the supply voltage

6 Operate and parameterize

6.1 Operate

PHIX has no local operating elements. Parameterization, calibration and the exchange of measured values are only possible via a Modbus master.

The following applications are available:

MULTICON-H Multi-Channel Controller

PC-based configuration tool SENSware with programming adapter EYY220

PLC or SCADA with Modbus application

For further information on operation, please refer to the operating instructions for the respective product.

6.2 Parameterization

6.2.1 Parameterization using the SENSware configuration software

The product is intended for parameterization via SENSware or the MULTICON-H and can alternatively be parameterized via the RS485 interface.

Further information on software and programming adapters can be found on our homepage.

- Programming adapter EYY220
- SENSware

Procedure for configuration using SENSware

1. Connect the EYY220 programming adapter to your PC using the USB TYPE A plug. If the LED on the programming adapter lights up green continuously, it is ready for operation.
2. Connect the M12 plug to the socket on the converter.
3. Start SENSware.
4. Start communication with the PHIX by executing the functions Data to device, Data from device or Read measured values.

6.2.2 Parameterization via MODBUS RTU

Reading measured values and parameters or adjusting them requires active MODBUS communication. This is established when the master and slave have matching communication parameters such as address, baud rate and parity, the registers in the sensor are correctly addressed (register address or function code) and the wiring is correct.

If the register address is not defined, the values are outside the value range or there is an incorrect function code, an error message is returned in the response and the bus LED flashes red.

Further details can be found in the MODBUS interface description.

Saving the parameters

Writing the parameters loads them into the RAM of the product. Changes that do not affect the bus take effect immediately. Changes that affect the bus only take effect after the next reset. This prevents communication from being interrupted.

If the changes are to be saved permanently, a command must be sent. This function allows adjustments, to be tried out during calibration. This avoids unnecessary saving operations. After triggering a save process, no communication with the product should take place for 100 msec.

Representation of floating point numbers, float

For correct processing of floating point numbers, the word order must be set on the master. The product uses the MODBUS-compliant representation form of float numbers, first the high word, then the low word. This format is often referred to as CDAB.

6.2.3 Parameterization with MULTICON-H

MULTICON-H offers two options for parameterizing connected sensors

- Local HMI
- USB-C connection and SENSware

For further information, please refer to the MULTICON-H operating instructions.

7 Functions

PHIX has a large number of measured values and parameters, which are grouped into the following topics: Identification, Sensor, Calibration, Clock, Logbook and Modbus.

The device also outputs information about its status in the status register.

The functions of the device are described below.

Note

A summary of the data, value ranges and addresses as well as status registers can be found at 13.4 Status register

7.1 Identification

To identify the device, PHIX has identification parameters for the purpose of replacement and remote diagnosis.

The information is predefined ex works:

- Manufacturer and manufacturer text
- Product name, product ID, product text, serial number, hardware and firmware version

The following data can be customized using SENSware:

- Application, function and location indicators
- Sensor type, sensor serial number

7.2 Measured values

7.2.1 Process value

The process value is the main measured value of the device. This is output either in pH or mV (parameter unit process value). The measured value is output depending on the set time constant.

If the process value is set to pH, the output value is composed of the input voltage, the slope, the zero point and the current temperature.

When measuring redox voltage in mV, the process value is generated by the input voltage and the "ORP adjustment" parameter value.

7.2.2 Temperature

The temperature in the device is available as a secondary measured value. In combination electrodes with an integrated Pt1000 measuring element, this can be recorded continuously or specified constantly via the "manual temperature input" parameter value.

The setting between continuous measurement or constant value is made via the "Temperature input" parameter

The "Temperature unit" parameter can be used to display values in °C or °F.

7.2.3 Glass impedance

The glass impedance is recorded continuously and is available in the unit MOhm. This value can be used to monitor an interruption in the measuring circuit (glass breakage).

If the specific resistance of a measuring chain is known, it is also possible to draw conclusions about the decomposition of the glass membrane.

Observe the accuracy specifications in the technical data.

7.2.4 Input voltage

The input voltage represents the raw measured value that the transmitter records from the combination electrode.

7.2.5 Internal electronics temperature

The temperature within the evaluation electronics. Due to the self-heating of the electronic circuit, this value is on average 5...10 °C higher than the ambient temperature. Serves as an indicator for the level of the ambient temperature or whether the electronics have an error. The value depends on the "Temperature unit" parameter.

