

Manual for use and maintenance

Green
EC-PH



Green EC-PH

Transmitter

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P/N: 116786

 **Munters**

Green EC-PH

Manual for use and maintenance

Rev 1.3 12/2020

This manual for use and maintenance is an integral part of the apparatus together with the attached technical documentation.

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1 Introduction

1.1 Disclaimer

Munters reserves the right to make alterations to specifications, quantities, dimensions etc. for production or other reasons, subsequent to publication. The information contained herein has been prepared by qualified experts within Munters. While we believe the information is accurate and complete, we make no warranty or representation for any particular purposes. The information is offered in good faith and with the understanding that any use of the units or accessories in breach of the directions and warnings in this document is at the sole discretion and risk of the user.

1.2 Introduction

Congratulations on your excellent choice of purchasing an Green EC-PH!

In order to realize the full benefit from this product it is important that it is installed, commissioned and operated correctly. Before installation or using the fan, this manual should be studied carefully. It is also recommended that it is kept safely for future reference. The manual is intended as a reference for installation, commissioning and day-to-day operation of the Munters Controllers.

1.3 Notes

Date of release: July 2019

Munters cannot guarantee to inform users about the changes or to distribute new manuals to them.

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2 Introduction to the Green EC-PH

This product description will guide you in the principles and operation of the Green EC-pH module along with maintenance and warranty information.

The Green EC-pH module consists of:

- a calculator/transmitter
- an EC and temperature probe
- a pH selective probe

The transmitter unit includes a 16 character LCD and Keyboard. The Keyboard is used to perform periodic calibration (sensors calibration is done using software). The LCD constantly displays the actual values of the EC and pH.

The EC pH can be installed as a:

- wall mount (Figure 1) or
- panel mount (Figure 2)

The Panel Mount unit consists of one or two EC pH modules. All functionality is the same, irrespective of the number of modules. On the front panel of the Double Unit is a **SWAP** button, which the user presses to switch between modules.



Figure 1: [Wall Mount Unit](#)



Figure 2: [Single](#) or [Double](#) Module Panel Mount Unit

3 Getting Started

The following section details how to mount and calibrate your unit.

- Mounting the Wall Mount
- EC Calibration
- pH Calibration
- Board Wiring

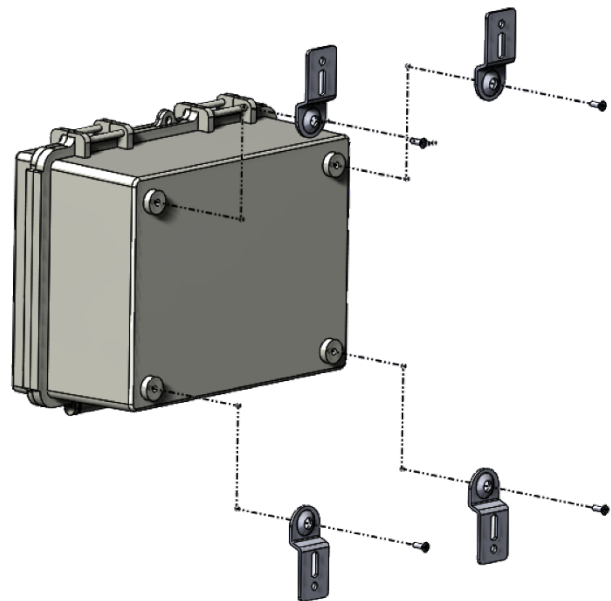
CAUTION This unit must be installed inside, in a location protected from solar radiation and direct rain.

3.1 Mounting the Wall Mount

1. Remove the mounting plates (x4) and screws (x8) from the plastic bag.



2. Fasten the mounting plates to the corners of the controller using four screws.



3. Place the controller box on the wall and make sure it is leveled (use a spirit level).

4. Using the remaining screws, secure the controller to the wall.

3.2 EC Calibration

NOTE Perform the following procedure in one continual session. Interruptions or delays while performing the procedure can cause calibration failure.

1. On Green EC-PH screen press





EC Calibration appears.

EC Calibration

2. Press **Enter**. Calib 1.4 appears.

Calib 1.4

3. Press **Enter**.

To EC 1.4 Enter

4. Clean and dry an EC sensor. Insert the sensor into 1.4mS calibration buffer; immerse for 5 – 7 seconds and immediately press **Enter**.



