Manual

EN 4.10 Version 2202

pHix® Compact V3.

NG (NEXT GENERATION)

mjk

a xylem brand

Your notes:

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Contact

You can always contact your local representative or the MJK support for advice and guidance:

Europe: Tel.: +45 45 56 06 56, e-mail: mjk@mjk.com

Visit our web site www.mjk.com to learn more about MJK Automation, our other products and the people behind them.

Declaration of conformity

DOC - CE

Konformitetserklæring

Vi, MJK Automation ApS, DK-3460 Birkerød, påtager os det fulde ansvar for at produktet

Declaration of Conformity

We, MJK Automation ApS, DK-3460 Birkerød, declare under our sole responsibility that the product

Declaração de Conformidade

Nós, MJK Automation ApS, DK-3460 Birkerød, declaramos sob nossa única responsabilidade que o produto

pHix® Compact pH / redox / temperature transmitter

som denne erklæring angår, er i overensstemmelse med følgende standard(er) eller andre normdokument(er).

to which this declaration relates is in conformity with the following standard(s) or other normative document(s).

a que se refere esta declara-ção está em conformidade com a seguinte norma (s) ou outro documento normativo (s) seguindo

Declaration de conformite

Nous, MJK Automation ApS, DK-3460 Birkerød, déclarons sous notre seule responsabilité que le produit

Dichiarazione di conformità

Noi, MJK Automation ApS, DK-3460 Birkerød, dichiariamo sotto la nostra esclusiva responsabilità che l'apparecchio

Declaración de conformidad

Nosotros, MJK Automation ApS, DK-3460 Birkerød, declaramos bajo nuestra única presponsabilidad que el producto

pHix® Compact pH / redox / temperature transmitter

auquel se réfère cette déclara-tion est conforme á la (aux) norme(s) ou autre(s) document(s) normatif(s)

al quale questa dichiarazione si riferisce, è conforme alla seguente normativa(e) standard o ad altri documenti di normativa(e)

al cual se refiere esta de-claración, está en conformidad con la(s) siguente(e) norma(s) u otros documentos normativos

EMC Directive 2014/30/EU EN 61326-1:2013, 61326-2-3:2013	BS2586:1979; §11, §12.1, §12.2	RoHS Directive 2011/65/EU

Birkerød, August 2020

Carsten Sønder, Managing Director MJK

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INT 4.10 pHix Compact NG DOC 2008

Introduction

Thank you for choosing our pHix® Compact pH/Redox transmitter. We have done everything possible to make a pH / Redox transmitter that can fulfill all your demands.

pHix® Compact is very simple to install and connect, as electrode, fitting and transmitter is built together in the same NEMA 6X / IP 68 class enclosure. By doing so, all error sources like e.g. bad cable connections and leaking fittings are eliminated.

As pHix® Compact is equipped with an union flange in one end and male thread in the other, the transmitter is very easily mounted in open tanks as well as pipes.

You can always contact your representative or the MJK Support for advice and guidance. Also, take a look at www.mjk.com[1]

pHix® Compact is registered trademark of MJK.

Measurements and standards used

This manual uses both the US standard measurement system (inches), Fahrenheit and North American industry standards and the metric measurement system, Celsius and European industry standards and side by side.

Safety instructions

1. Read this manual carefully.
2. Be aware of the environment on the installation site. Wear necessary protective equipment and follow all current safety regulations.
3. Always ensure that connected machinery and other equipment are effectively being put out of service (i.e.by log out/tag out) before commencing setting, fault finding, service and maintenance work etc.

Repair

Repair must only made by MJK or by a service representative approved by MJK.

Explosion hazardous areas

Note! pHix® Compact must **not** be installed in explosion hazardous areas!

1 http://www.mjk.com

Construction

pHix® Compact is a loop powered 4-20 mA 4-wire transmitter with power supply and measuring signal transmitted over the same pair of wires.

pHix® Compact also has Modbus® communication capabilities via the seperate RS485 wires where both the primary measuring signal (pH or redox) and the secondary measurement signal can be read. Modbus® communication also gives the possibility to configure nearly all parameters like measuring ranges, electrode parameters and also buffer settings for buffer adjustment.

Modbus® communication requires that pHix® Compact is connected to a RS485 Communication device or a PLC with RS485 interface. The pH loop must be applied with 10-28VDC supply.

pHix® Compact is delivered as standard for pH or redox (ORP) measurement and temperature, but can also be delivered with non-standard cable length.

Product identification

Check that the item(s) delivered corresponds to the ordered item(s). The item number is printed on a label that is sticked onto the packing. Shown in the following, is the label for a delivery including a pHix® Compact transmitter with pH electrode with zero point at pH 4,6:

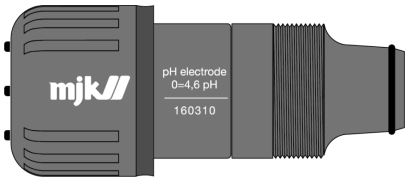
1. Item number
2. Item description
3. Serial number

4. Electrode specification.
   An identical marking is found on the pH transmitter cable:

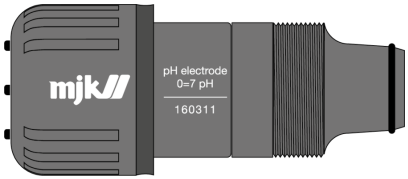
Mounting

Electrode types

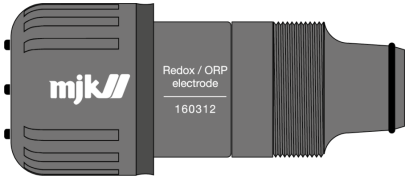
The electrode housing is marked with information about electrode type and measuring range for the actual electrode:



pH electrode, item no. 160310, 1 - 14 pH, 50-176° F / 10-80° C, 0 = 4.6 pH.



pH electrode, item no. 160311, 1 - 14 pH, 50-176° F / 10-80° C, 0 = 7.0 pH.



Redox electrode, item no. 160312, 176° F / 0-80° C.

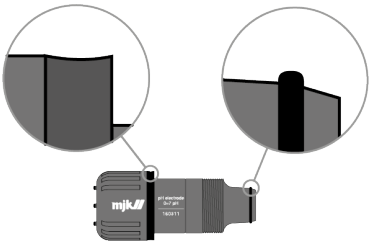
Mounting the electrode

Upon delivery of pHix® Compact, the electrode is **not** mounted. pHix® Compact is configured for the electrode type included in the delivery, and therefore it must **only** be used together with the electrode with which it was delivered.

Contact MJK if other electrode types should be used. Replacement of an electrode to another of the same type does **not** require reconfiguration.
The electrode must **not** become dry. Therefore, **do not** remove the protective cap before before commissioning of pHix® Compact.

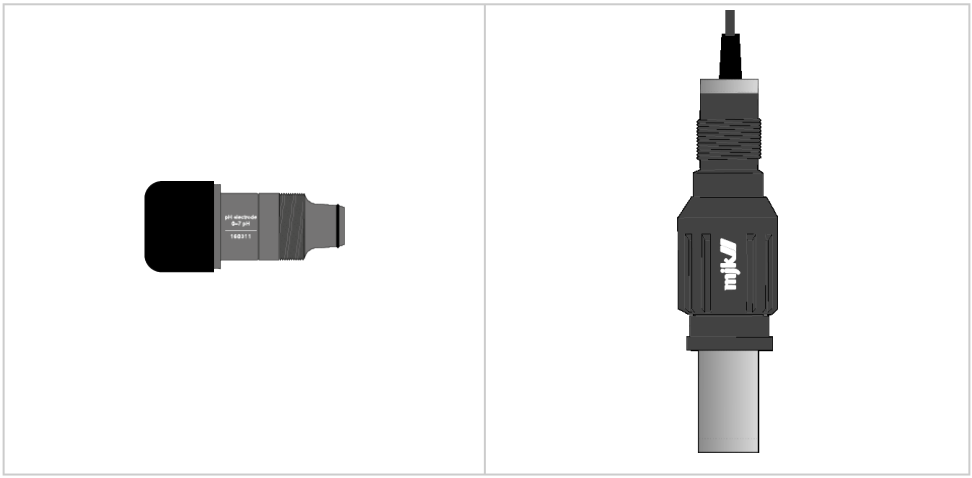
Gasket and O-ring

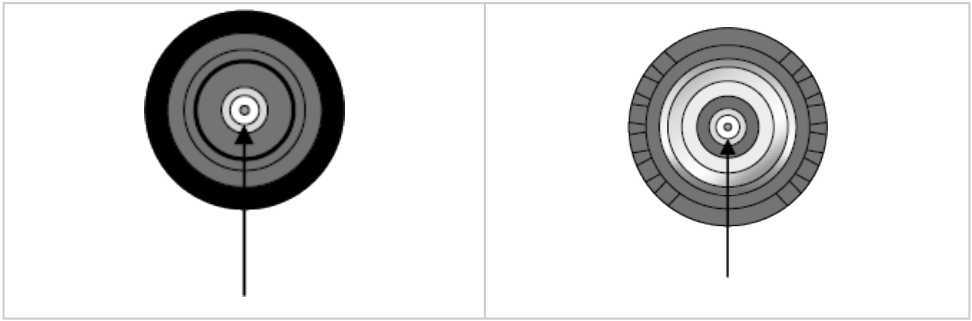
It is very important that both gasket and O-ring and packing surfaces are clean and smooth and without cracks and scratches to avoid penetration of liquid in the center plug connection.



Check that gasket and O-ring are complete and clean and that they are placed correctly.

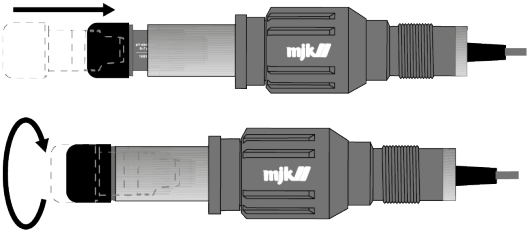
Likewise, the connectors in both transmitter and electrode should be absolutely clean and dry. Use a dry cloth if needed.





Check that the connectors are absolutely clean and dry.

1. Lubricate the O-ring in acid-free grease or Vaseline.
2. Check that the O-ring is placed correctly in the recess of the new electrode.
3. Check that the hole for the electrode in the pHix® Compact is completely dry – if necessary use a dry cloth.
4. Screw in the new electrode and tighten by hand. **Note!** Do **not** use tools!



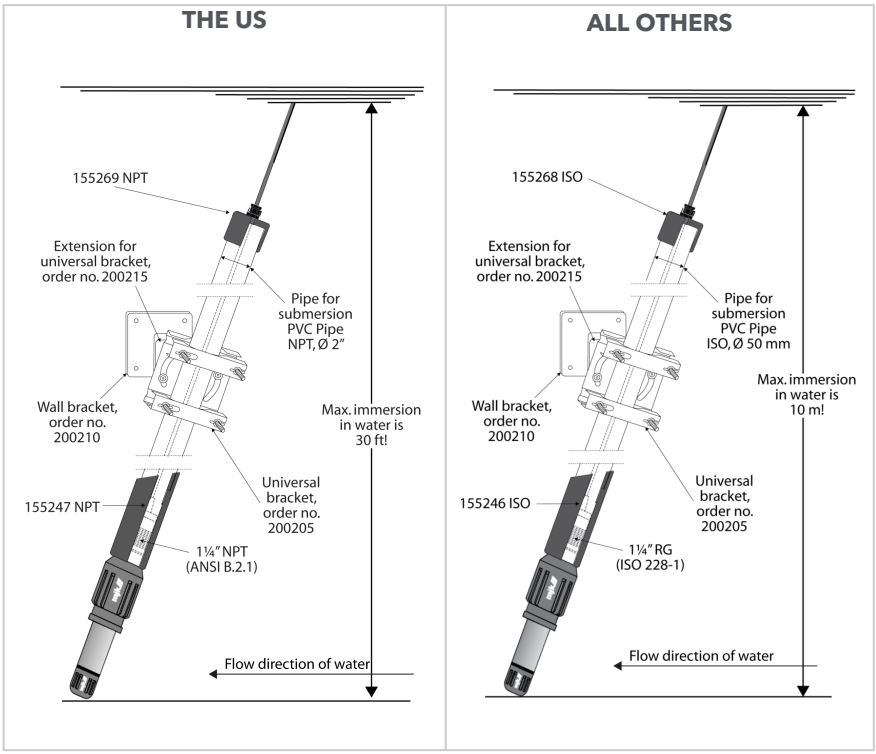
5. Finally, pHix® Compact must be buffer adjusted (see page 22) prior to commissioning.

Mechanical mounting

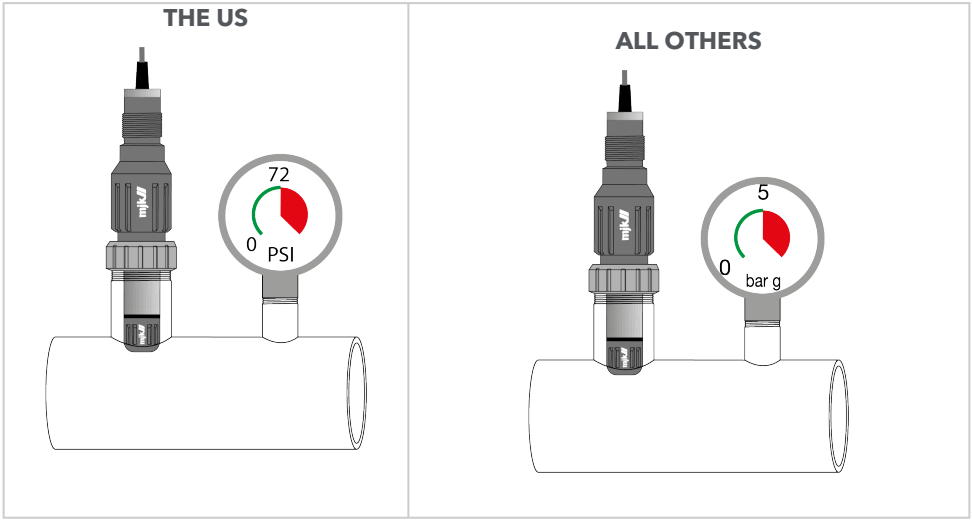
pHix® Compact is made from PPS Fortron and/or stainless steel (EN 1.4404 / AISL316L) and because of this, it has a tremendous resistance against chemicals. pHix® Compact can, when mounted on a pipe socket, be used for measuring in solvents and strong alcalic or acid liquids

Open and closed systems

pHix® Compact is designed for measuring in both open and closed systems.
Open systems are, for example, gutters, wells, and reservoirs. Closed systems are, for example, pipe systems or tanks/vessels.



pHix® Compact has class IP 68 / NEMA 6X enclosure, and therefore withstands submersion into open system to a max. pressure of ***14 psi or 30 ft WG / 1 bar or 10 mWG.***

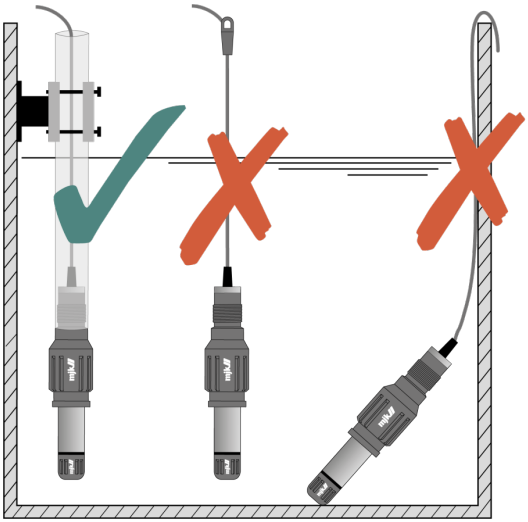


pHix® Compact conforms to pressure class PN 5, and can therefore be mounted in closed systems with a working pressure of ***max. 72 psi / 5 bar.***

Mounting in open channels and reservoirs

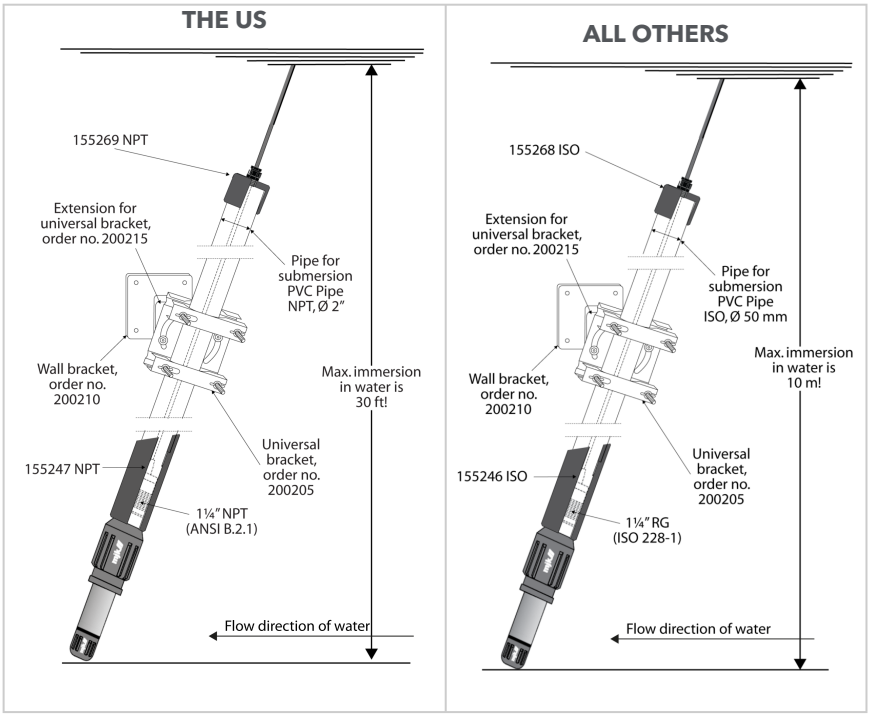
Due to the lifetime of the electrode and measurement accuracy, the following should be complied with when mounting pHix® Compact.