7.2.6 Internal supply voltage

The evaluation electronics measure your internal supply voltage. This is usually stable at 3.4V. Fluctuating values are an indication that the supply voltage of the device is not within the specified range. Measurement errors cannot then be ruled out.

7.3 Temperature compensation

Temperature compensation is possible for pH measurement. The temperature value required for this can be specified manually or measured (requires combination electrode with integrated Pt1000).

The setting is made via the "Temperature input" parameter: Sensor or manual

If manual temperature compensation is set, the desired temperature value (operating point) must also be set in the "Manual temperature value" parameter.

7.4 Calibration

Zero point and slope

Zero point and slope are the main measured value parameters for pH measurement. These are individual for each electrode and change depending on the conditions and duration of use. Regular checking (calibration) is therefore essential for reliable measured value acquisition.

Both parameters can be specified via SENSware or MULTICON-H (e.g. if the calibration was previously carried out in a laboratory).

To do this, adjust the "Zero point" and "Slope" parameters accordingly.

In addition, the internal calibration routine can be used to determine the values automatically.

7.4.1 Calibration routine

1-point and 2-point calibration procedures (calibration type) can be selected for calculating the zero point and slope of a pH combination electrode. The 1-point calibration calculates the zero point in reference to the selected buffer solution. The 2-point calibration calculates both the zero point and the slope.

The SENSECA buffer set is stored as the standard buffer characteristic. Alternatively, a buffer set for calibration according to DIN19266 can be selected (buffer set).

The nominal value for the calibration point can be selected for each calibration point (buffer 1/buffer2 pH4/7 or 10).

The calibration procedure is started via SENSware or MULTICON-H (Calibration/Open Calibration Dialog). The user is guided through the calibration by a dialog.

Note

The "SENSECA" buffer set can also be used for commercially available buffers. Inaccuracies may occur due to the deviation in the characteristics. Compare the value table of your reference with the SENSECA characteristic.

Note

If a calibration is successfully completed, the calculated values are overwritten in the zero point and slope parameters and are valid from this moment. The previous pair of values is stored in "Calibration Log1" with a date stamp. The value in "Calibration Log1" is then copied to "Calibration Log2", etc.

7.4.2 Error messages during calibration

PHIX checks the measured values for plausibility during calibration and issues error messages in the event of deviations.

Message	Error
"...temperature too low"	Temperature too low, not defined in the buffer set
"...temperature too high"	Temperature too high, not defined in the buffer set
"...buffer set not found"	Buffer set not found
"...buffer not found"	Remote buffer value not found in buffer set
"...difference to buffer > pH3"	Voltage does not match the buffer
"Buffer nominal values are equal Please select different ones"	Buffer value equal*
"Same buffers used?"	Buffer equal*
"Short circuit or equal buffer?"	Short circuit*
"Zero point < pH 4"	Zero point too small
"Zero point > pH 10"	Zero point too large
"Slope < 30 mV/pH"	Slope too small
"Slope > 80 mV/pH"	Slope too high

Table 4 Error messages during calibration

* Appears only with 2-point calibration

Note

Any error messages that occur during calibration do not automatically lead to the calibration being aborted. The user is responsible for interpreting and continuing the routine.

7.4.3 Calibration interval

Calibration intervals are very application-specific depending on the operating conditions. An integrated calibration timer is available to make it easier to comply with the necessary calibration intervals. This can be individually set to a number of days via the "Calibration interval" parameter.

The number of days remaining until the next calibration is displayed via the "Remaining time" parameter.

Resetting Timer "time remaining"

The "Time Remaining" can be changed by changing the value of the "Calibration interval" parameter manually. A new calibration after "Calibration Expired" error resets the "Time Remaining" parameter.

Status messages

Calibration expired

If timer Remaining days becomes negative, "Calibration expired" error will be set. Recalibrate the device.

Calibration timer error

Until a Calibration log entry is recorded, this message will remain active. Therefore, Phix is required to be calibrated before initial use, and the error becomes inactive after the first entry is recorded.

Recalibrate the device.

7.4.4 ORP adjustment

PHIX offers an offset adjustment for ORP electrodes. The associated parameter is "ORP adjustment". For adjustment, the cleaned electrode is immersed in an ORP buffer solution with the desired reference value, the current temperature is measured and the corresponding reference value is read from the buffer solution. The ORP adjustment parameter is used to adjust the current measured value to the reference value.