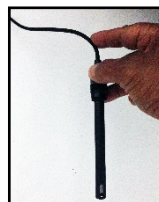
Calibration is in process.

EC: 1.4 Cal:1.4

NOTE Perform the following step as soon as the EC 0 screen appears.

5. When the following screen appears, remove the sensor from the buffer and hold it in the air; press **Enter**.

To EC 0 - Enter



6. Calibration is in process; wait until next screen is displayed, which indicates that EC Calibration is complete.

EC: 0.0 Cal:0.0

7. Wait until the following screen appears.

Calibration OK

EC calibration is complete.

NOTE If display says "BUFFER FAULT" please refer to Troubleshooting.

3.3 pH Calibration

*NOTE Perform the following procedure in **one continual session**. Interruptions or delays while performing the procedure can cause calibration failure.*

1. On Green EC-PH screen, press **MENU**.



EC calibration appears.

EC Calibration

2. Press **Select** to scroll down to pH CALIBRATION.

pH Calibration

3. Press **Enter**.

To pH 7.0 Enter

NOTE Perform the following step as soon as the EC 7.0 screen appears.

4. Verify that the pH sensor is dry; insert it into a pH 7 calibration buffer, immerse for **5 - 7 seconds** and press **Enter**.



The following screen appears.

pH: 6.9 Cal:7.0

5. Calibration is in process, wait until the following screen appears.

To pH 4 - Enter

NOTE Perform the following step immediately upon appearance of the pH 4 screen.

6. Verify that the pH sensor is dry; insert it into pH 4 calibration buffer, immerse for **5 - 7 seconds** and press **Enter**.



The following screen appears.

pH: 3.3 Cal:4.0

7. Wait until the following screen appears.

Calibration OK

pH calibration is complete.

NOTE If display says "BUFFER FAULT" please refer to Troubleshooting.