1. pHix® Compact should be mounted on a location with a good liquid circulation.
2. The electrode tip should be minimum 30 cm below the liquid surface.
3. The electrode tip must **not** touch the bottom.
4. The cable must **not** be hung in a cable bracket.



Mounted on a pipe end

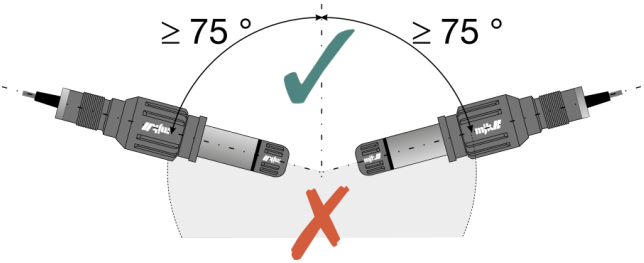
When measuring, pHix® Compact should be firmly fixed. Fixed mounting can be made by means of a pipe with 5/4" inner thread (ISO 228-1), and screwing pHix® Compact directly into the pipe.



pHix® Compact mounted directly on a immersion bracket (item no. 155205), which is fastened with universal bracket (item no. 200205) and wall bracket (item no. 200215).

Mounting in closed systems

The electrode is filled with a liquid which should cover the membrane internally at all times. Therefore, pHix® Compact should not be mounted in angles exceeding 75° from vertical.

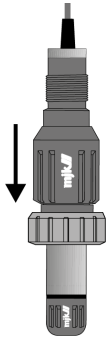


Because of the liquid inside the electrode, pHix® Compact should always be mounted in angles less than 75° from vertical.

pHix® Compact can be screwed into a pipe stub with 2" outer thread. This can happen by means of an union (item no. 521409) placed over the housing flange after removal of the switch ring.

Pull off the switch ring.

Put on the union.



Put on the switch ring if needed.

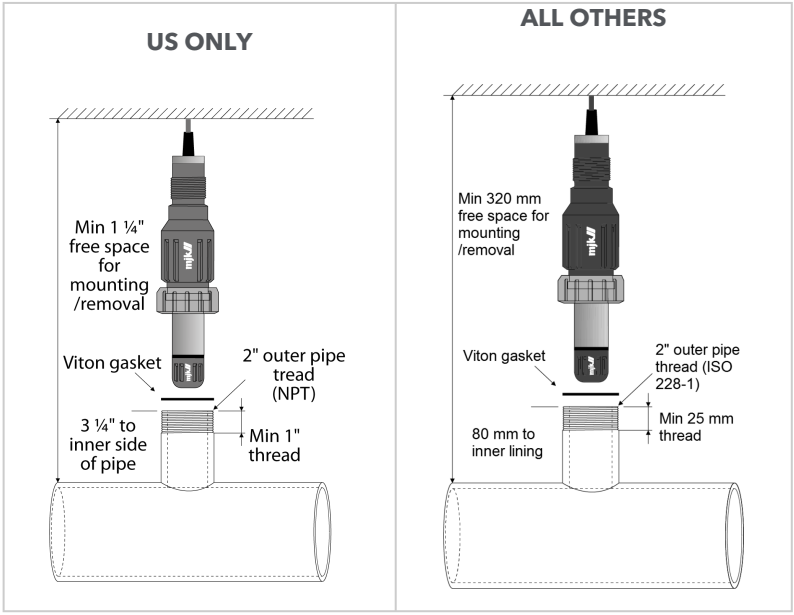
The switch ring is only used for buffer adjustment (calibration), but it is also possible to perform a buffer adjustment (see page 22) without using the switch ring.

Mounting on pipe socket

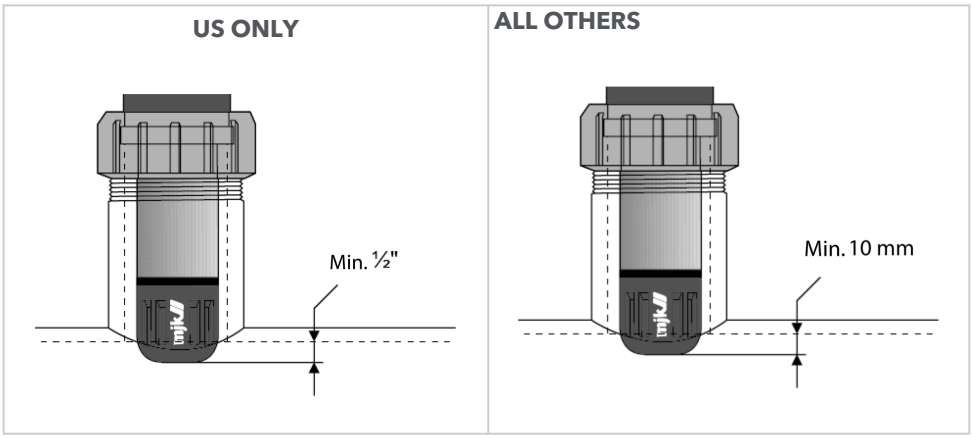
In order to ensure a tight seal and correct function of pHix® Compact, the following should be complied with:

1. The pipe socket must be flushed and free of burrs, etc.
2. The pipe socket must have a length so that the tip of the electrode is immersed min. 10 mm into the liquid.
3. Take care to have adequate room for mounting and removal of pHix® Compact.
4. The working pressure of the system must not exceed **72 psi / 5 bar g .**
5. The working temperature of the system must not exceed **176° F / 80° C.**

See also the following illustrations for correct adaptation to the pipe system.



Max working pressure = 72 psi / 5 bar g. Max working temperature = 176° F / 80° C.



pHix® Compact is mounted correctly when the electrode tip is emerged min. ½" in / 10 mm under the pipes inner pipe wall.

Eletrical mounting

pHix® Compact must not be installed in explosion hazardous locations! pHix® Compact should be connected to an active 4-20 mA input or supplied from a separate 10-28 VDC voltage source. Max power consumption is 50 mW.
pHix® Compact 4-20 mA output(s) is galvanically separated from the liquids potential.

Signal cable

pHix® Compact comes with two galvanically separated mA signal outputs and Modbus RS485.

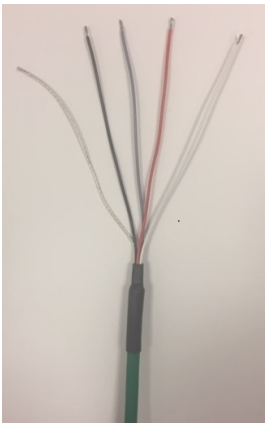
Note! pHix® Compact is delivered with cable made of PUR.

pHix® Compact with 2 x 4-20 mA outputs, one for pH or redox measurement and one for temperature measurement.

Connections			
No.	**Designation**	**Colour**	**Channel**
1	(+) 10-28 V DC	Red	Supply
2	(−) 4-20 mA	Black	pH or redox signal
3	(+) 10-28 V DC	White	Supply
4	(−) 4-20 mA	Grey	Temp signal
5	RS 485 B	Yellow	ModBus com. B
6	RS 485 A	Green	ModBus com. A

Cutting the signal cable

The cable comes with stripped wire ends ready for mounting.

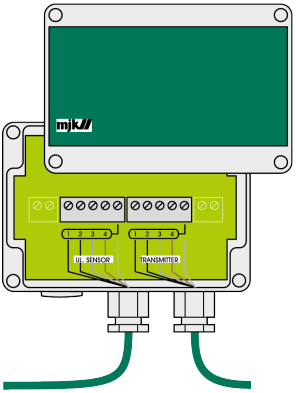


pHix® Compact uncut cable-end with two signal outputs.

Extending the signal cable

There are no specific demands to the cable that may be used for extending the existing cable, except that it should be shielded and that the voltage drop should not be too big.
Note! pHix® Compact is a passive transmitter. Considerations should be taken regarding the voltage drop over the signal cable.

The supply voltage on the site must not drop below 10 V DC at maximum current (20 mA.)
In order not to compromise operational reliability, the cables should be interconnected by means of a watertight connection box (item no. 200590).

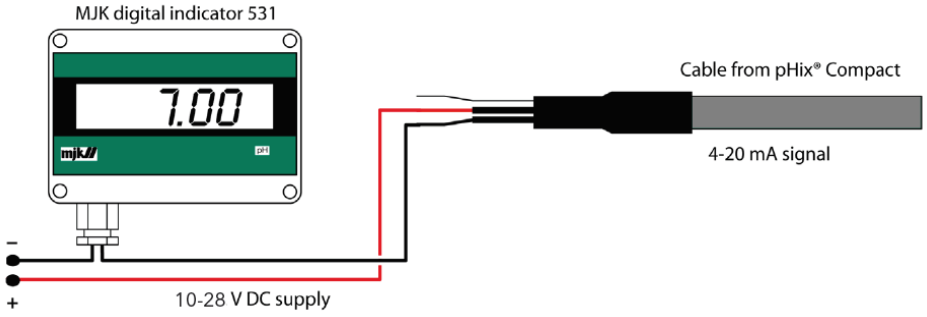


MJK connection box (item no. 200590).

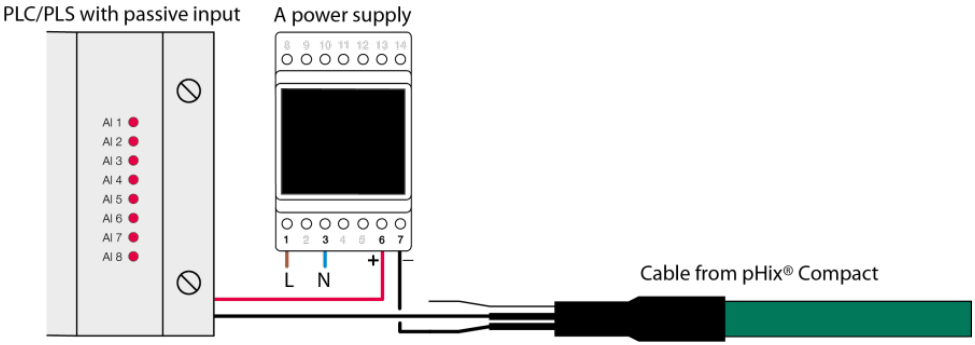
Connection examples

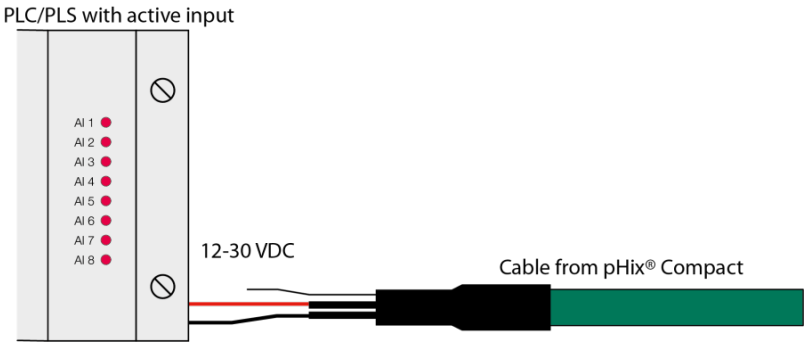
In order to communicate by RS-485, the pH loop must be applied by 10-28VDC.

Local display



Connection to PLC_PLS





Buffer adjustment

If the transmitter is installed without the power supply turned on, please allow the transmitter to boot-up for 1 minute before an adjustment is performed.

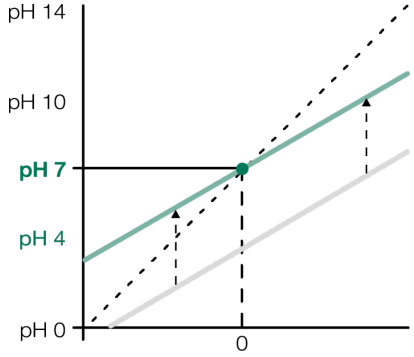
In order to ensure a precise and stable pH measurement, pHix® Compact must be buffer adjusted with regular intervals. Buffer adjustment is carried out in practice by dipping pHix® Compact in solutions (buffers) with known pH values. The calibration is made by using these known pH values as reference points.

pHix® Compact is buffer adjusted using two buffers with pH values of 4.01 and 7.00 (acidic range) or pH values of 7.00 and 10.01 (alcalic range). For measurements around pH 7 (neutral), both buffer pairs 4.01 - 7.00 and 7.00 -10.01 can be used for adjustment.

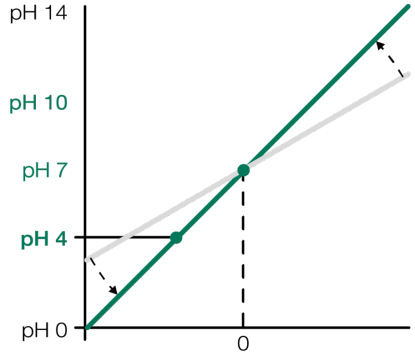
The sequence of buffer used for adjustment is not important. pHix® Compact automatically detects which buffer is used for adjusting zero points, and which buffer is used for adjusting the slope (the conversion between the electrodes mV and the measured pH value).

The first reference point sets the correct zero point for the measurement curve, and the second reference point sets the correct slope for the measurement curve.

pHix® Compact is, as standard, delivered to use buffer values at 4.01, 7.00 and 10.01.



First buffer adjustment with pH 7 as reference.



Second buffer adjustment with pH 4 as reference.

Buffer adjustment details

The buffer adjustment is the process that is done in order to get the main characteristics of a pH electrode, those are slope and zero point.
The buffer adjustment is done as a 2 point adjustment. The pHix is dipped into two different buffer solutions. This gives to points (mV, pH) that are converted then to slope

and zero point.
Existing buffer adjustments are deleted once new buffer adjustments is completed.
It is needed that pHix, the electrode and the buffer solutions are at the same temperature during adjustment to get a correct slope and zero point.

The electrode acceptance limits	**min**	**max**
Slope [mV/pH] @ 25°C	-62.12 mV	-50.0 mV
Offset [mV]	-30 mV	30 mV

The LED pattern during buffer adjustments is:	
1 flash every 5 seconds.	Measuring mode
3 flashes every 5 seconds.	Trying to find buffer
2 flashes every 5 seconds.	Buffer found
1 flash every second.	Buffer not found
3 flashes every second.	Error mode

Timeouts
Two minutes to find buffer.
Ten minutes to complete the buffer adjustment.

If the the switch ring is used, the buffer found must be the same as the one selected with the ring, else an error is triggered.
If the switch ring is not used the pHix automatically detects the buffer.

The default reference buffer values are 4.01, 7.0 and 10.01 pH, corresponding to the buffer solutions provided by MJK. This values can be changed via pHix Configurator software (see page 34).

Buffer solutions

Buffer solution are delivered as ready-to-use solutions with the pH values 4.01, 7.00 and 10.01.

During the buffer adjustment, pHix® Compact is calibrated in accordance with the pH values of the buffer solutions. It is therefore important to use as accurate buffer solutions as possible, i.e. to ensure that a pH 7 buffer solution in fact has a pH value of exactly 7.

MJK delivers buffer solutions for both pH and redox calibration.

The pH value of the buffer solution is dependent of the temperature, and the stated pH value is valid at 77° F / 25° C.

Buffer solution has a limited lifetime. Buffer solution for pH 4 and 7 has a life time of app. one year, and buffer solution for pH 10 a somewhat shorter lifetime.
Note! Buffer solution with pH 10 is more unstable than the buffer 4.01 and 7.00 and should therefore be disposed of no later than 10-15 minutes after it has been poured from the bottle.

Cleaning

Before starting buffer adjustment, wash the electrode in running drinking water and wipe it with a cloth before immersing it in the buffer solution. Washing and wiping must be repeated between each step of the buffer adjustment.

Use only fresh buffer solutions! Dispose of any used buffer solution.
Observe that transmitter, electrode and buffer solution has the same temperature - preferably app. 77° F / 25° C.

Buffer adjustment using the switch ring

Remember to clean the electrode as described in the previous section!
When the switch ring has been on for at least 10 minutes, it will only be possible to buffer adjust pHix® Compact with the switch ring. The switch ring has four positions, and must only be set to one of these positions in order to obtain correct function:

Position	Function
M	Measurement. The switch ring should always be in this position during normal service (measuring). This is indicated by the LED flashing app. every 5 seconds.
4	Buffer adjustment in buffer with pH value 4.01.
7	Buffer adjustment in buffer with pH value 7.
10	Buffer adjustment in buffer with pH value 10.01.

If the switch ring is set to one of the positions 4, 7 or 10, the LED will give out three short flashes every 5 seconds.

If pHix® Compact is being put into a buffer solution with the same value as the switch ring is set to, pHix® Compact will automatically begin to scan for a buffer with the same value. When the value is found, pHix® Compact will automatically set the 0-point or slope to the correct value, and the LED will indicate this with two short flashes every 5 seconds.

pHix® Compact is now ready, either for measurement by turning the switch ring in position M, or for another buffer adjustment at another pH value.

pHix® Compact determines automatically if zero point or slope needs to be adjusted depending of the electrode's zero point and the preceding buffer values.
If pHix® Compact cannot find the pH value for the selected buffer solution, it will go into alarm mode, which is indicated with continuous LED flashes every second.
Note! Only use 2 buffer solutions for the adjustment, for example, 4.01 -7.00 or 7.00 - 10.01.

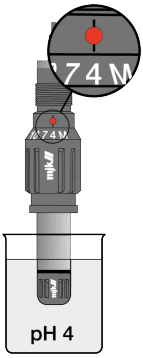
Example of buffer adjustment in pH 4 and 7

1. With the switch ring in position **M**, flush the electrode tip in water. Carefully, wipe of the electrode tip with a cloth. Never use materials that can scratch the measuring lens. (The LED gives one short flash every 5. sec.)
2. Turn the switch ring from position **M** to position **7**, and dip the electrode tip into the pH 7 buffer solution. (The LED will now begin to give three short flashes

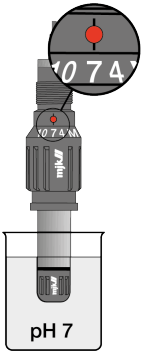
every 5 sec.). When the buffer adjustment has finished successfully, the LED will start to give two short flashes every 5 sec. The zero point is now set.