7.5 Time

PHIX has an integrated RTC (real-time clock). This is used for local indication in combination MULTICON-H, to record time stamps for documenting calibration results and to control the calibration timer.

Both the date and time can be set, as well as the time zone and automatic summer time changeover.

7.6 Log book

The device has an internal recording function. The data can be read out with a Modbus-Master, SENSware as a .csv file or displayed with the MULTICON-H..

7.6.1 Operating hours

Recording of the operating hours of the transmitter from factory delivery. (Not resettable).

7.6.2 Calibration log

Results zero point and slope of the last 5 successfully completed calibrations (resettable).

7.6.3 Process log

Recording of operating times within a measured value. Graduated in 1pH steps from pH1 to pH14 (resettable).

7.6.4 Temperature log

Recording of operating times within a measured value. Graduated in 10°C steps from 0 to 100°C (resettable).

7.6.5 Commands

In addition to measured values and parameters, the PHIX has commands that can be used to trigger internal functions.

These are only required for operation and parameterization via the Modbus interface and are already implemented in SENSware and MULTICON-H.

Register	Command	Data type	Available	Value range
35001	Saving to the EEPROM	UINT16	w	5001
45150	Delete calibration recording	UINT16	w	5001
45151	Delete process recording	UINT16	w	5001
45142	Delete temperature recording	UINT16	w	5001

Table 5Modbus commands

8 Maintenance

8.1 Operating and maintenance instructions

Note

When cleaning, make sure that the materials are not attacked by the cleaning agent. Furthermore, deposits and residual moisture from cleaning agents on the thread must be avoided.

Note

The quality of the measurement depends significantly on the condition of the connected electrode.

Please observe the care instructions for the electrode used.

8.2 Repair

This product cannot be repaired on site.

9 Error and system messages

9.1 Optical signals

LED	Meaning	Possible causes / remedy
Bus LED -from-	No bus communication	Channel A and B swapped àCheck wiring Address parameters are incorrect à Synchronize MODBUS parameters (address, baud rate, parity) with master
Bus LED -flashing red	Errors have occurred in the communication	Read-only parameter Value range violation Parameter not available àCheck Modbus command (register address, function code) Unsupported function code àEvaluate error code. àSee document MODBUS interface description
Power LED -flashing green	Fatal error	Internal error àSend in product for maintenance

Table 6signals

9.2 Status messages

PHIX provides additional measured values and status messages for monitoring the measuring point.

Depending on the respective electrodes and application, the glass impedance can be used to draw conclusions about the condition of the electrode.

The internal temperature and supply voltage can also be used to diagnose the operating status.

Measurement and parameterization errors, system status or calibration reminders are output as status messages.

Status message	Possible causes / remedy
Process value too small Process value too large	pH: < -550mV ORP: < -1600mV pH: > +550mV ORP: > +1600mV
Temperature too low/high	< -55°C / > +205°C
int. Temp. too small/large	< -20°C / > +85°C Check the ambient temperature and establish the intended range.
int. Voltage too low/ high	< +3,3V / > +3,6V Check the supply voltage and establish the intended range.
Exit compensation area	Process or manual set Temperature exceeds limits < -20°C or > 120°C
Sensor break / not dipped	Glass Impedance >1010 MOhm
Short circuit	Glass Impedance <1 MOhm
Clock not set	Error in reading value →Reset Clock
Calibration timer error	No Calibration log entry is recorded. →Recalibrate Sensor
Calibration expired	Calibration timer is expired. →Recalibrate Sensor / reset value "calibration interval"
Fatal error	Internal error -->Send in product for maintenance

Table 7 Status messages

Note

For register address and bit assignment, see chapter 13.4 Status register

10 Waste disposal

When disposing of the product, ensure that the product components and packaging are separated and recycled. The legal regulations and guidelines valid at this time must be observed.



Note

The product must not be disposed of in the residual waste garbage can. If the product is to be disposed of, take it to a municipal collection point where it will be transported safely to the disposal company in accordance with the requirements of hazardous goods legislation. Otherwise, send it back to us with sufficient postage. We will then dispose of it properly, professionally and in an environmentally friendly manner.