3.4 Board Wiring

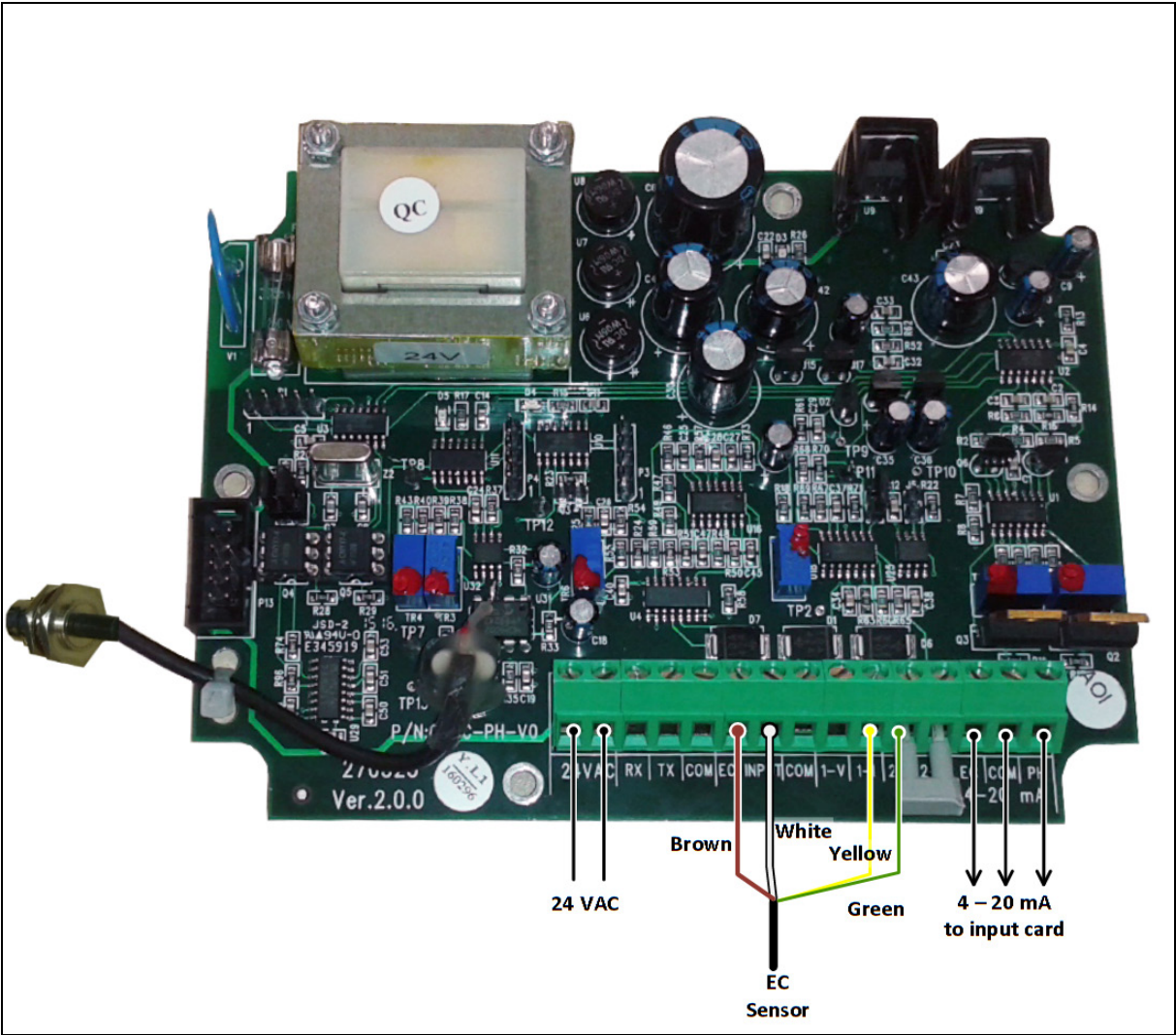


Figure 3: EC & pH Transmitter Wiring for EC Sensor (PT-100)

4 Measuring Characteristics

- EC Measuring Characteristics
- pH Measuring Characteristics

4.1 EC Measuring Characteristics

The electrical conductivity of water depends on the whole spectrum of the dissolved minerals in the water, and on the water temperature. Since our main interest is the nutrients concentration, a temperature sensor is included in the EC sensor to eliminate the temperature factor. The values of both conductivity and the termistor are converted to digital data and reach as input to the unit's CPU, which calculates them to a curve. The accuracy of the calculation depends on the CPU's resolution. EC & pH utilized by 16 bit CPU which producing accurate reading even for values which are far from the calibration point.

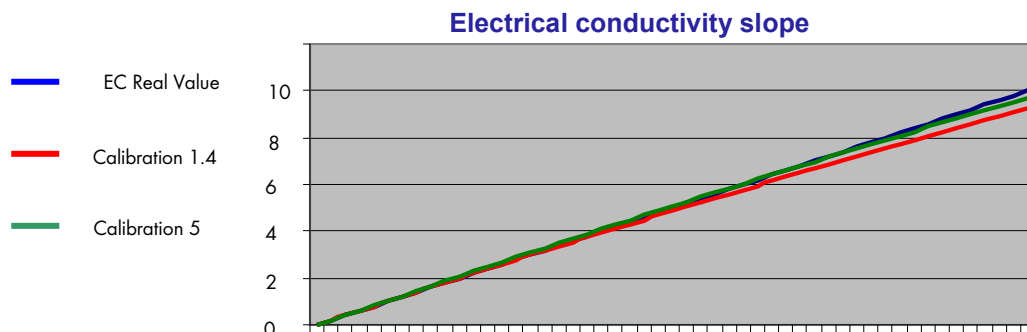


Figure 4: Water Value

The offset of the EC slope is always 0 (Zero). The EC sensor should indicate zero when it is wiped and held out in the open air. The second calibration point (gain) will be either EC 1.4 or EC 5 – whichever is closer to the final measured water.

4.2 pH Measuring Characteristics

The pH solution indicates the level of acid or alkali. The formal mathematical definition of pH is the negative logarithm of hydrogen ion activity. In most cases, hydrogen ion activity can be approximated by the hydrogen ion concentration, and the formula becomes $\text{pH} = -\log_{10} [\text{H}^+]$. On the pH scale, which varies from 0-14, a very acidic solution has a low pH value, a very basic solution has a high pH value, and a neutral solution has a pH of approximately 7.12.

A pH measurement loop is essentially a battery where the positive terminal is the measuring electrode and the negative terminal is the reference electrode. The measuring electrode, which is sensitive to the hydrogen ion, develops a potential (voltage) directly related to the hydrogen ion concentration of the solution. The reference electrode provides a stable potential against which the measuring electrode can be compared. When immersed in the solution, the reference electrode potential does not change with the changing hydrogen ion concentration. A solution in the reference electrode also makes contact with the sample solution and the measuring electrode through a junction, completing the circuit.