3. Carefully, wipe of the electrode tip with a cloth. Never use materials that can scratch the measuring lens. Turn the switch ring from position **7** to position **4**, and dip the electrode tip into the pH 4 buffer solution. (The LED will now begin to give three short flashes every 5 sec.). When the buffer adjustment has finished successfully, the LED will start to give two short flashes every 5. sec. The span angle is now set.

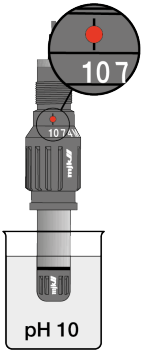
In service (measurement). One flash every 5. second.



Buffer adjustment in pH 4 buffer.



Buffer adjustment in pH 7 buffer.



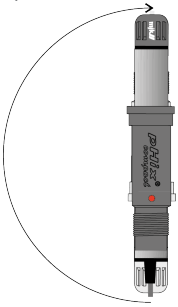
Buffer adjustment in pH 10 buffer.

Buffer adjustment using the tilt switch

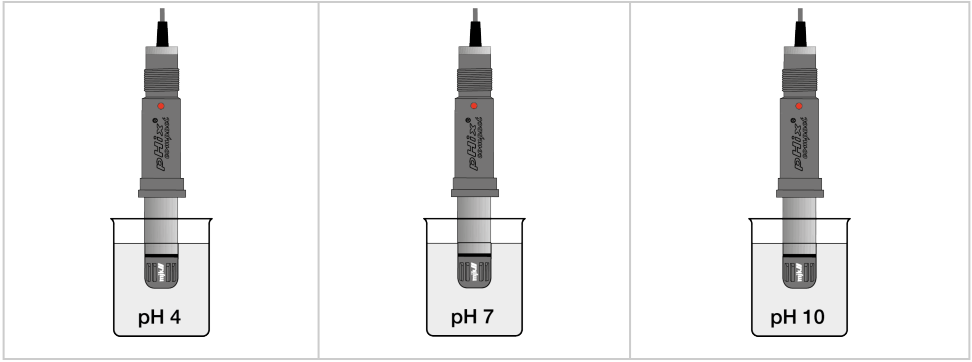
Remember to clean the electrode as described earlier!
Only the built-in tilt switch is active when the switch ring has been removed for more than 10 minutes.
The tilt switch inside pHix® Compact detects when the electrode tip is turned upwards.

When the electrode tip has been turned upwards for more than 30 seconds, pHix® Compact will go into buffer adjustment mode.

Proceed as described:
Remove pHix® Compact from the process, rinse the electrode, and turn the electrode upside-down.



The buffer adjustment mode is initiated after app. 30 seconds - this is indicated by the LED with 3 short flashes every 5 seconds.



If pHix® Compact is dipped into a buffer solution with a value of 4, 7 or 10 pH, pHix® Compact automatically searches for a buffer with one of those values. When the correct value is found, the zero point or slope will automatically be set to the right value. The LED will give one short flash every 5 seconds for indication of a successful adjustment adjustment. Now turn the switch ring in position M for measuring.

pHix® Compact is now ready to be put into service by turning the switch ring in position M, or for another buffer adjustment with another pH value.

For a new buffer adjustment to another (or same) pH value, simply turn pHix® Compact upside-down again with the electrode tip pointing upwards for approximately 30 seconds. When the LED gives three short flashes every 5 seconds, the above procedure is repeated.

If pHix® Compact cannot find the correct pH value for the selected buffer solution, the transmitter will enter alarm mode indicated by a flash every second.

To start a new buffer adjustment, the buffer solution or electrode should be replaced and pHix® Compact turned upside-down for at least 30 seconds before a new buffer adjustment is made.

Buffer adjustment using pHix Configurator

See Buffer adjustment, pHix Configurator (see page 70) .

Maintenance

A pH or redox measuring system requires maintenance with regular intervals. Cleaning and buffer adjustment is a normal and necessary maintenance that should be carried out regularly.

Intervals

The interval between buffer adjustments and cleaning depends widely on the working conditions. Therefore, the easiest way to find the most appropriate cleaning interval is by checking for drift or deviation and take notice of a potential maintenance interval. For instance, start out by cleaning and buffer adjusting every week.

If measurements are unchanged or just slightly changed after buffer adjustment, the cleaning interval can be changed to two weeks and after that, one month.
The intervals are equally reduced if the electrodes are coated, or very dirty, and the measurements are significantly changed after cleaning and buffer adjustment.

There are no general guidelines to cleaning and adjustment, but in most cases, a monthly adjustment is sufficient. Before beginning a buffer adjustment, the electrode must be thoroughly cleaned:

1. first in portable water
2. then, if necessary, in a degreasing fluid, like, for example a 5-10% hydrochloric acid solution
3. then, before the electrode is put into the buffer solution, and again in between every step of the buffer adjustment, rinse with water and dry with a dry cloth.

Redox electrodes

Like pH electrodes, Redox electrodes require cleaning but not buffer adjustment. However, MJK does deliver redox buffers for calibration of electrode and transmitter.

If the transmitter is deviating from the reference values when put into the buffer solution, the electrode must be exchanged.

Cleaning of the electrode

Use clean drinking water for cleaning the electrode.
A 5-10% hydrochloric acid solution can be used for cleaning if the electrodes are greasy. Protein coatings are removed with Pepsin cleaning fluid.

Electrode lifetime

The expected lifetime of the electrodes is dependent of the application. The lifetime is given with reservation as the physical conditions as well as the temperature, pressure and the characteristics of the measured liquid have great influence on the stated lifetime.
The lifetime is based on **77° F / 25° C**, but if the temperature is doubled, the lifetime is halved in worst case!

pH electrodes in water or wastewater treatment plant lasts approximately one year, whereas the lifetime of pH electrodes in industrial plants is dependent on the application and the process. Redox electrodes have a lifetime of approximately two years, depending on the application and the cleaning intervals.

Electrode spare parts

Item no.	Description
160310	pHix® pH electrode, 0-point=4,6 pH
160311	pHix® pH electrode, 0-point=7,0 pH
160312	pHix® redox electrode
571030	Black rubber gasket for electrode
521409	Union ring w. Viton gasket for mounting of pHix® on pipe **- NOT AVAILABLE IN THE US**
521441	Viton gasket for union ring **- NOT AVAILABLE IN THE US**

The following is recommended for cleaning and buffer adjustment:

Item no.	Description
163032	pH buffer, 0,25 liter pH 4 **- NOT AVAILABLE IN THE US**
163034	pH buffer, 0,25 liter pH 7 **- NOT AVAILABLE IN THE US**
163036	pH buffer, 0,25 liter pH 10 **- NOT AVAILABLE IN THE US**
163040	Redox buffer, 6x20ml +180 mV Pt/Kalomel/+220mV PT-Ag/AgCL **- NOT AVAILABLE IN THE US**

Note! For further accessories, see **pHix Compact Datasheet** which can be downloaded from our Download Center[2] under **Datasheet.**

Electrode storage

When a pH-electrode is not in use and is kept in storage, always put the electrode in a 3mol KCL-solution. If a storage solution is not available, a buffer 4 can be used temporarily.

Note! Never store the electrode in demineralized water.

Specifications

pHix® Compact	
Supply voltage	10-28 V DC
Consumption	App. 50mW
Temperature range	-4 … +176° F / -20 … +80° C
Housing material	Housing exists in two variants: 1. with PPS Fortron only 2. with PPS Fortron and stainless steel (EN 1.4404 / ASTM 316L) combined.
Enclosure	NEMA 6X / IP 68, withstands submersion to 10 mWG
Input	0-14 pH/-1000 ... +1000 mV
Input, impedance	Measuring input: > 10^{12} ohm. Reference input: > 10^{6} ohm
Output	0-14 pH / 4-20 mA. 32-122° F / 0-50° C = 4-20mA
Temperature comp.	Built-in sensor. Entire operating range
Temp. electrode	Built-in to electrode holder
Buffer adjustment	Automatic with tilt switch or switch ring
Cable length	19.7 feet / 6 meter

2 https://mjk.com/download-center?mainCatId=3104&catId=all&lang=english

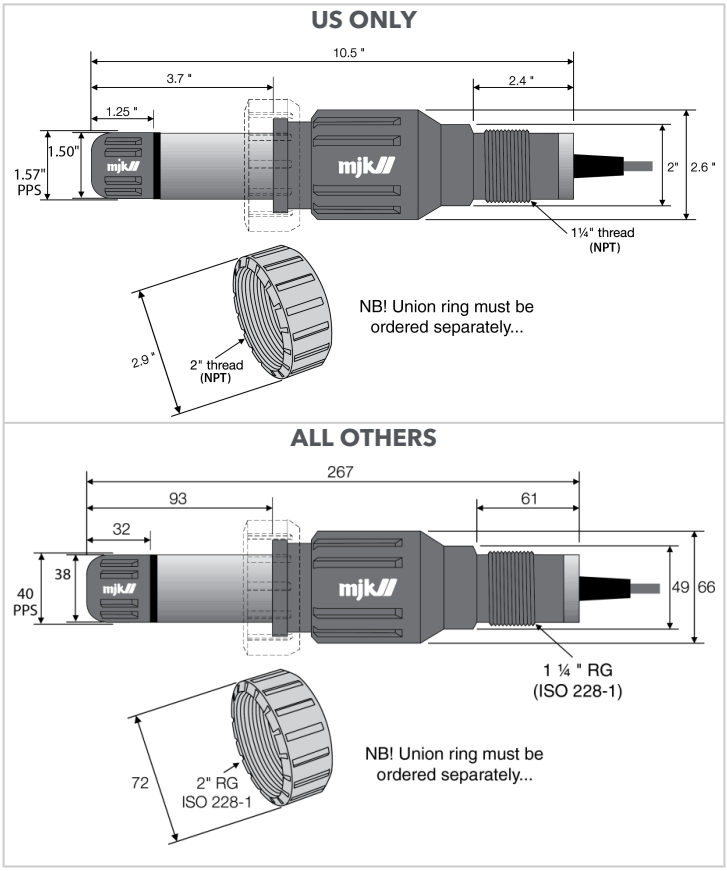
pHix® Compact	
CE approvals	EN61326-1 EN61326-2-3

Note! See also **pHix Compact Datasheet** which can be downloaded from our Download page[3] under **Datasheet.**

3 https://mjk.com/download-center?mainCatId=3104&catId=all&lang=english

Dimensions

Measurements are in mm /inches.

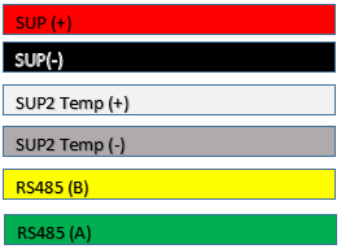


pHix Configurator software

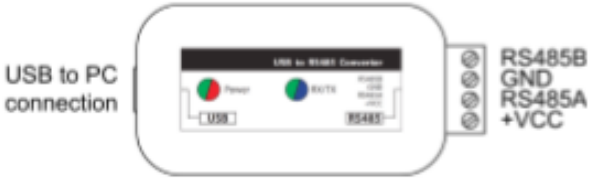
Programming connection

K-114 RS-485

PC Interface used to connect pHix to a PC.



Designations		
1	Yellow	Data In - RS485B
2	Black	Negative (-) wire (GND)
3	Green	Data Out - RS485A
4	Red	Positive (+) wire (+VCC)



Others RS-485

4- 20 mA loop must be supplied with 10- 28 VDC before programming via RS485 communication is possible.

General information

Item		Description
		File handling: Open configuration
		File Handling: Save configuration
		pHix Compact Manual
		Get configuration from the unit to the PC or read configuration from the unit
		Send configuration from the PC to the unit or write configuration on the unit
		Connect /Disconnect
		Toggle between Online data view and main configuration
		Device functions
		Check for updates Get the newest pHix Configuration version if there is a new one

File handling

The user can save or open a pHix configuration from pHix Configurator. The file has Xml extension and it contains all the configuration parameters and their corresponding values.

	Click **Folder** on top menu bar or start up window .

	Click **Save folder** on top menu bar.

Current working folder

When a file is saved, the current working folder determines where the file is placed.
For all file handling windows in pHix Configurator, folder information and a selector for the current working folder is available.
The information is a drop-down list of the last 10 locations where the files have been saved, combined with a settings button for selecting a new location.

This offers the advantage of organising configurations, various exports, counter back-ups and more in a desired structure.

In all file handling windows, the current working folder selector looks like this .

As default, the current working folder, where files are saved, is set to the folder:
"C:\Users_USER_\Documents\Xylem\pHix Configurator\Config\

Changing current working folder

By selecting one of the last visited folders in the folder drop down list, the current working folder can be changed individually for every file handling window available.
Alternatively, it can be done by selecting a new folder not on the list using the button

This will open an MS Windows **Select folder** dialog for selecting a new folder.
Navigate to a desired folder, select the folder, and click **Select folder**.

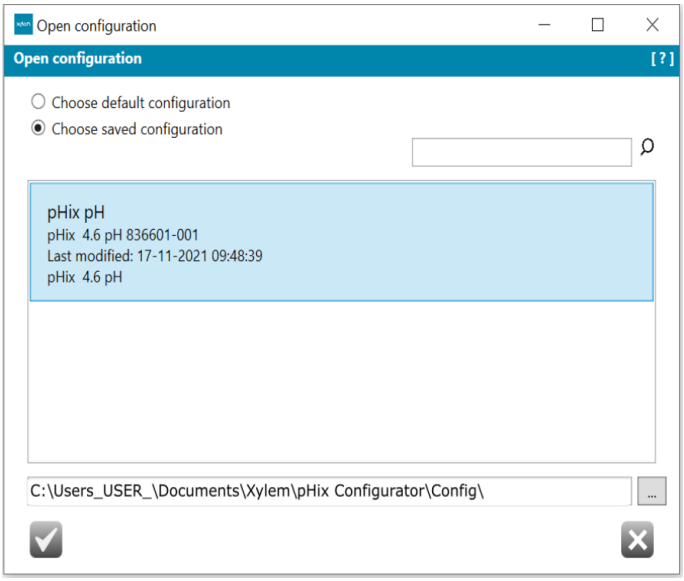
The new folder has now been added to the drop-down list for last visited working folders, and has automatically been selected as the current working folder.

Open configuration

	Click **Folder** on top menu bar or start up window .

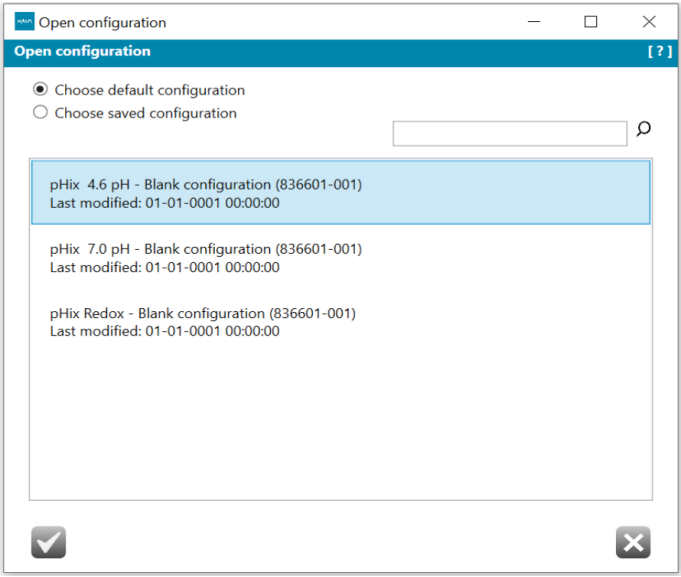
Choose saved configuration

pHix configurations from the **Current working folder** (see page 35) are listed. But when pHix Configurator is connected to the unit, only the corresponding configurations for the selected electrode type are available.



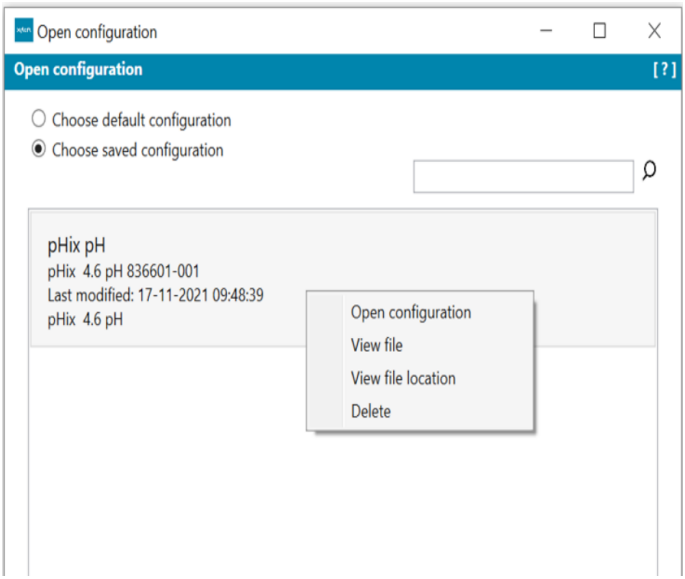
Select the desired configuration in the list and click **OK** or simply double-click on the selected item to open the configuration.

Choose default configuration



Default configurations are empty/blank configurations corresponding to the connected unit where nothing is configured yet, but every settings in unit are present.