11 Technical data

Feature	Value range
Auxiliary voltage	4,7 ... 28 V DC, max. 60 mA
Electrical connection	8-pin M12 plug, nickel-plated brass
Conformity	CE
Ambient/storage temperature	-10 ... +60 °C
Condensation	Not permitted
Measuring range	pH 0...14; Redox ± 1500 mV
Basic accuracy	$\pm 0.5\%$ of measuring range*
Temperature measuring range	Pt1000, 2-wire (-200...600°C)
Basic accuracy	$\pm 0.5\%$ of measuring range*
Glas impedance measuring range	0...1G Ω (temperature compensated)
Standard error	+/- 20 %
Sensor connection	S7/S8 or VP (VarioPin)
Interface	RS485, 2-wire, half-duplex
Protocol	Modbus RTU
Baud rates	1200, 2400, 4800, 9600, 19200
Material	PVC-U
Viewing window	Acrylic glass (PMMA)
Total weight	approx. 160 g
Protection class	IP67

Table 8 Technical data

*Additional deviations possible in environments with a high degree of EMC pollution.

12 Ordering Code

PHIX	1.	2.	3.	4.	
1. Model; B-Connector	S8				Electrodes with S7 or S8 plug-in head
	VP				Electrodes with VP plug-in head
2. Interface; A-Connector		MB			RS485, MODBUS RTU
3. Options			00		Without options
4. Operating instructions				00	Without
				DE	German
				EN	English

Table 9 Order code

12.1 Spare parts and accessories

Below you will find a selection of spare parts and accessories for this product.

Article	Designation	Description
-	SENSware	Download on Senseca Homepage
475291	EYY220	Programming adapter M12/USB
476332	ACI113-00	Field attachable 8-pin sensor connector, nickel-plated brass
476331	ACI113-VA	Field attachable 8-pin sensor connector, stainless steel
476116	ACI113-005-0-00	8-pin M12 connection socket with unshielded cable and wire end sleeve 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.
485556	GPH-DOS-4	Buffer solution pH 4 red in 250 ml dosing bottle
485554	GPH-DOS-7	Buffer solution pH 7 green in 250 ml dosing bottle
485557	GPH-DOS-10	Buffer solution pH 10 blue in 250 ml dosing bottle

Table 10 Spare parts and accessories

13 Modbus registers and data types

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

[w] Write access

13.1 Measured values

Measured value	Register	Range	Access	Type
Status	30001	0...65535	r	uint16
pH value	30002	-5000.00...+5000.00	r	Float
Temperature	30004	-50...+200.0	r	Float
Glass impedance	30006	0...2000	r	Float
Input voltage	30008	-5000.0...+5000.0	r	Float
Internal temperature	30010	-50.0...+200.0	r	Float
Internal voltage	30012	-100,00...+100.00	r	Float

Table 11Measured values

13.2 Identification

Parameters	Register	Access	Default	Type
Device				
Manufacturer	40081	r	Senseca Germany GmbH	String
Manufacturer Text	40097	r	www.senseca.com	String
Product name	40113	r	PHIX	String
Product ID	40129	r	12345	String
Product Text	40145	r	pH / ORP converter	String
Serial number	40161	r	SN00000	String
Hardware version	40177	r	HW-V0.00	String
Firmware version	40193	r	FW-V0.00	String
Application indicator	40209	r/w	***	String
Function indicator	40225	r/w	***	String
Location license plate	40241	r/w	***	String
Sensor type	40257	r/w	***	String
Sensor serial number	40273	r/w	***	String

Table 12Identification

13.3 Parameterter

Parameters	Register	Range	Access	Default	Data type
Sensor					
Process value, unit	40001	1422- pH 1243- mV (ORP)	r/w	1422 (pH)	uint16
Time constant	40002	0.10...10.00	r/w	1,00s	float
Temperature, unit	40004	1001- °C 1002- °F	r/w	1001 (°C)	uint16
Temperature, input	40005	0 sensor 1-manual	r/w	0 (sensor)	uint16
Temperature, offset	40006	-5.0...+5.0	r/w	0,0°C	float
Temperature, manual	40008	-50.0...+200.0	r/w	25.0°C	float