The electrode's output ranges is from -417mV (pH 14) to +417 mV (pH 0). The quality of the measurement depends on the stability of the referenced electrode.

5 Hardware Specifications

- Transmitter Specifications
- Sensor Specification
- Power Specifications

5.1 Transmitter Specifications

Transmitter card	Data
Operating temperature	0 - 50°C / 32 - 122°F
EC Input	Data (pt100)
EC Range	0 - 6 mS
Cell constant	K = 1 ±5%
Response time	1 second
EC Output	Data
4 - 20 mA	4mA=0mS, 20mA=10mS, Max load=200Ω
Monitoring	Local Display
Accuracy	0.05 to 0.1 mS, including galvanic isolation
pH Input	Data
ION Selective	±417mV, 0mV=pH7.0
pH range	0 - 14
Response time	3 seconds for 98%
pH Output	Data
4 - 20 mA	5.6mA=1pH, 20mA=14pH, Max load 200Ω
Monitoring	Local Display
Accuracy	0.05pH
Max load impedance	500Ω

5.2 Sensor Specifications

pH Sensor	Data
Shaft material	PPO (polyphenylene oxide)
Diaphragm	Annular gap
Conductive system	Plastic cartridge
Pressure range	0 to 6 bar
Fitting length	120 mm
Electrode head	plug cap (S6) plug cap with fixed cable screw cap Pg13.5 (S8) screw cap Pg13.5 with fixed cable
Active pH element	UW glass (pH 0 – 12, briefly pH 14)
Active redox element	platinum tip (± 2000 mV)
Electrolyte	solid electrolyte
EC Sensor	Data (pt100)
Cell constant ¹	K=1.0
Typical measuring range	0.1 to approx. 5 mS/cm
<i>NOTE This is the recommended measuring range. Outside of this range, accuracy decreases.</i>	
Temperature compensation	PT100
Process connection	Pg13.5 screw-in thread
Electrode material	Special graphite
Body material	PPO (polyphenylene oxide)
Maximum pressure	6 bar (at 25°C)
Electrical connection	Attached cable (free cable ends) or M12 connector

¹ Depending on the production conditions, the cell constant can deviate by $\pm 10\%$ from the nominal value.

5.3 Power Specifications Single Units

Parameter	Definition
Input current	
EC PH	24 VAC $\pm 15\%$, 50/60 Hz, 5 Watts, 200 mA
Fuse	315 mA

5.4 Power Specifications Double Panel Mount

Parameter	Definition
Input current	
EC PH	24 VAC \pm 15%, 50/60 Hz, 7 Watts, 550 mA
Fuse	315 mA

CAUTION : Ensure that the Green EC-PH Wall mount is connected to an external, easy to reach, power disconnection device (for example switch, (labeled) circuit breaker, AC/AC adapter plug).

6 Troubleshooting

- Power Issues
- EC Troubleshooting
- pH Troubleshooting
- Factory Settings

6.1 Power Issues

If the EC-pH unit does not turn on:

1. Using a Multimeter or AVOMeter check the fuse.
 - If the fuse is non-operational, replace it with the supplied spare (see the following picture).
2. Ensure that the input current is 24V