Managing configuration



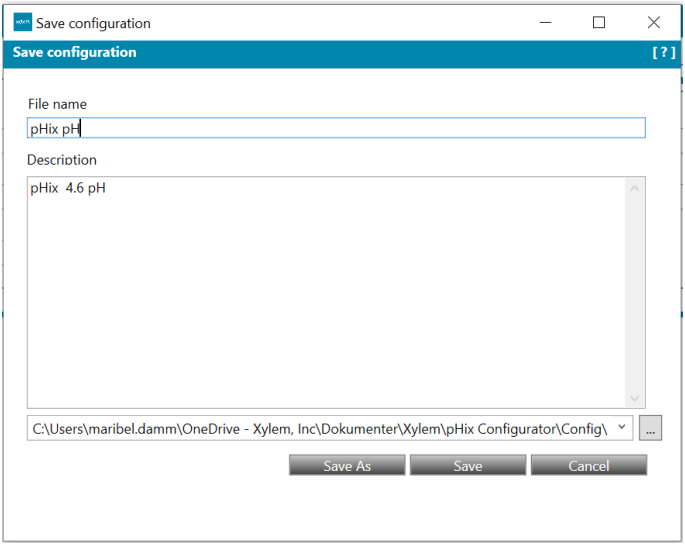
Item	Description
Open configuration	Same as double-clicking on a configuration or clicking **OK**.
View file	Opens the file in a text editor to view the contend of the xml configuration file.
View file location	Opens the MS Windows folder, where the configuration is saved.
Delete	Will delete the selected configuration without warning.

Save configuration

	Click **Save folder** on top menu bar

Save the configuration in the working folder that has been imported from the unit, or edited by the operator.

Clicking **Save Configuration** will open a new window, with the **Save Configuration** dialog, for entering details for the configuration before saving.



Item	Description
File name	Name of the saved configuration.
Description	Extra information.
Save As	Saves new configurations, or updates and overwrites an earlier saved configuration.

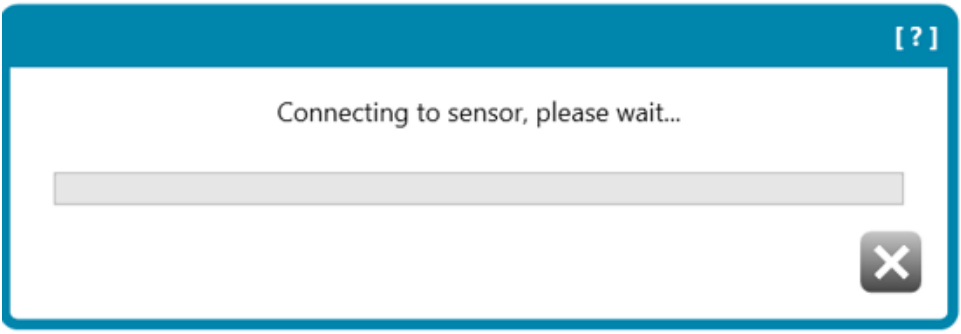
Save	Save the configuration.
Cancel	No action performed.

Connection

	Click **PC with a light** **ning connecting to a unit** on top menu bar or the start up window

Connecting

When connecting to a unit, and the carrier is available, a pop-up will appear on screen with information stating that requesting information from the unit is ongoing.
This pop-up will appear for a longer or shorter time, depending on the speed of the communication carrier.



	When the connection is established, **PC with a lightning connecting to a unit** will change to PC with 2 green arrows connected to the unit

Disconnecting

		Place the arrow over **PC with 2 green arrows connected to a unit** on top menu bar. This will change to **PC with 2 red arrows connected to a unit**. Click it .

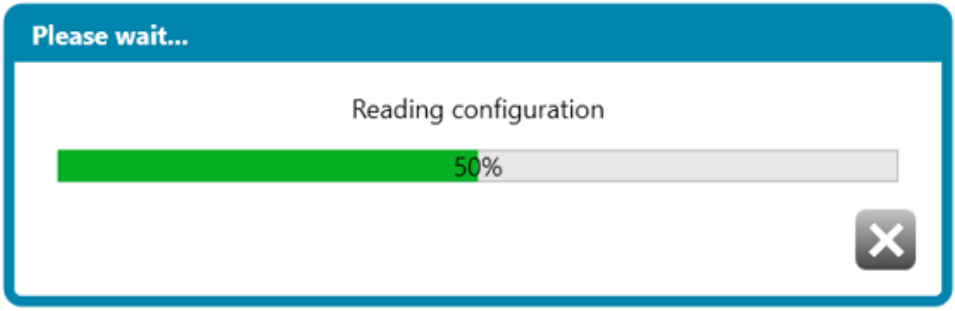
Connection status

The status is shown in the bottom right corner.

Read from the sensor

	Click **Sensor with arrow pointing towards PC** on top menu bar.

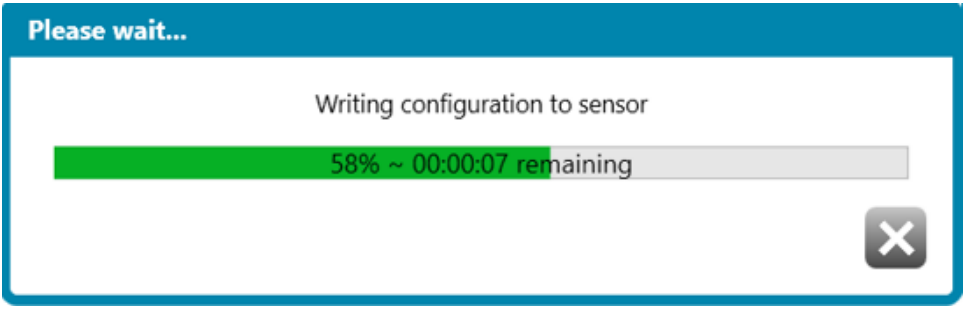
When pHix Configurator is connected to the sensor, the configuration from the sensor can be read for editing or saving.



Write to the sensor

	Click **PC with arrow pointing towards sensor** on top menu bar.

When pHix Configurator is connected to a sensor the active configuration in pHix Configurator can be send to the unit.



Toggle

	Click **Live view** on top menu bar or start up window to go to online data. **Live view** connects to the sensor.
	Click **Home** on top menu bar to go to the main configuration

Live view

This is an easy way of viewing most of the online values and data as they are at current, live from the connected unit.

pHix Configurator and the unit and the values are read directly from the unit or written directly to the unit.

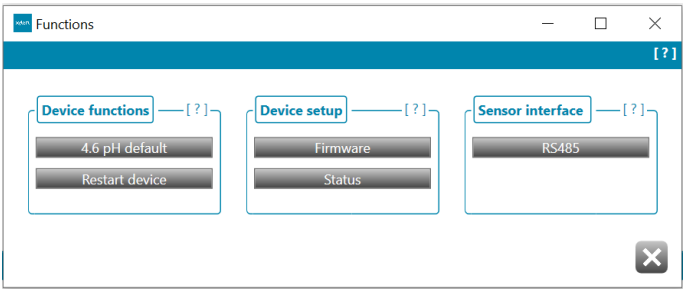
Home

From the main configuration, the user can :

- Read the unit 's configuration
- Send a configuration to the unit
- Save the current configuration
- Open a configuration.

Device settings

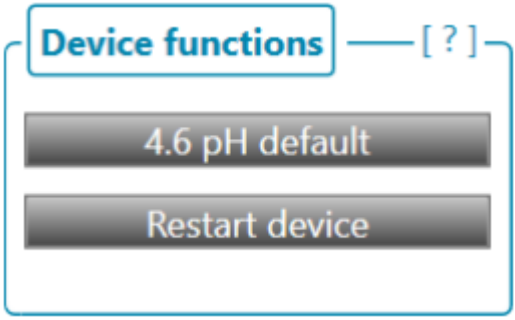
	Click **Device with cog-wheel** on the top bar. This will open the **Device functions** menu.



Default	This function will delete all data and setups and will set the unit to corresponding default factory setup. 4.6 pH default 7.0 pH default Redox default
Restart device	The sensor is restarted

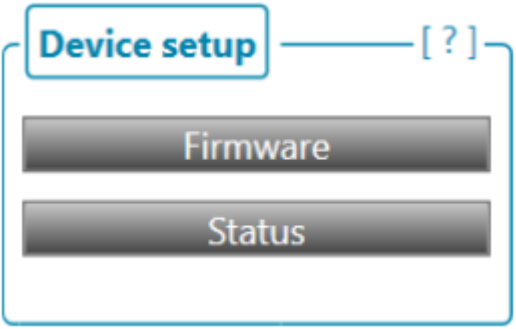
Firmware	Check for new firmware version Load and flash firmware file Factory firmware
Status	Change the status for Liquid ground Switch ring Tilt

Device function

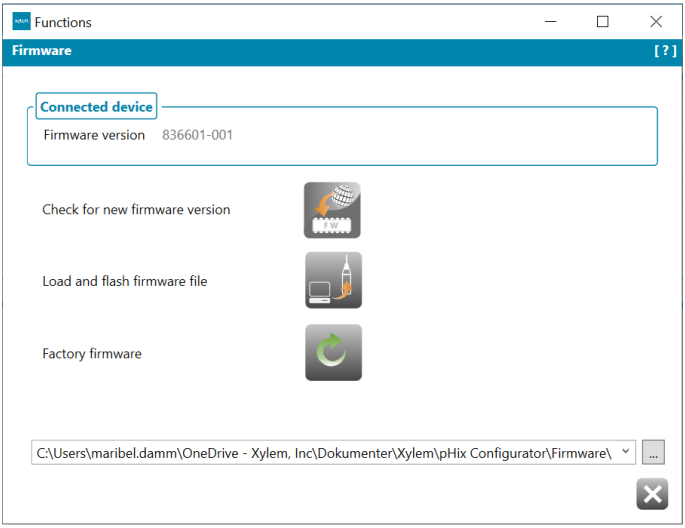


Default	4.6 pH default 7.0 pH default Redox default	Set all the all the parameters (Modbus registers) to the default values for the connected sensor type.
Restart device		The sensor is restarted

Device setup



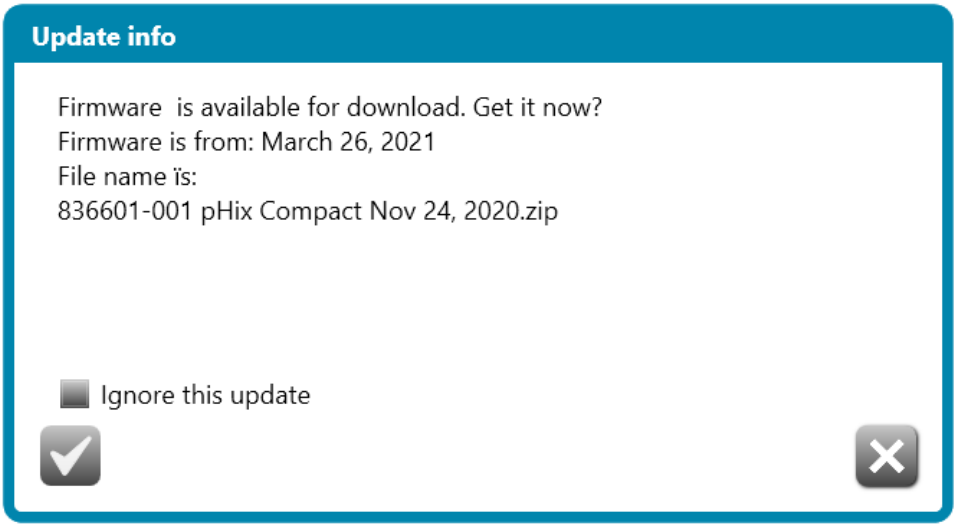
Firmware



Check for new firmware version	Get the newest firmware version if there is a new one available

Load and flash firmware	If a firmware has previously been downloaded, this option will offer the possibility to load the firmware file for flashing. Note! Echo need to be disabled.
Factory Firmware	Come back to the factory firmware

Check for new firmware version

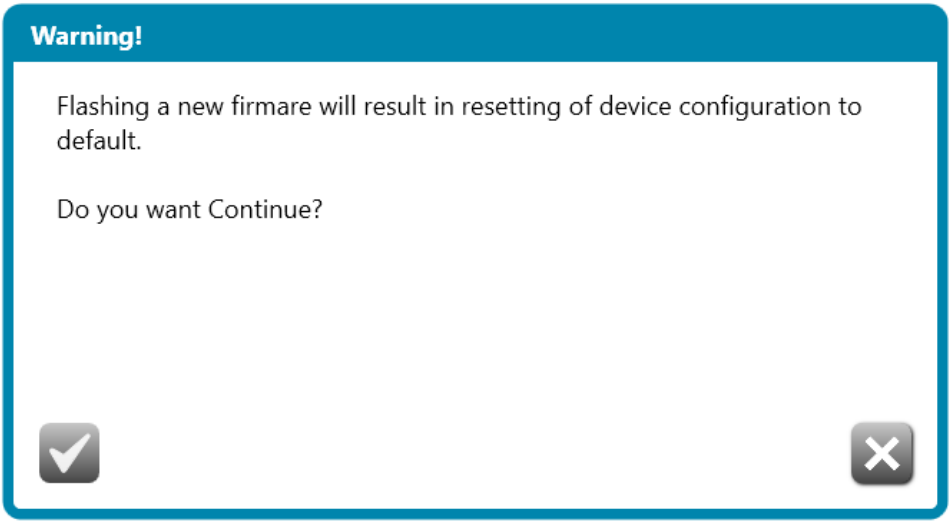


If a new version is available from the update server, a pop up with **Update info** is shown.

The information includes:
The new version available and your current installed version.

Click **Yes** to download the new version.
Click **No** to bypass the update and keep working with the out of date version currently being used.

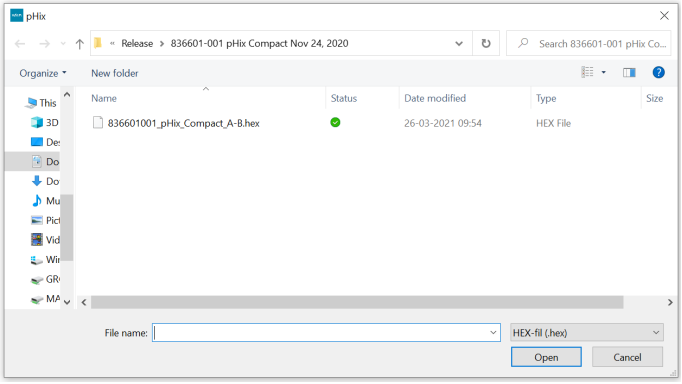
Load and flash firmware



Your configuration will be reset if a new firmware is flashed into the unit.

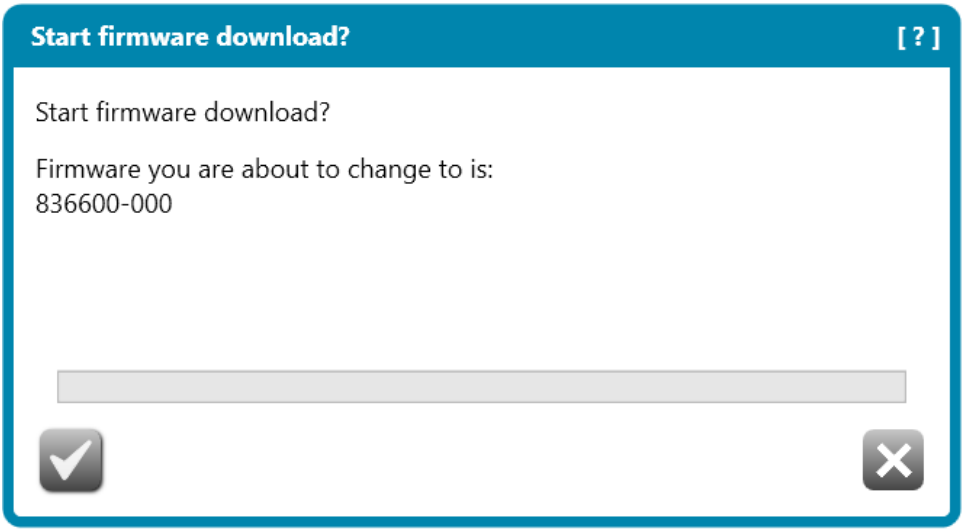
Click **Yes** to continue.

Load file

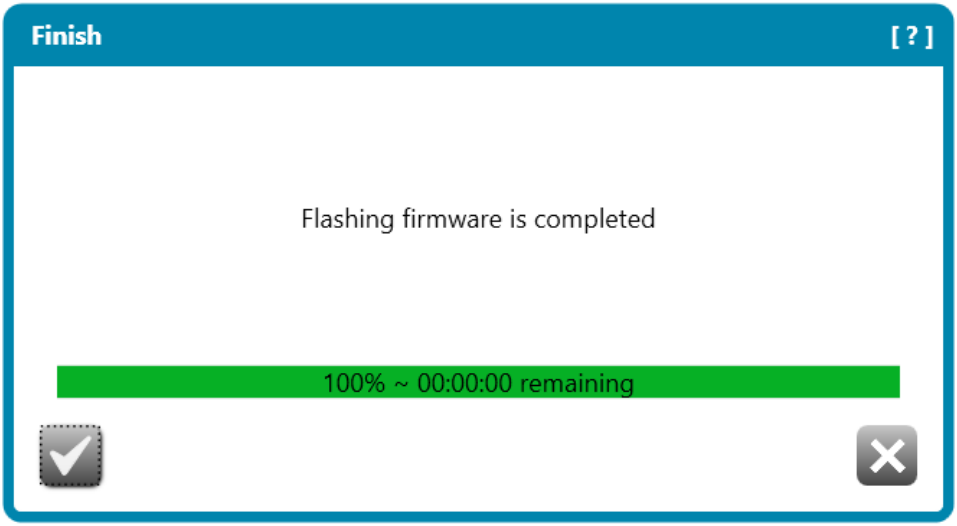


Choose the firmware file

Flash firmware

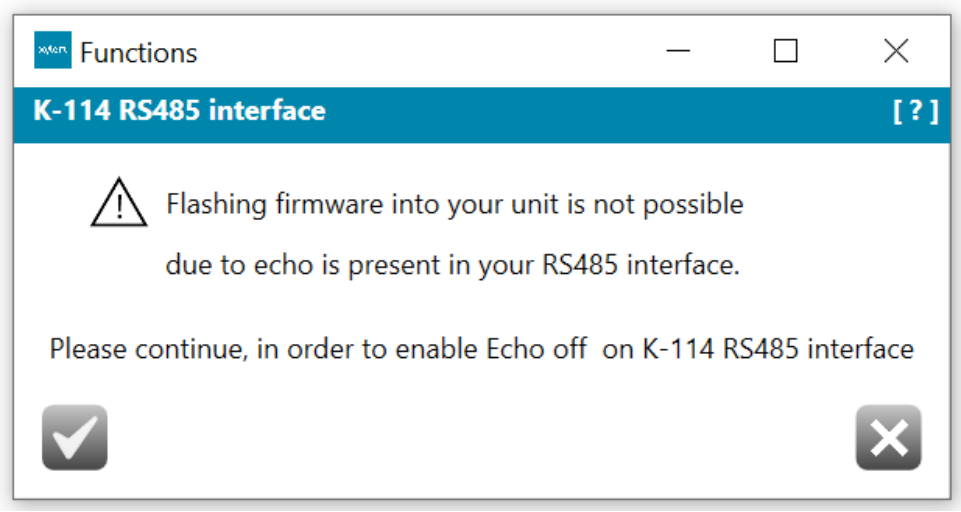


Click **Yes** to download new version. Click **No** to bypass update and keep working with the out of date version currently being used.