Table 13 Sensor parameters

Parameters	Register	Range	Access	Default	Data type
Calibration					
Zero point	40030	4.00...10.00	r/w	7.00 pH	float
Slope	40032	40.00...80.00	r/w	59.20 mV/pH	float
Calibration, type	40034	0- 1-point 1- 2-point	r/w	1 (2-point)	uint16
Buffer set	40035	0- SENSECA, 1- DIN19266	r/w	0 (SENSECA)	uint16
Buffer 1	40036	0- 4.00 1- 7.00 2- 10.00	r/w	0 (4.00pH)	uint16
Buffer 2	40037	0- 4.00 1- 7.00 2- 10.00	r/w	1 (7.00pH)	uint16
ORP adjustment	40038	-400...+400	r/w	0 mV	float
Calibration interval, days	40040	0...365	r/w	0 d	int16
Calibration interval, remaining time	40041	0...365	r	0 d	int16
Start calibration	40025				Action

Table 14 Calibration parameters

Parameters	Register	Range	Access	Default	Data type
Clock					
Time		yyyy-mm-ddThh:mm:ssZ	r/w	Time	String, UTC format
Time zone	40042	-660 -UTC-11 Samoa Time -600 -UTC-10 Hawaii Time -540 -UTC-9 Alaska Time -480 -UTC-8 Pacific Time -420 -UTC-7 Mountain Time -360 -UTC-6 Central Time -300 -UTC-5 Eastern Time -240 -UTC-4 Atlantic Time -180 -UTC-3 Argentina -120 -UTC-2 Sao Paulo -60 -UTC-1 Ittoqqortoormiit 0 -UTC+0 London 60 -UTC+1 Berlin 120 -UTC+2 Helsinki 180 -UTC+3 Moscow 240 -UTC+4 Dubai 300 -UTC+5 Islamabad 330 -UTC+5:30 India Standard Time 360 -UTC+6 Astana 420 -UTC+7 Jakarta 480 -UTC+8 Beijing 540 -UTC+9 Tokyo 570 -UTC+9:30 Darwin 600 -UTC+10 Brisbane 630 -UTC+10:30 Adelaide 660 -UTC+11 Melbourne 720 -UTC+12 Auckland	r/w	60m (Berlin)	uint16
Season offset	40043	0- no 1- yes 2- automatic	r/w	2 (auto)	uint16

Table 15 Time parameters

Parameters	Register	Range	Access	Data type
Operating hours	45000	0...99999999 h	r	float
Calibration log1 / date	45002	yyyy-mm-ddThh:mm:ssZ	r	string
Calibration log1 / zero point	45018	0...14.00 pH	r	float
Calibration log1 / slope	45020	0...80.00 mV/pH	r	float
... follower register =base register +20				
Calibration log5 / date	45082	yyyy-mm-ddThh:mm:ssZ		string
Calibration log5 / zero point	45098	0...14.00 pH		float
Calibration Log5 / Slope	45100	0...80.00 mV/pH	r	float
Process log pH 0...1	45102	0...99999999 h	r	float
Process log pH 1...2	45104	0...99999999 h	r	float
... follower register (graduated in 1 pH steps) = base register +2				
Process log pH 13...14	45128	0...99999999 h	r	float
Process Log Temp 0..10°C	45130	0...99999999 h	r	float
Process Log Temp 10..20°C	45132	0...99999999 h	r	float
... follower register (graduated in 10°C steps) = base register +2				
Process Log Temp 90..100°C	45148	0...99999999 h	r	float

Table 16 Logbook

Parameters	Register	Range	Access	Default	Type
Sensor Interface					
Address	40050	1...247	r/w	80	int16
Baud rate	40051	2- 1200 3- 2400 4- 4800 5- 9600 6- 19200	r/w	6 (19200)	uint16
Parity	40052	0- none (None) 1- odd (Odd) 2- even (Even)	r/w	2 (even)	uint16

Table 17 Modbus parameters

13.4 Status register

Measured value	Register	Range	Access	Data type
Status	30001	0...65535	r	uint16

Table 18 Measured status value

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Hex
No error	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0000
Underflow Process value																1	0001
Overflow Process value															1		0002
Underflow Temperature														1			0004
Overflow Temperature													1				0008
Electronics -temperature												1					0010
Internal Supply voltage											1						0020
Compensation										1							0040
Sensor break									1								0080
Short circuit								1									0100
Clock not set							1										0200
Calibration timer error						1											0400
Calibration expired					1												0800
UART Noise			1														2000
Fatal error	1																8000

Table 19 Status register

senseca.com



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WEEE REG. NO. EN 93889386