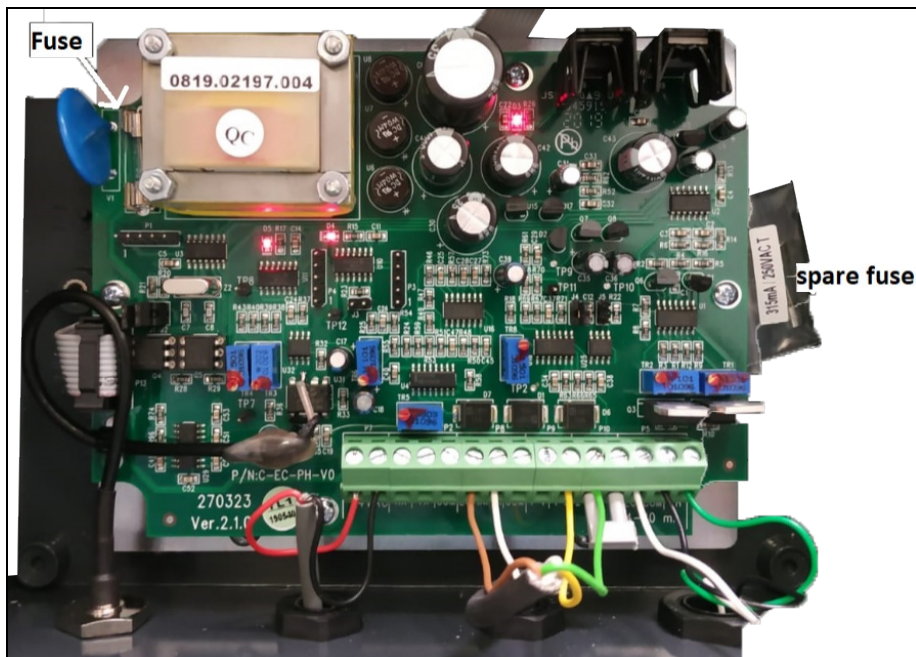


Figure 5: Fuse and spare fuse location

6.2 EC Troubleshooting

The EC soft calibration is define to correct the following deviations:

- EC 1.4: Correct a deviation of up to 0.7mS
- EC 5: Correct a deviation of up to 1mS

Any higher deviation will presented as BUFFER FAULT.

Description	Course of action	Instructions
EC reading problem	Disconnect the EC sensor	Perform a Factory set and verify that EC is 0, otherwise, replace the card
Power problem	Check the supplied power while the unit is ON	The voltage range should be between 18 to 28VAC, if the power source proven normal – replace the card
EC calibration fail	EC electrode chemical treatment	1. Oil remains will be removed by hot water (70°) and detergent. 2. Immerse the probe in Sodium dioxide 2-3% for 2 minutes. Wash with fresh water. Perform Autoset, and then regular calibration.
EC calibration fail	Transmitter card check	Use an Ampere-meter in order to compare the 4-20mA transmitted value the EC value that presented on the display. EC 1.4 should transmit 6.24mA, EC 5 should transmit 12mA
Significant deviation between the transmitted value and the reading	Replace card	

6.3 pH Troubleshooting

The pH sensor is very sensitive; make sure:

1. The pressure in the system never exceeds 6.0Bar / 85PSI
2. The sensor immersed in the water even when the system is in rest.
3. The water content/quality in the system is normal.

The pH soft calibration define to correct a deviation of up to 1.0 pH, therefore correction of pH 7.0 can be made when the value range is between 6.0 to 8.0.

Exceeding this range will presented as BUFFER FAULT.

Description	Course of action	Instructions
pH reading problem	Disconnect the pH sensor by the BNC connector	Short between the BNC poles on the transmitter side, perform an Factory set and verify that the pH value is 7.0
Power problem	Check the supplied power while the unit is ON	The voltage range should be between 18 to 28VAC, if the power source proven normal – replace the card

Description	Course of action	Instructions
Liquid is poor	pH electrode chemical treatment	1. Oil remains will be removed by hot water (70°) and detergent. 2. Immerse the probe in Sodium dioxide 2-3% for 2 minutes. Wash with fresh water. Perform Autoset, and then regular calibration.
Liquid is Poor	Transmitter card check	Use an Ampere-meter in order to compare the 4-20mA transmitted value the pH value that presented on the display. pH 7.0 should transmit 12mA, pH 4.0 should transmit 8.57mA
Significant deviation between the transmitted value and the reading	Replace card	

NOTE Distinction between an old pH sensor to a new one made by noticing its content. The contents in a new probe is thick (gel state), whereas the contents of an old probe is thin (liquid state). When a probe nears its end, we recommend having a replacement probe ready, within easy access

6.4 Factory Settings

- EC Factory Set
- PH Factory Set

6.4.1 EC FACTORY SET

1. On the Green EC-PH screen, press **MENU**.



EC Calibration appears.



2. Press **Select** and scroll down to EC FACTORY SET. Press **ENTER**.



3. Press **Enter**.



4. Press **Enter**.

Factory Set Ok

5. Go back to main screen by pressing **ENTER**.

6.4.2 PH FACTORY SET

1. On the Green EC-PH screen, press **MENU**.



EC calibration appears.

EC Calibration

2. Press **Select** and scroll down to pH FACTORY SET.

pH Factory Set

3. Press **Enter**.

For pH Def-Enter

4. Press **Enter**.

Factory Set Ok

5. Press **Enter** to go back to the main screen.

7 Maintenance

The pH sensor requires periodic maintenance of cleaning and calibration. The duration between one periodic cleaning and calibration to the next depends on process conditions and the user's accuracy.