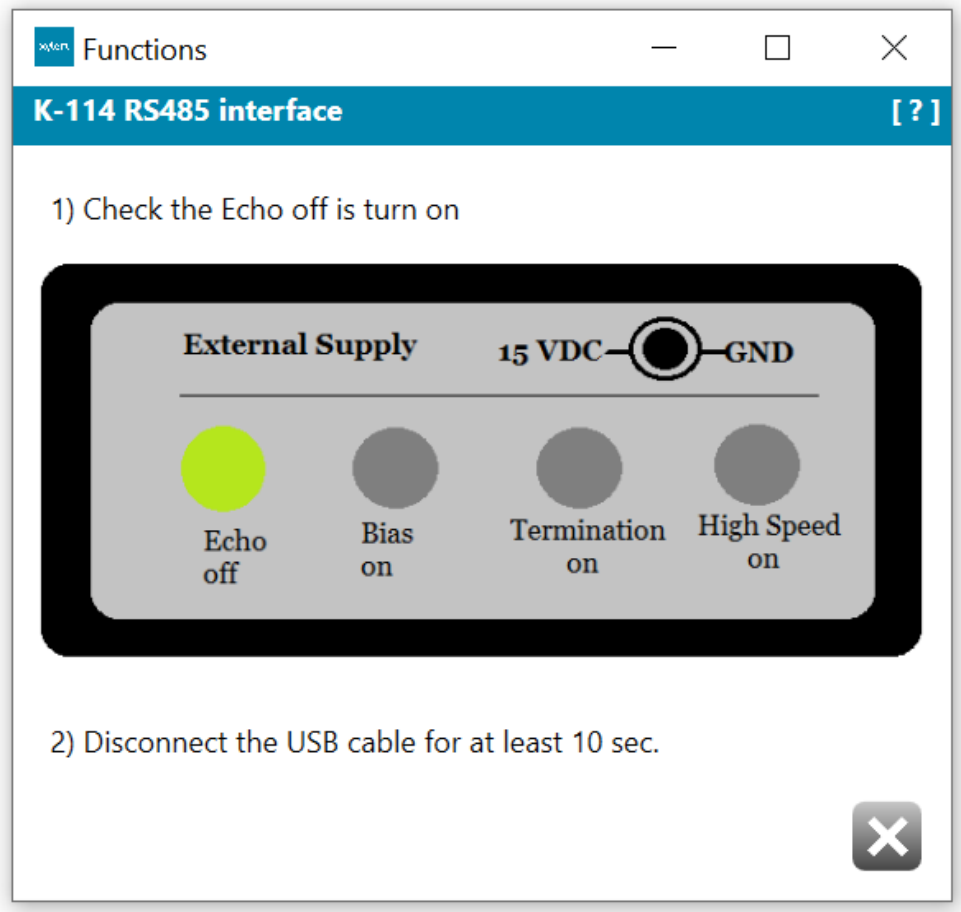


Wait until flashing reaches 100%.

Echo warning

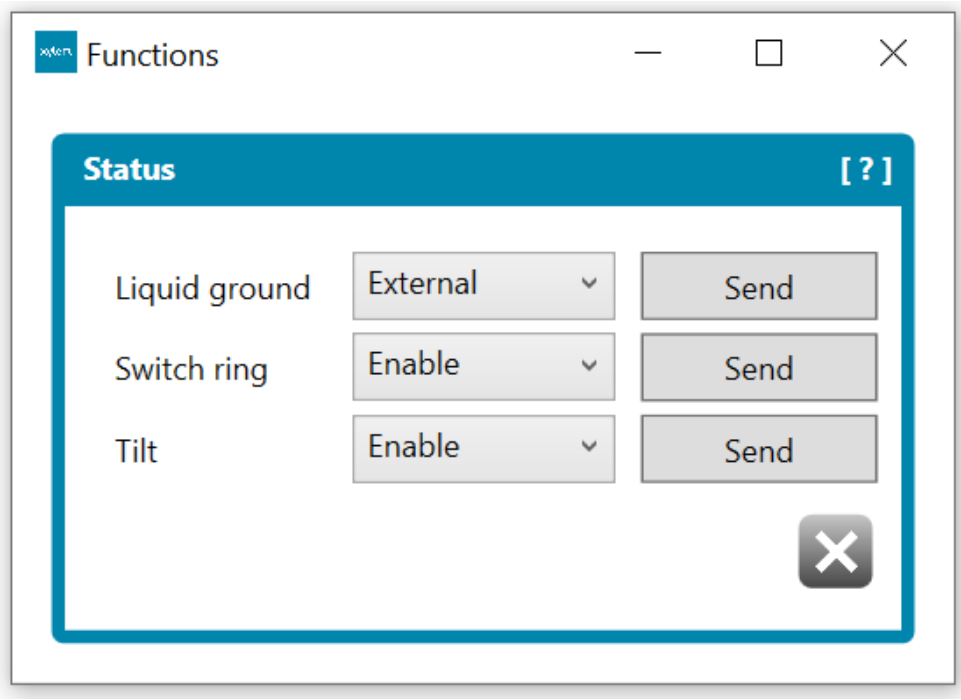


If the serial interface is provided by MJK Automation, K-114 RS485, pHix Configurator will enable Echo off. Otherwise you need to make sure that there is not echo on the serial interface.



Disconnect the USB cable, wait at least 10 seconds and connect the cable again.

Status

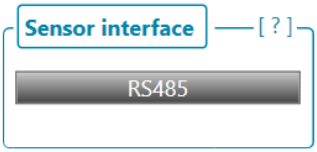


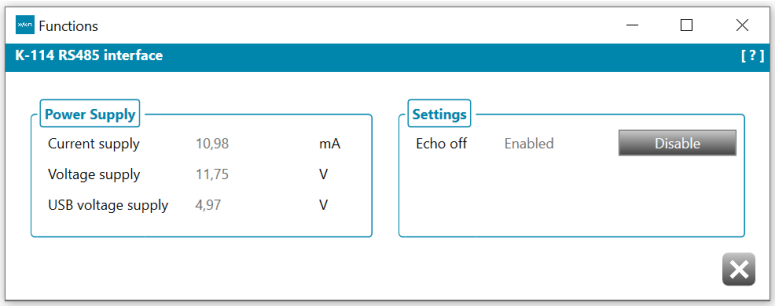
Choose the function's status and click **Send**.

Liquid ground **(Potential equalization)**	Internal External	Internal is only for the PPS sensor version External is only for the stainless steel version
Switch ring	Enable Disable	Switch ring is only for pHix 4.6 pH and 7.0 pH Enable the ring position of the sensor.
Tilt	Close/Up Open/Down Disabled	Tilt is only for pHix 4.6 pH and 7.0 pH Enable the position of the sensor.

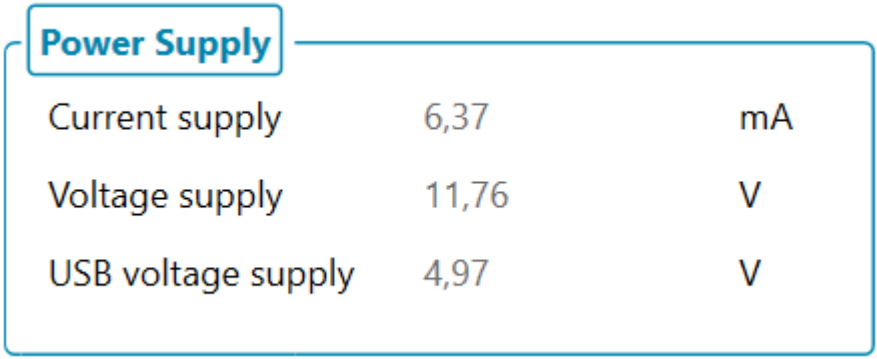
Sensor Interface

This tool only can be used for the K-114 RS485 Interface



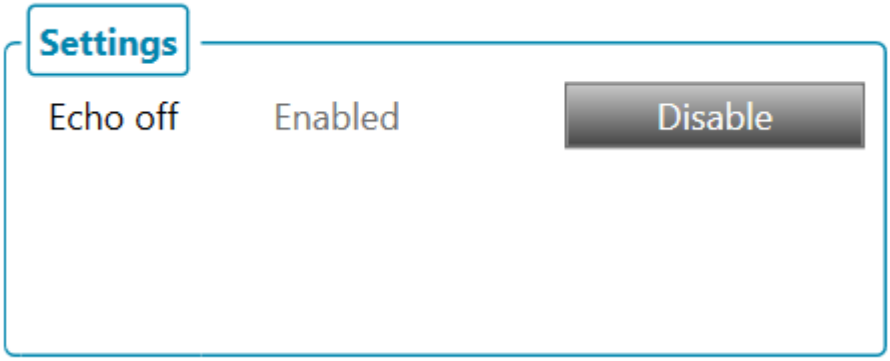


Power supply



Current Supply	0 - 40 mA	• Close to zero, if it is not connected to pHix Compact V3 • 10-12 mA, if it is connected to pHix Compact V3
Voltage Supply	11,2 - 12,5 VDC	
USB voltage supply	Aprox. 5 VDC	

Settings



Echo Off status	Enabled	No echo
	Disabled	Echo
Echo Off button	Enable	Set to no echo
	Disable	Set to echo

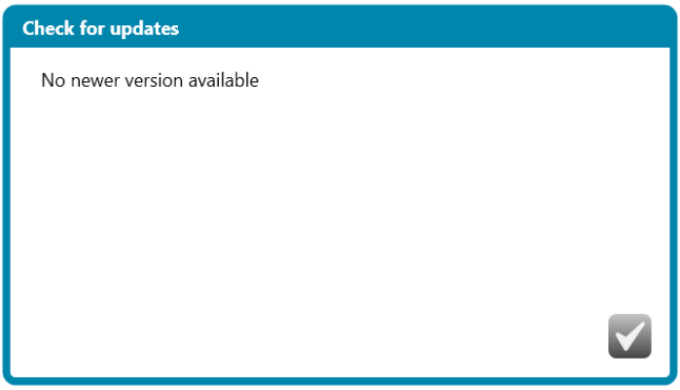
Check for updates

	Click PC downloading from the server Get the newest pHix Configurator Version if there is a new one available

pHix Configurator and the help file can be updated by downloading the latest version directly from the software.

pHix Link contacts MJK's update server, and checks if there is a newer version available.

No new version



If there is no newer version available, the above pop up will be shown.
Clicking **OK** will end the check for updates sequence.

New version available

If a new version is available from the update server, a pop up with **Update info** is shown.

The information includes:
The new version available and your current installed version.

Click **Yes** to download the new version.
Click **No** to bypass the update and keep working with the out of date version currently being used.

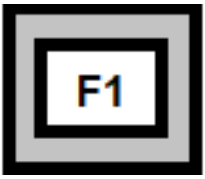
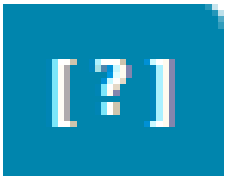
Help file new version

If a new version of the help file is available from the update server, a pop up with **Update info** is shown.

The information includes:
The new help file version available and your active help file.

Click **Yes** to download the new version of the help file.
Click **No** to bypass the update and keep working with the out of date version currently being used.

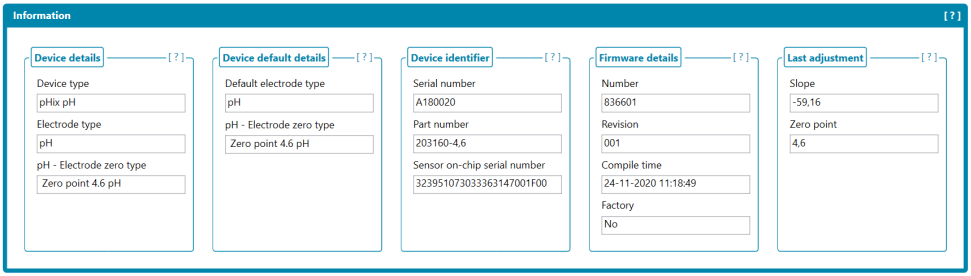
Help

	Click **Document** on top menu bar to open the pHix Compact manual .
	**F1** key opens the pHix Compact manual
	Click **Question mark** to open the pHix Compact manual on the corresponding chapter.

Main configuration

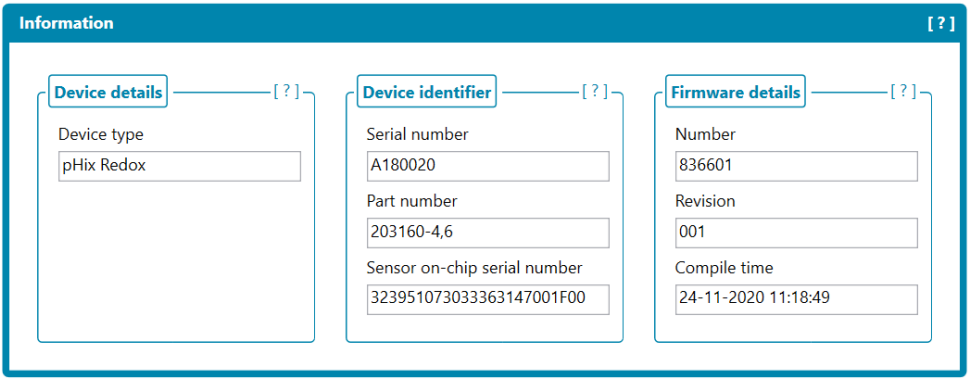
Information

pHix pH



Menu item	Option	Description
Device type	pHix pH	The sensor type
Electrode type	pH	
pH-Electrode zero type	Zero point 4.6 pH Zero point 7.0 pH	The pH electrode type
Serial number		The sensor serial number
Part number		The sensor item number
Sensor on-chip serial number		Chip serial number
Number & Revision		The current firmware in the sensor
Compile time		The last time the firmware was changed
Slope		The slope is determined by measuring the difference in mV readings pH buffers. The ideal slope should be approximately -59.16 mV/pH at 25°C
Zero point		The pH where the Zero Point is 0 mV, it means the same amount of H+ and OH- ions.

pHix Redox



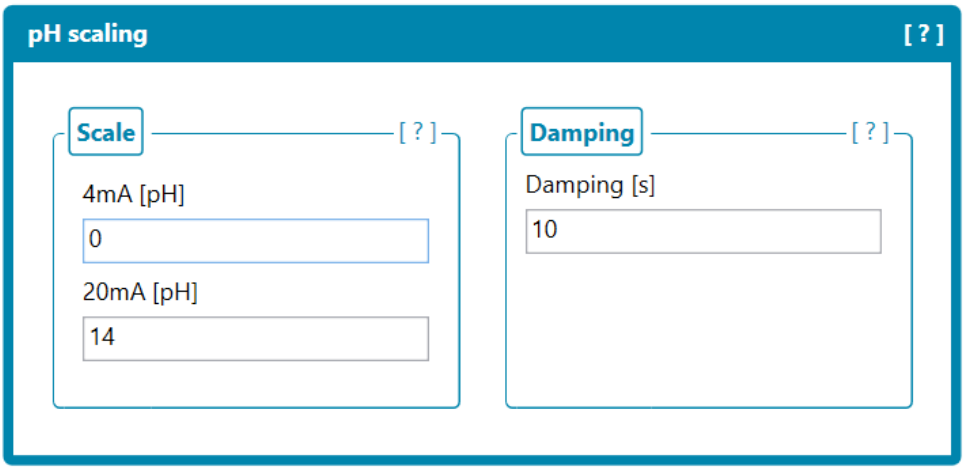
Menu item	Option	Description
Device type	pHix Redox	The sensor type
Serial number		The sensor serial number
Part number		The sensor item number
Sensor on-chip serial number		Chip serial number
Number & Revision		The current firmware in the sensor
Compile time		The last time the firmware was changed

Output scaling

pH scaling

Output scaling

Output scaling for electrode type 4.6 pH and 7.0 pH.



Menu item	Option	Default	Description
4mA [pH]	0-12	0	pH value represented by 4mA
20mA [pH]	2-14	14	pH value represented by 20mA
Damping [s]	0 - 3600	10	Set the time period for averaging the signal. The averaging is a running average.

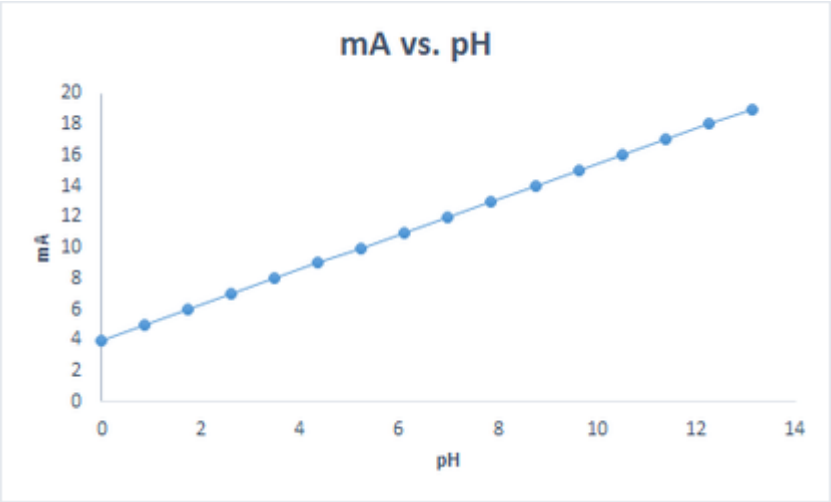
The **minimum span is 2**.

Examples:

pH scaling from 0-14.

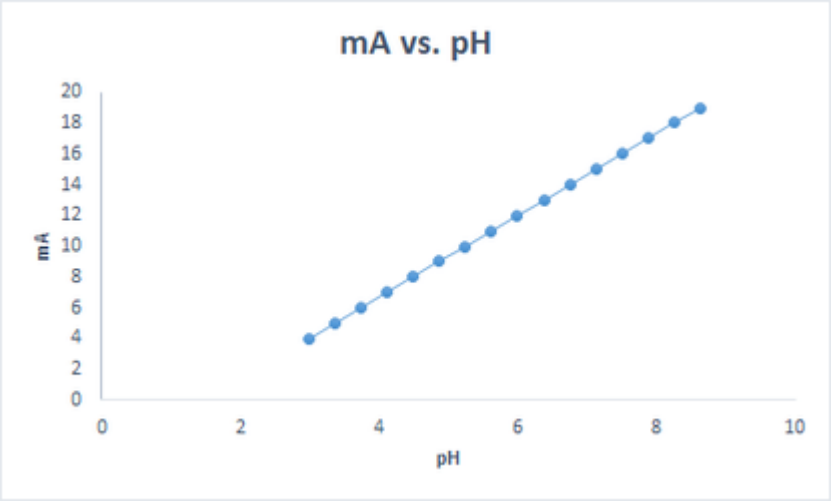
If there is 12 mA , the pH will be:
pH = 14 -**(**(14-0)/(20mA-4mA)**)***(20mA-12mA)

pH = 7



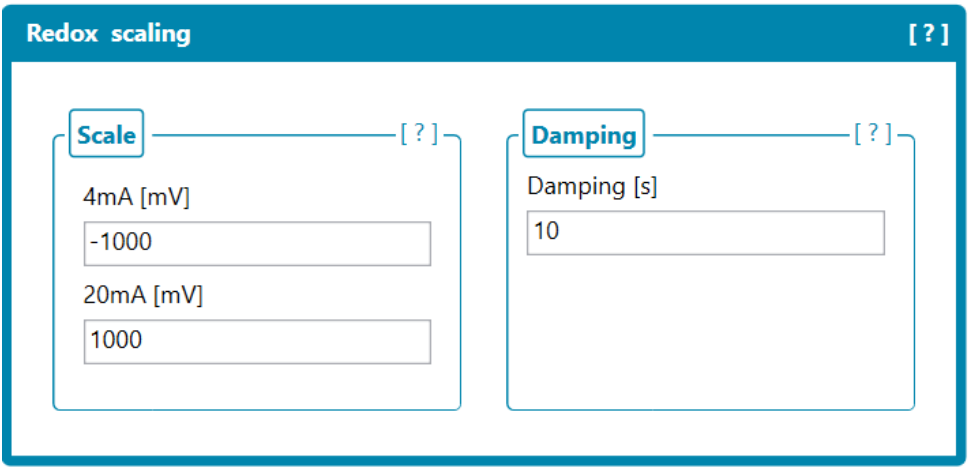
pH scaling from 3-9:

If there is 12 mA , the pH will be:
pH =9 -**(**(9-3)/(20mA-4mA)**)***(20mA-12mA)
pH = 6



Redox scaling

Output scaling



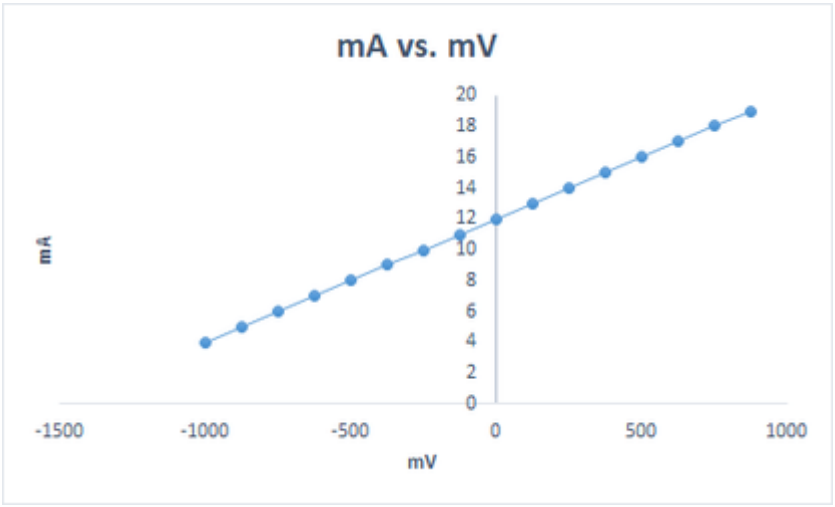
Menu item	Option	Default	Description
4mA [mV]	-1000 - 800	-1000	mV value represented by 4mA
20mA [mV]	-800 - 1000	1000	mV value represented by 20mA
Damping [s]	0 - 3600	10	Set the time period for averaging the signal. The averaging is a running average.

The **minimum span is 200**.

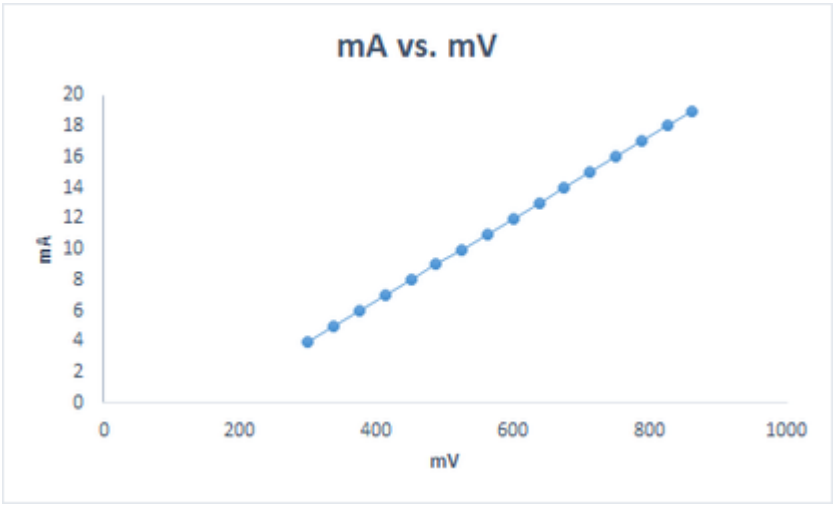
Examples:

mV scaling from -1000 - 1000.
If there is 12 mA , the mV will be:
mV = 1000 -**(**(1000 - (-1000))/(20mA-4mA)**)***(20mA-12mA)

mV = 0

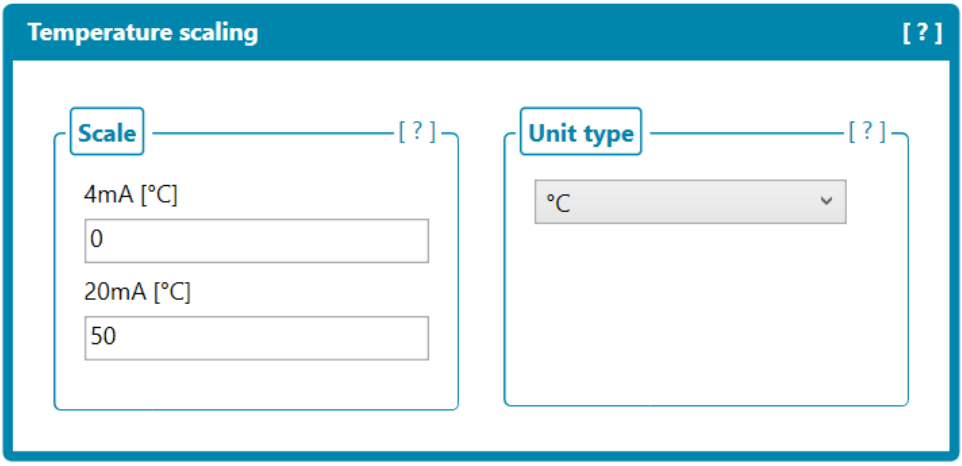


mV scaling from 300 - 900.
If there is 12 mA , the mV will be:
mV = 900-**(**(900-300)/(20mA-4mA)**)***(20mA-12mA)
mV = 600



Temperature scaling

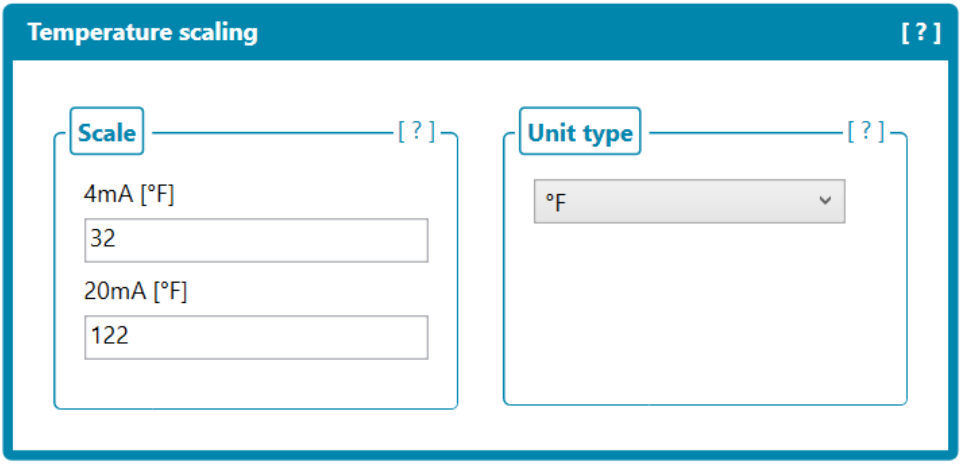
Output scaling - Celsius



Menu item	Option	Default	Description
4mA [°C]	0-40	0	mV value represented by 4mA
20mA [°C]	10-50	50	mV value represented by 20mA

The **minimum span is 10.**

Output scaling - Fahrenheit



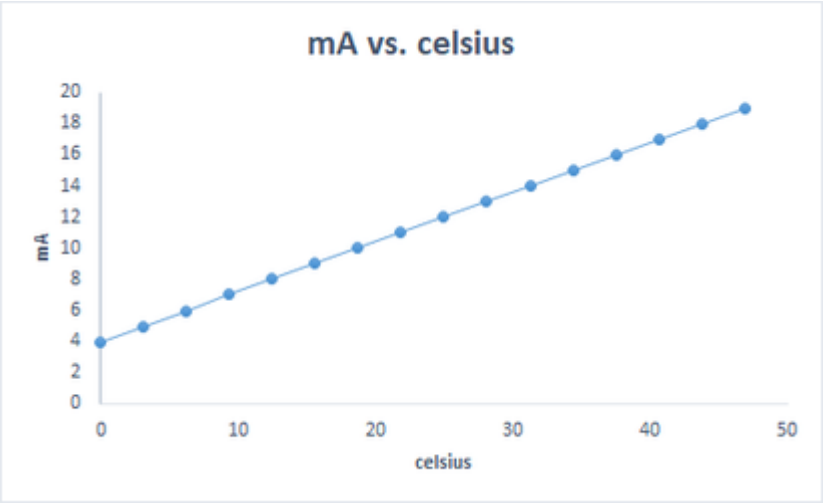
Menu item	Option	Default	Description
4mA [°F]	32-104	32	mV value represented by 4mA
20mA [°F]	50-122	122	mV value represented by 20mA

The **minimum span is 18.**

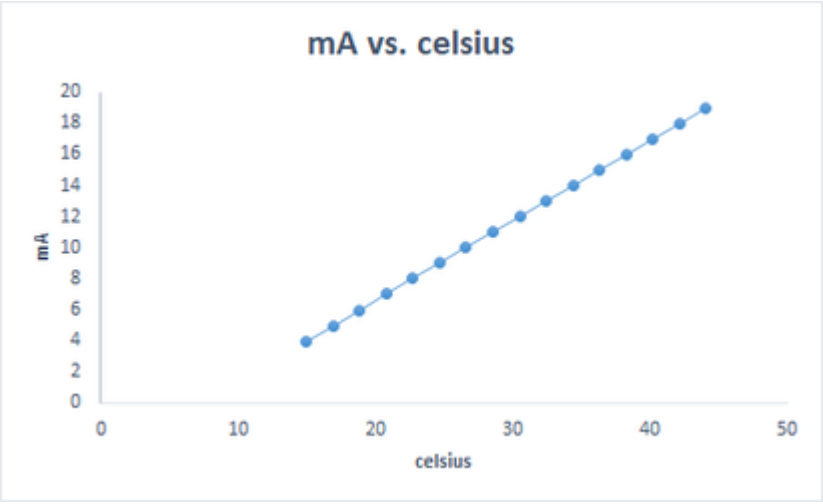
Example Celsius

Temperature scaling from 0-50.
If there is 12 mA , the °C will be:
°C= 50 -**(**(50-0)/(20mA-4mA)**)***(20mA-12mA)

°C = 25

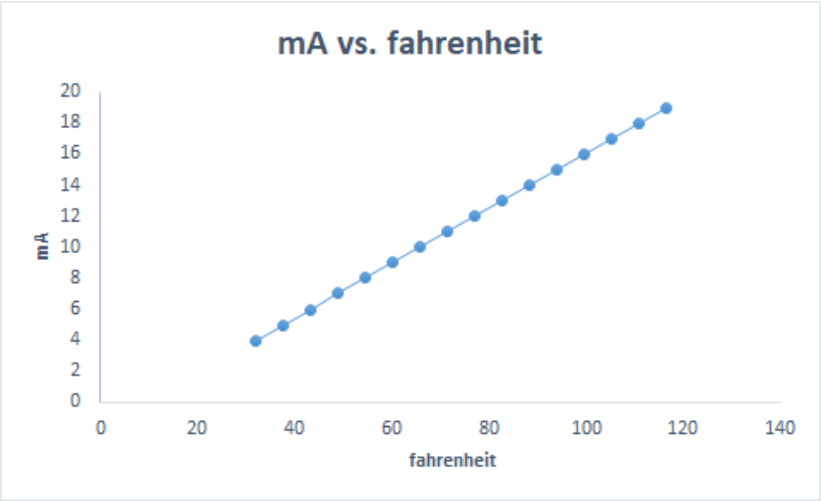


Temperature scaling from 15-46.
If there is 12 mA , the °C will be:
°C= 46 -**(**(46-15)/(20mA-4mA)**)***(20mA-12mA)
°C = 30,5

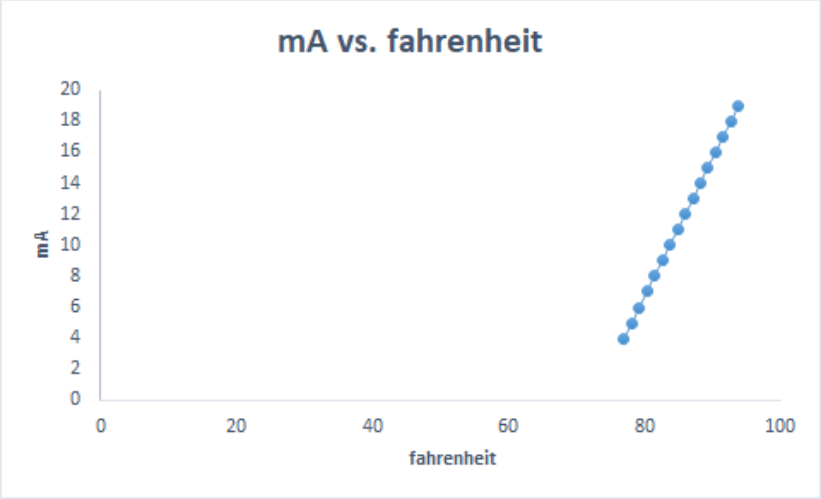


Example Fahrenheit

Temperature scaling from 32-122.
If there is 12 mA , the °F will be:
°F= 122 -**(**(122-32)/(20-4)**)***(20mA-12mA)
°F = 77

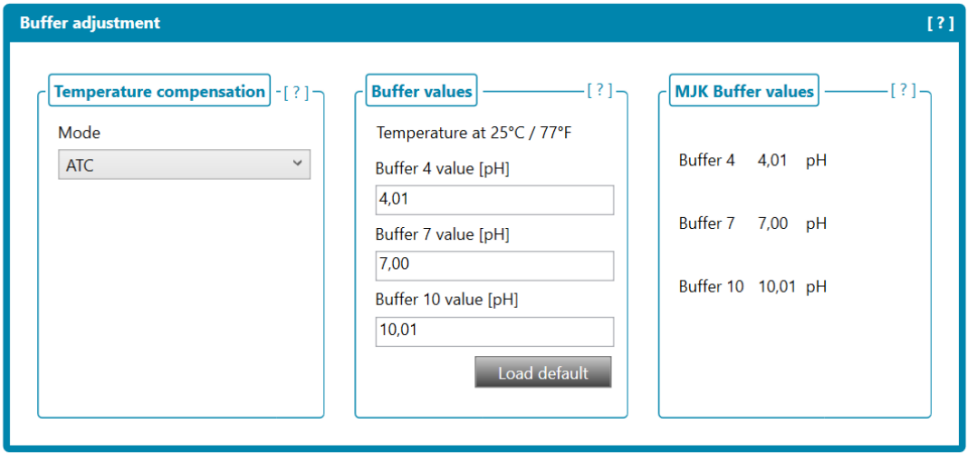


Temperature scaling from 77-95.
If there is 12 mA , the °F will be:
°F= 95 -**(**(95-77)/(20-4)**)***(20mA-12mA)
°F = 86