- The recommended period between calibrations of the pH sensor should not exceed four weeks.
- The EC sensor requires periodic maintenance too, but not as frequently as the pH sensor since it's not so sensitive.
- The recommended period between calibrations of the EC sensor should not exceed six months.

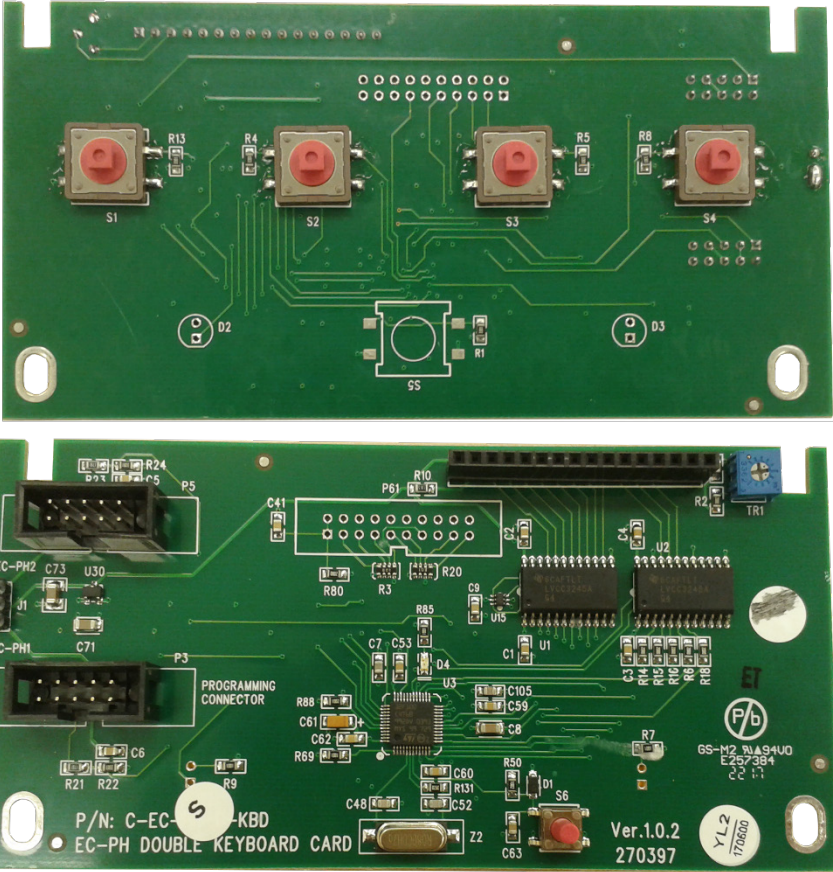
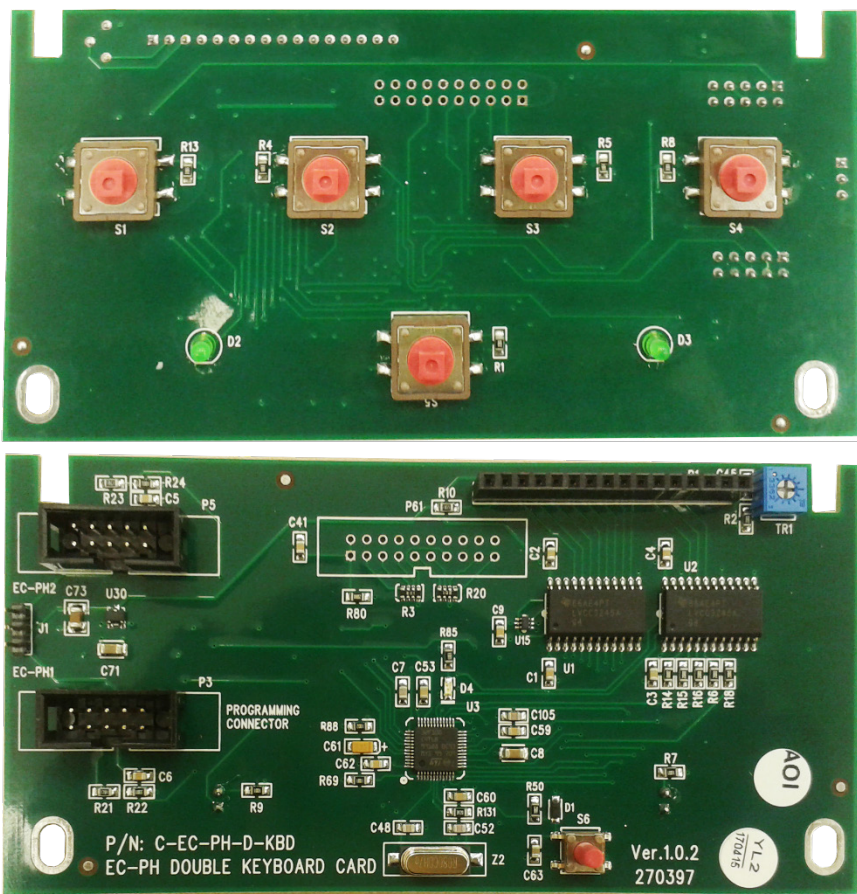
Description	Period	Instructions
Primary cleaning of EC sensor	Every calibration	Slightly wipe with napkin
Primary cleaning of pH sensor	Every calibration	Direct stream of water on the sensor's membrane
Chemical treatment of EC sensor	Every six months OR when calibration process fails	1. Oil remains are removed by hot water (70°) and detergent.
Chemical treatment of pH sensor		2. Immerse the probe in Sodium dioxide 2-3% for two minutes. Wash with fresh water. Perform Autoset, and then regular calibration.