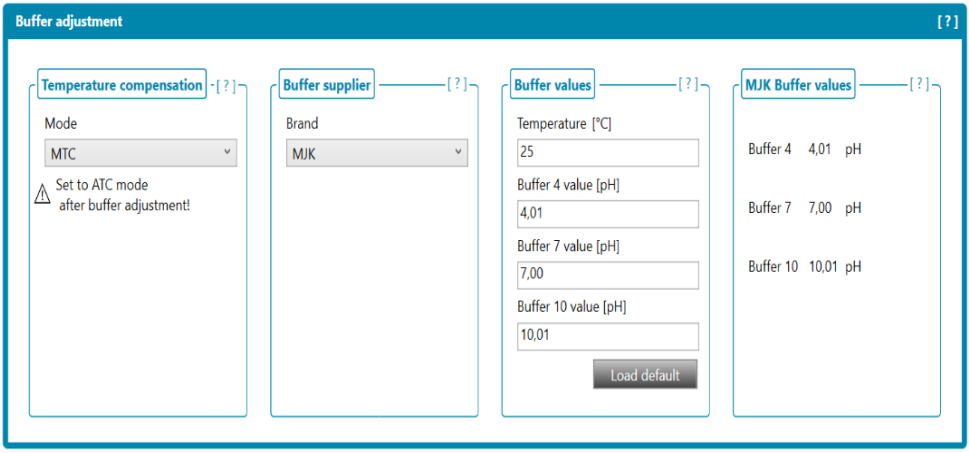


Buffer adjustment, pHix Configurator

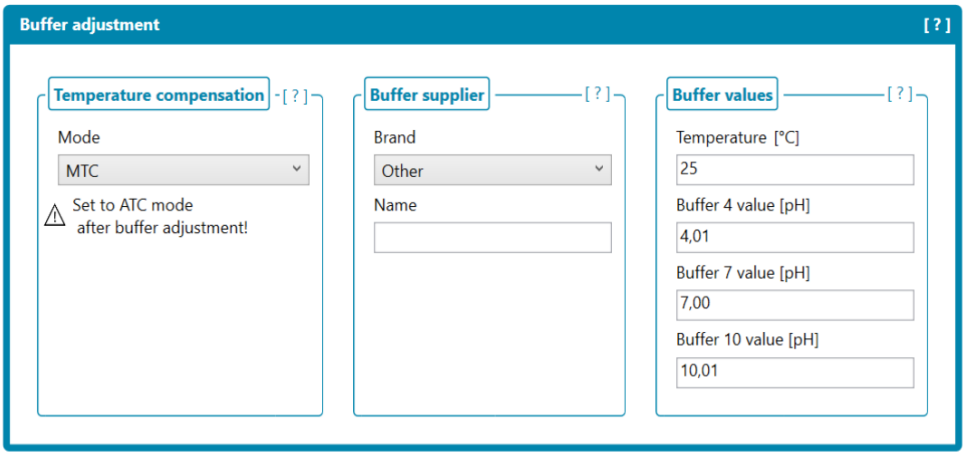
Automatic temperature compensation



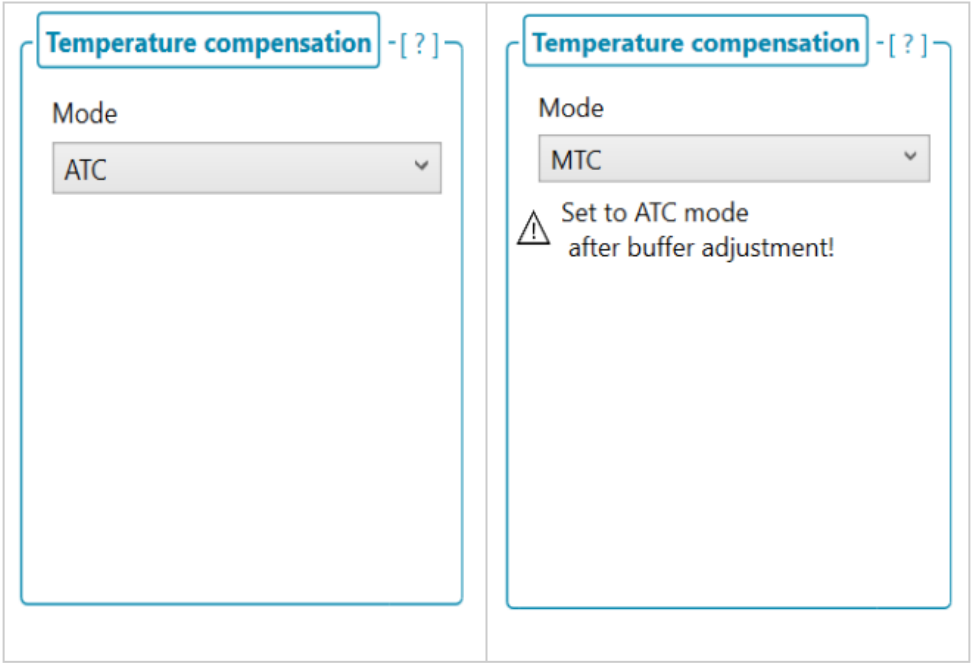
Manual temperature compensation



Other manual temperature compensation



Temperature compensation

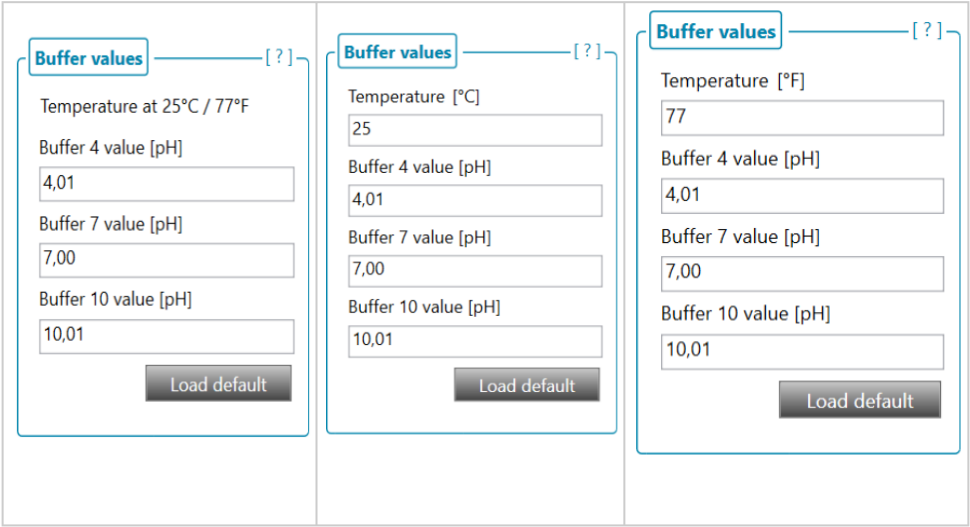


Item	Options	Default	Description
Mode	ATC : Automatic temperature compensation	ATC	The sensor uses the Buffer solution values (see page 72) and its own temperature's measurement to make the buffer adjustment.
	MTC: Manual temperature compensation		The sensor uses the Buffer solution values (see page 72) entered by the user to make the buffer adjustment

⚠ Make sure to return to ATC mode after buffering

Buffer solution values

During the buffer adjustment, pHix is calibrated in accordance to the pH values of the buffer solutions. It is therefore important to use as accurate buffer solutions as possible, i.e. to ensure that a pH 7 buffer solution in fact has a pH value of exactly 7. For more details see Buffer solutions (see page 23) .



Item	Option	Default	Description

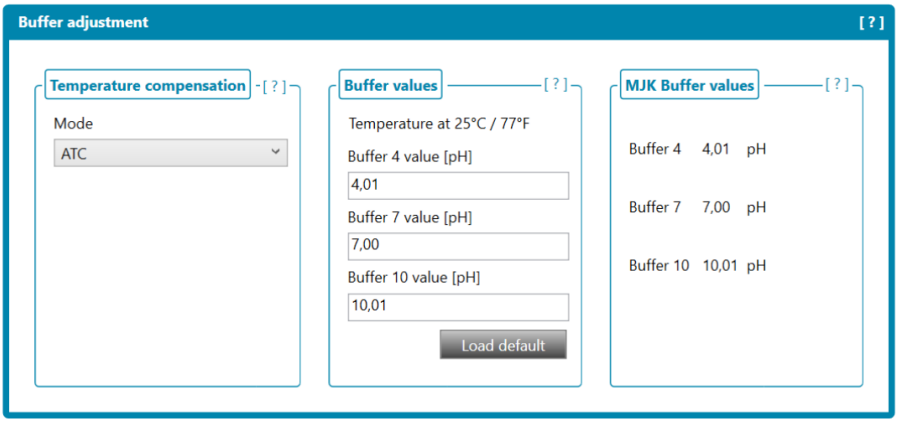
Temperature °C	5-50	25	Buffer solution temperature in Celsius degrees entered by the user to make the buffer adjustment in MTC mode
Temperature °F	41-122	77	Buffer solution temperature in Fahrenheit degrees entered by the user to make the buffer adjustment in MTC mode

MJK buffer values

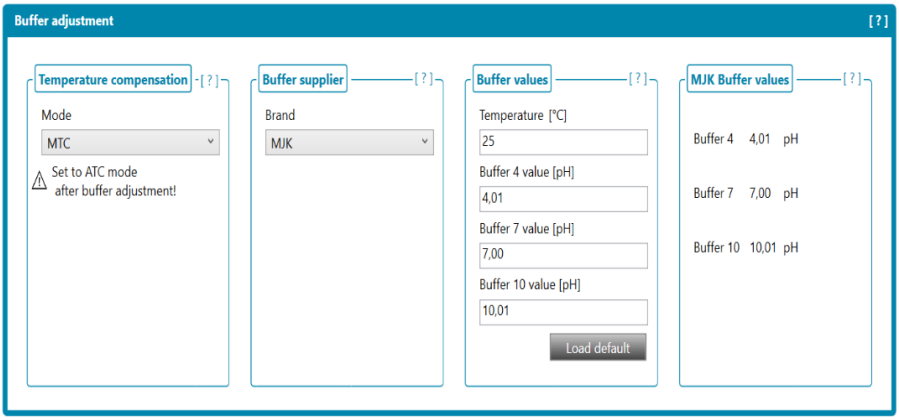
MJK Buffer liquid is delivered as ready-to-use solutions with the pH values 4.01, 7 and 10.01 For more details see Buffer solutions (see page 23) .

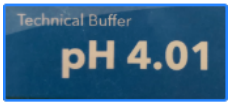
Click Load default to load MJK Buffer values

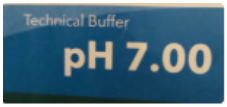
ATC , the temperature for MJK Buffer values is always 25°C/77°C.

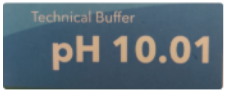


MTC , the values for MJK Buffer values depends of the temperature.

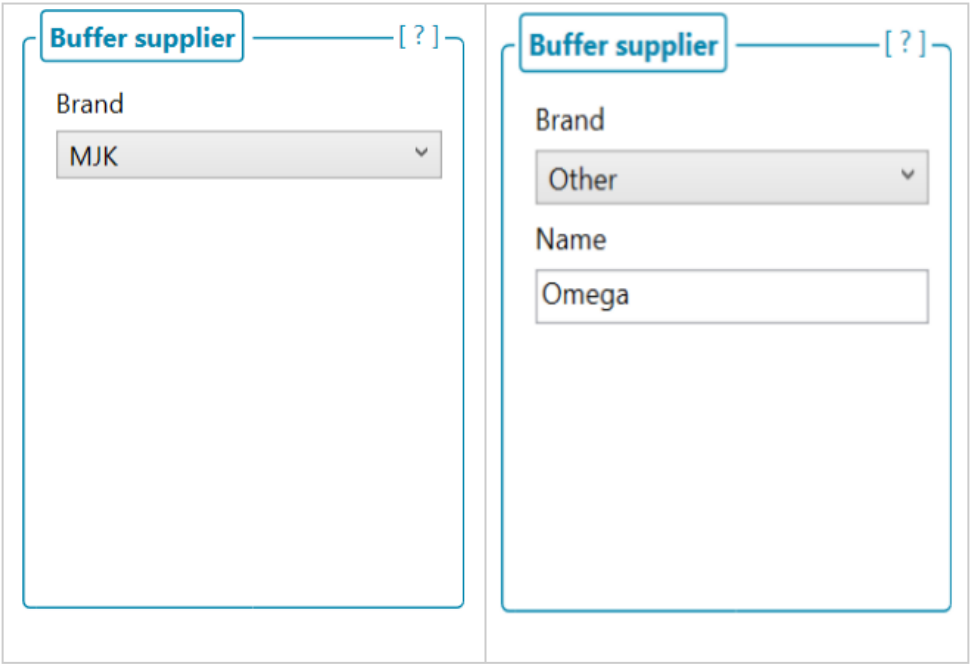


MJK technical buffer	°C	°F	
	5	41	4.01
	10	50	4.00
	15	59	4.00
	20	68	4.00
	25	77	4.01
	30	86	4.01
	40	104	4.03
	50	122	4.06

MJK technical buffer	°C	°F	
	5	41	7.09
	10	50	7.06
	15	59	7.04
	20	68	7.02
	25	77	7.00
	30	86	6.99
	40	104	6.97
	50	122	6.97

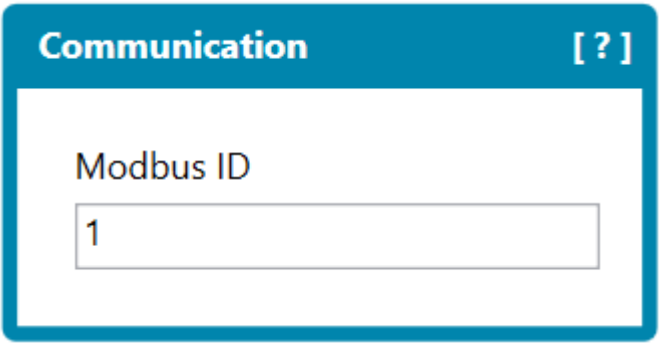
MJK technical buffer	°C	°F	
	5	41	10.24
	10	50	10.18
	15	59	10.12
	20	68	10.06
	25	77	10.01
	30	86	9.97
	40	104	9.98
	50	122	9.82

Buffer supplier



Buffer Supplier	Options	Default	
Brand	MJK Other	MJK	Buffer supplier information. When MJK, the buffer value information is provided by MJK buffer values (see page 73). For other brand, the buffer values must be provided by the user.
Name	Max. 6 characters	Empty	Buffer supplier information for other brands.

Communication



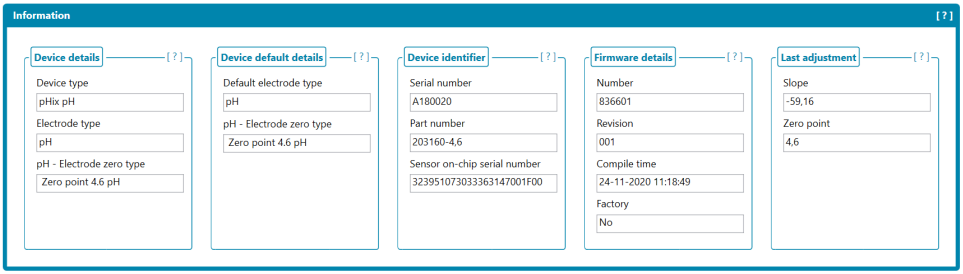
Menu item	Option	Default	Description
Modbus ID	1-246	1	The ID is used as identification of the unit in SCADA-system

Online data

Live view is an easy way of viewing most of the online values and data as they are at current, live from the connected pHix sensor.
This will give the operator a total overview of various measurements and buffer values from the connected unit.

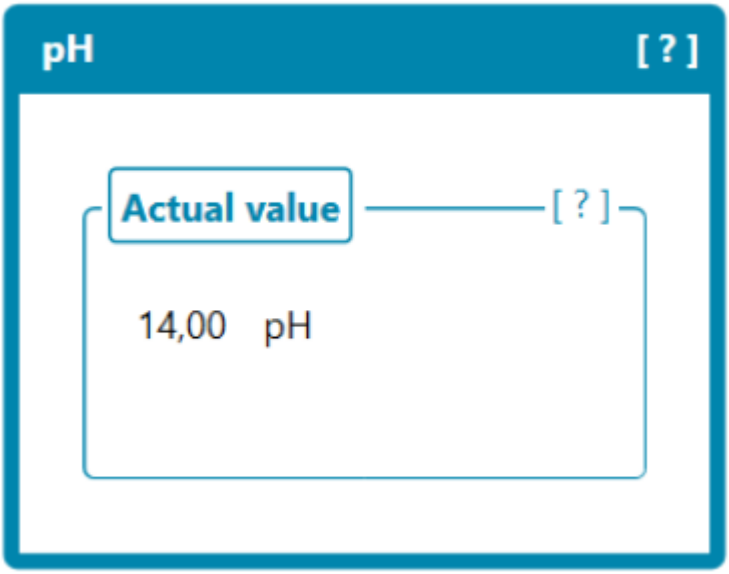
Information - online

The values are read from the connected pHix sensor. See Information (see page 59)



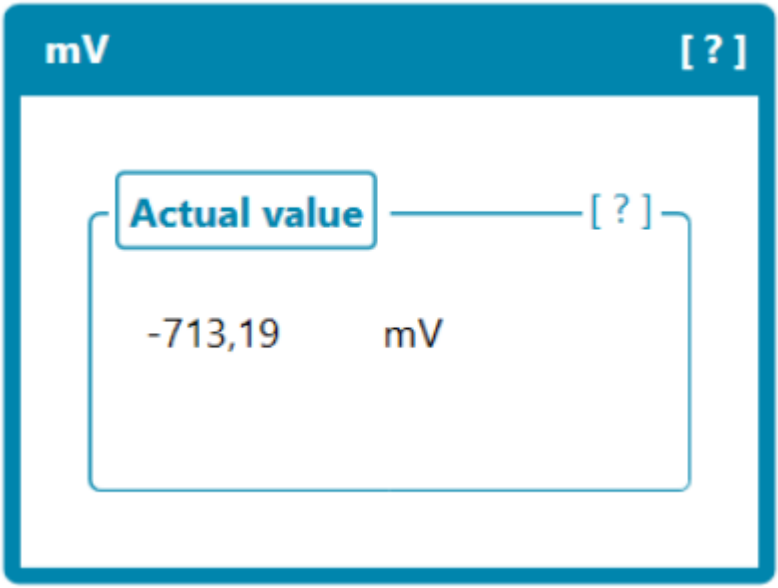
Output values

pH actual value



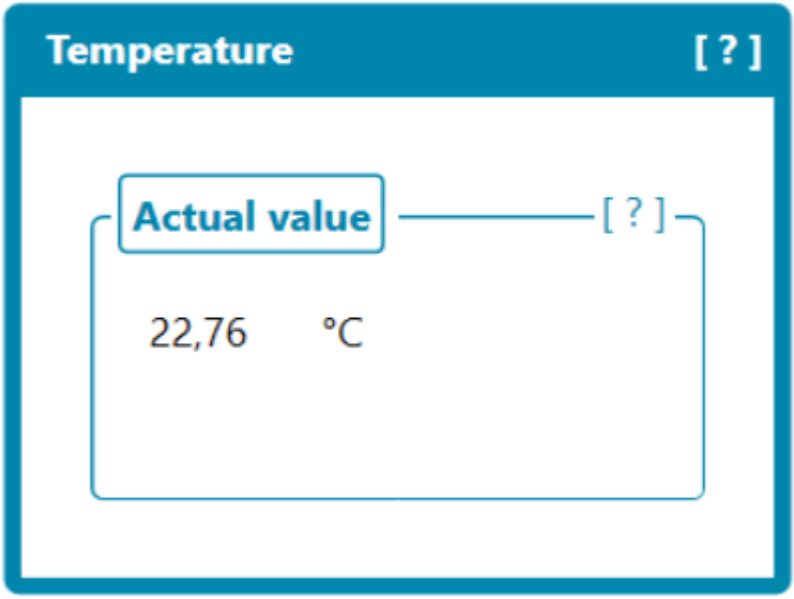
pH actual value	The scaled pH measurement. See pH scaling (see page 61)

mV actual value



mV actual value	The scaled mV measurement. See Redox scaling (see page 63)

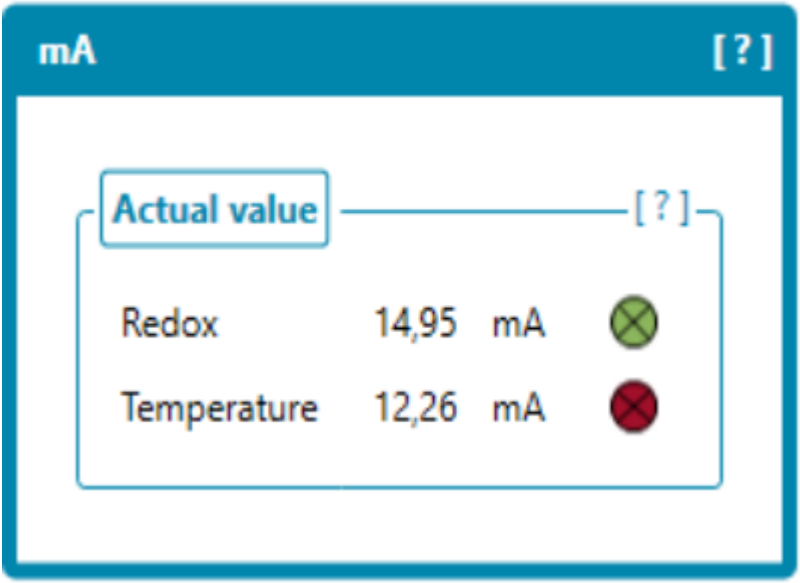
Temperature actual value



Actual value	The scaled temperature measurement. See Temperature scaling (see page 66)

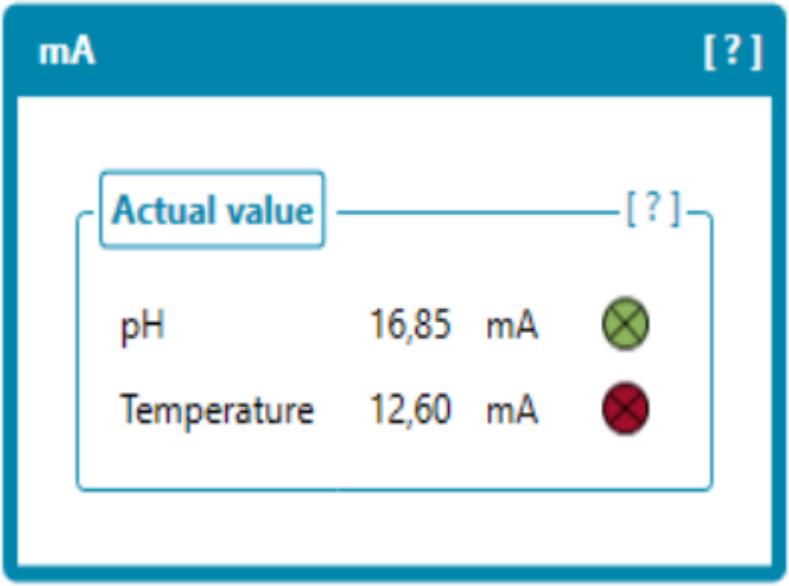
mA actual value

pHix Redox



Redox	mA value measured by Redox sensor.
Temperature	mA value measured by Redox sensor.

pHix pH



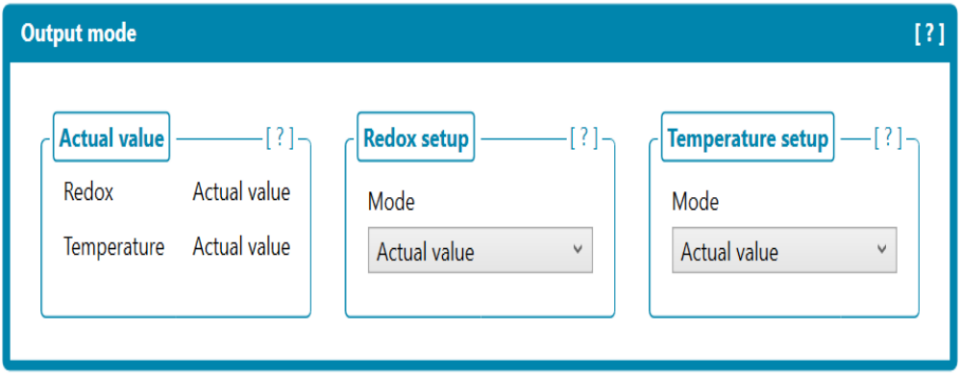
pH	mA value measured by pH sensor.
Temperature	mA value measured by pH sensor.

Connection Status

	Analog Output is connected.
	Analog output is not connected.

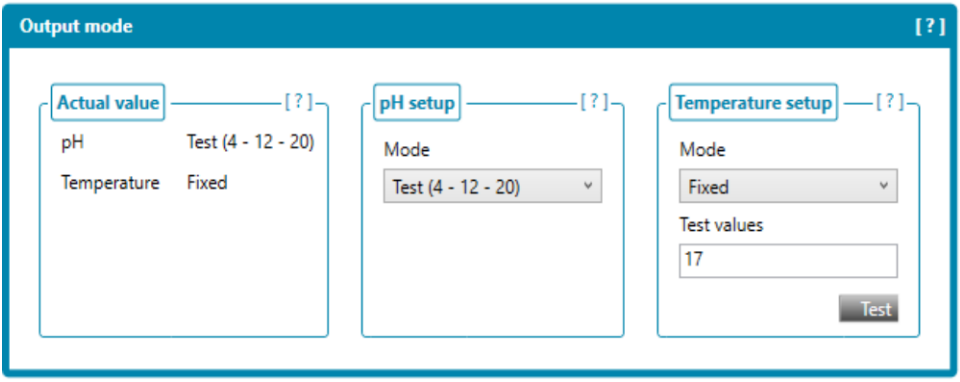
Output mode

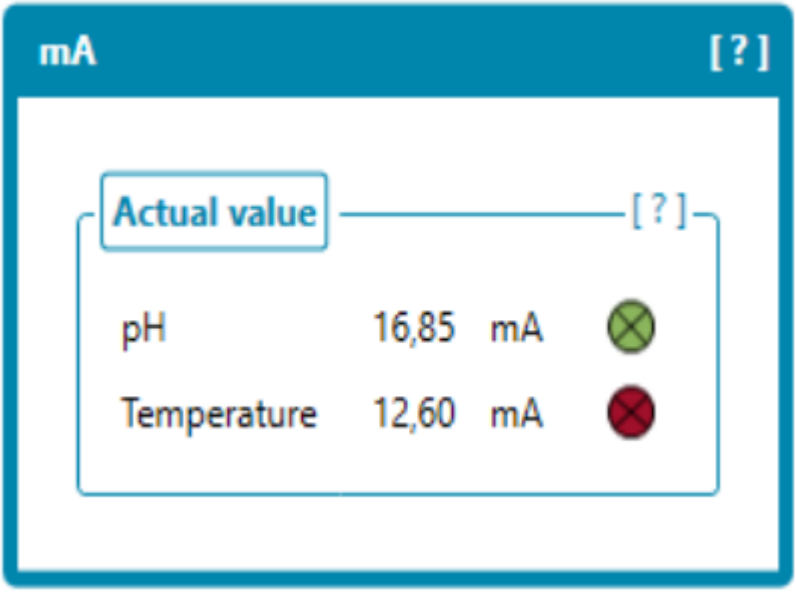
The output mode can be used to test the output for the actual mA value.



pH/Redox output mode	Actual value Fixed Test(4-12-20)	Actual value: The mA value measured by pHix sensor. Fixed: The mA value is entered by the user. Test(4-12-20): The mA changes from 4-12-20 mA **Note:** Mode changes to actual value after 5 seconds.
Temperature output mode		

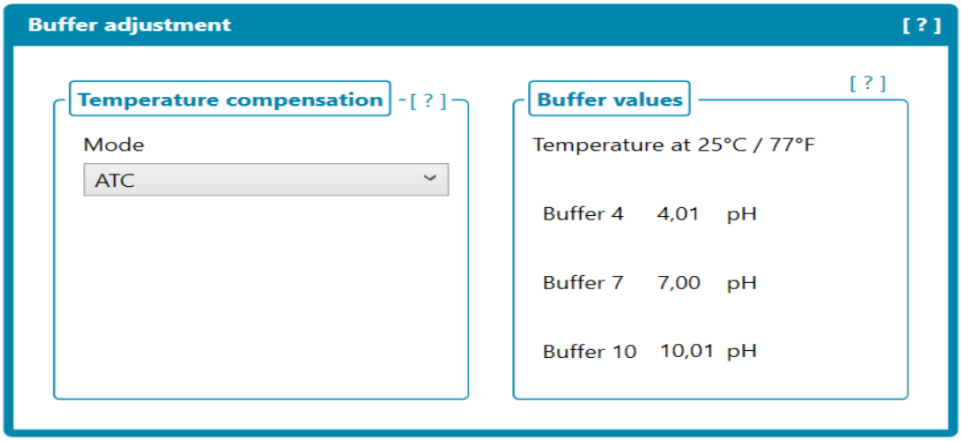
Example

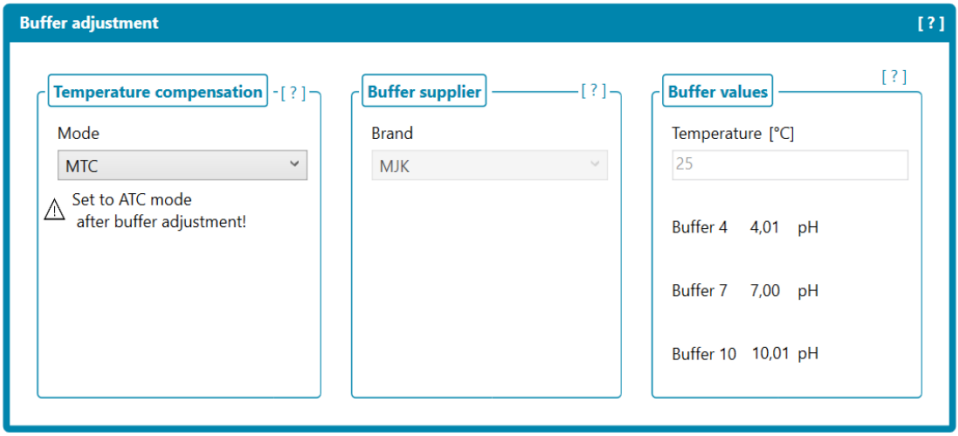




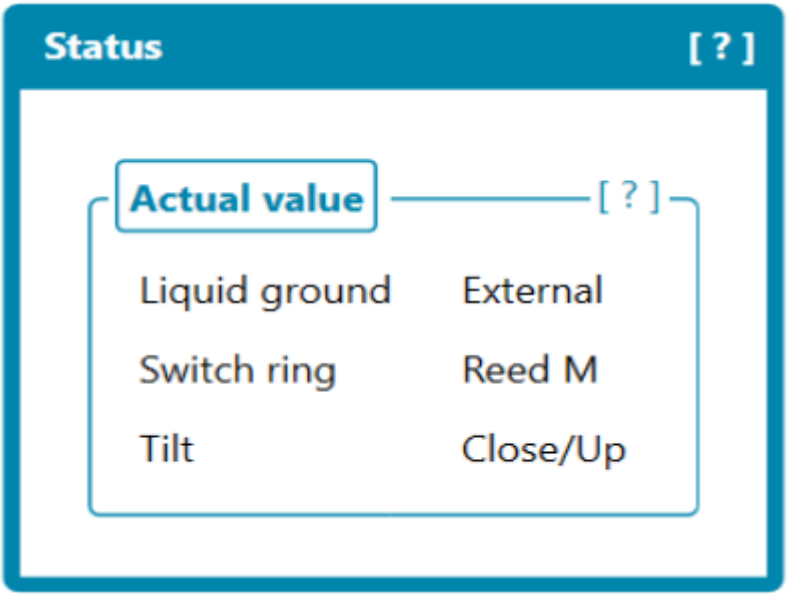
Buffer values

See Buffer adjustment (see page 22)




Buffer adjustment
[?]
Temperature compensation
[?]
Mode
MTC
Set to ATC mode
after buffer adjustment!
Buffer supplier
[?]
Brand
MJK
Buffer values
[?]
Temperature [°C]
25
Buffer 4 4,01 pH
Buffer 7 7,00 pH
Buffer 10 10,01 pH

Status


Status
[?]
Actual value
[?]
Liquid ground
External
Switch ring
Reed M
Tilt
Close/Up

Liquid ground **(Potential equalization)**	Internal External	Internal is only for the PPS sensor version External is only for the stainless steel version
Switch ring	No switch ring Reed 4 Reed 7 Reed 10 Reed M Disabled	Switch ring is only for pHix 4.6 pH and 7.0 pH Show the ring position of the sensor. For buffer adjustment see Buffer adjustment using the switch ring (see page 25)
Tilt	Close/Up Open/Down Disabled	Tilt is only for pHix 4.6 pH and 7.0 pH Show the position of the sensor. For buffer adjustment see Buffer adjustment using the tilt switch (see page 26)

Register list

General descriptions

Modbus protocol is used to read/write registers.

Read registers : Function code 3: Read Multiple Holding Registers

Write registers : Function code 16: Write Multiple Holding Registers

Data types

The following data types are used in pHix units, when reading registers from a register list.

Name	Description
U16	Unsigned word (16 bit) [WORD]
F32	Float (32 bit) comply with IEEE754 [FLOAT

Register list, detailed

Parameters	Data type	Register	Description
Primary Value	F32	600	Scaled pH actual value or scaled mV actual value (Analog output 1)
Unit code	U16	606	Primary value - Unit code mV = 36 pH = 59
Secondary Value	F32	610	Scaled temperature value (Analog output 2)
Temperature unit type	U16	616	Secondary value - Unit code °C = 32 °F = 33

Appendencies

Error codes

Symptom/mA signal	Fault	Remedy
Constant current signal or 1 = 0 mA	Electrical connection is not made correctly	Check connection and make the necessary corrections
Unsteady current signal	Undervoltage	Check the voltage at transmitter. Min. voltage @ max. load > 12 V DC
I = 3.80 mA	Undervoltage	Check the voltage at transmitter. Min. voltage @ max. load > 12 V DC
I = 3.85 mA	Electrode error	Exchange the electrode
I = 3.90 mA	Calibration not possible	Exchange the electrode
I = 3.95 mA	pH lower than measuring range	Readjust the measuring range to a lower range
I = 4.00 mA	Error on startup	Disconnect the transmitter from PSU for min. 5 seconds and try again
I = 22.00 mA	pH higher than measuring range	Readjust the measuring range to a higher range

Standard transmitter configuration

The transmitter is standard configured as described below on delivery:

pHix® Compact pH/temperatur. transmitter, 203160-4,6 - 203161-4,6 - 203170-4,6 - 203171-4,6

- Measuring range: 0-14 pH = 4-20 mA, 0-point = 4,6 pH
- Temperature: 0-50° C/ 32-122° F = 4-20 mA

pHix® Compact pH/temperatur. transmitter, 203160-7,0 - 203161-7,0 - 203170-7,0 - 203171-7,0

- Measuring range: 0-14 pH = 4-20 mA, 0-point = 7,0 pH
- Temperature: 0-50° C/ 32-122° F = 4-20 mA

pHix® Compact Redox (ORP) /temperatur. transmitter, 203160-Redox - 203161-ORP - 203170-Redox - 203171-ORP

- Measuring range: -1000 to +1000 mV = 4-20 mA
- Temperature: 0-50° C/ 32-122° F = 4-20 mA

Modbus communication

Primary registers can be read by RS 485 using Modbus protocol. For Modbus commands and registers, see pHix Configurator software (see page 34).

Xylem |ˈzīləm|

1) The tissue in plants that brings water upward from the roots;

2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com

mjk
a xylem brand

MJK Automation ApS
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