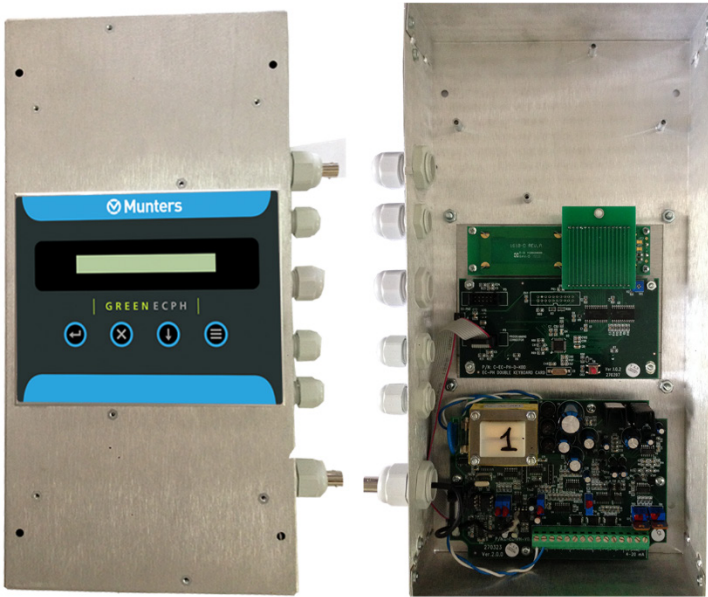
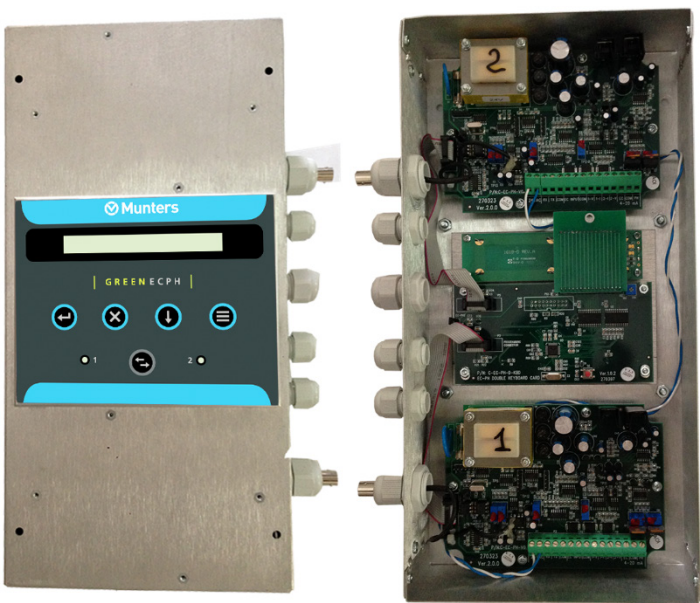
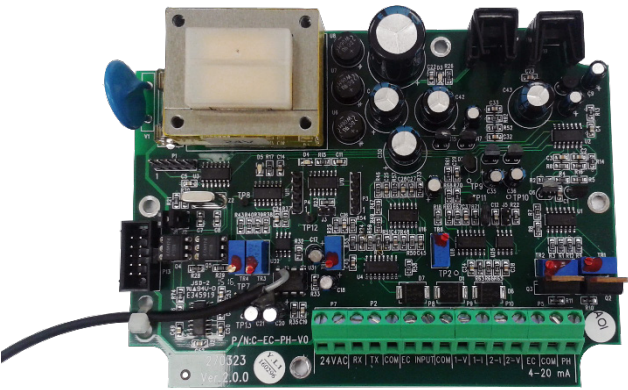
8 Ordering Information

Please note: Munters does not sell the required buffer solutions or calibration sensors. When purchasing these items:

- Ensure that the sensors match the specifications given in Sensor Specifications, page 12.
- Ensure that you have the following calibration solutions:
 - PH4.01 buffer for pH calibration
 - PH7.01 buffer for pH calibration
 - EC 1.41 mS for EC calibration

Catalog number	Description	Picture
960-05-00001	EC pH - Monitor 24 Volt Wall Mount	 A black rectangular wall-mounted monitor with a blue top and bottom border. The Munters logo is on the top blue bar. The LCD screen displays '001.41 PH 5.04'. Below the screen, the text 'GREEN EC PH' is visible, followed by four circular buttons with icons: a left arrow, a cross, a right arrow, and a menu icon.
960-99-00107	EC-PH LCD for Green House	 A green printed circuit board (PCB) with a rectangular LCD screen mounted in the center. The screen is currently blank. The PCB has various electronic components and a long row of pins along the bottom edge.

<p>960-99-00024</p>	<p>EC-PH-KBD Wall Mount 4 Buttons Keyboard Card</p>	 <p>The image shows the top and bottom views of the EC-PH-KBD Wall Mount 4 Buttons Keyboard Card. The top view features four red push buttons labeled S1, S2, S3, and S4, arranged in a 2x2 grid. The bottom view shows the internal circuitry, including a microcontroller (U1), various resistors (R1-R13), capacitors (C1-C10), and connectors (P1-P5). The PCB is green with white silkscreen markings. The bottom view also includes the text "P/N: C-EC-KBD", "EC-PH DOUBLE KEYBOARD CARD", and "Ver.1.0.2 270397".</p>
<p>960-99-00023</p>	<p>EC-PH Panel Mount 5 Buttons Keyboard Card</p>	 <p>The image shows the top and bottom views of the EC-PH Panel Mount 5 Buttons Keyboard Card. The top view features five red push buttons labeled S1, S2, S3, S4, and S5, arranged in a 2x3 grid with the fifth button centered below the first four. The bottom view shows the internal circuitry, including a microcontroller (U1), various resistors (R1-R13), capacitors (C1-C10), and connectors (P1-P5). The PCB is green with white silkscreen markings. The bottom view also includes the text "P/N: C-EC-PH-D-KBD", "EC-PH DOUBLE KEYBOARD CARD", and "Ver.1.0.2 270397".</p>

<p>960-05-00002</p>	<p>EC pH Monitor 24 Volt Panel Mount</p>	
<p>960-05-00003</p>	<p>Double EC pH Monitor 24 Volt Panel Mount</p>	
<p>960-99-00027</p>	<p>EC-PH Card 24Volt</p>	

9 Warranty

Warranty and technical assistance

Munters products are designed and built to provide reliable and satisfactory performance but cannot be guaranteed free of faults; although they are reliable products they can develop unforeseeable defects and the user must take this into account and arrange adequate emergency or alarm systems if failure to operate could cause damage to the articles for which the Munters plant was required: if this is not done, the user is fully responsible for the damage which they could suffer.

Munters extends this limited warranty to the first purchaser and guarantees its products to be free from defects originating in manufacture or materials for one year from the date of delivery, provided that suitable transport, storage, installation and maintenance terms are complied with. The warranty does not apply if the products have been repaired without express authorisation from Munters, or repaired in such a way that, in Munters' judgement, their performance and reliability have been impaired, or incorrectly installed, or subjected to improper use. The user accepts total responsibility for incorrect use of the products.

The warranty on products from outside suppliers fitted to Green EC-PH, (for example antennas, power supplies, cables, etc.) is limited to the conditions stated by the supplier: all claims must be made in writing within eight days of the discovery of the defect and within 12 months of the delivery of the defective product. Munters has thirty days from the date of receipt in which to take action, and has the right to examine the product at the customer's premises or at its own plant (carriage cost to be borne by the customer).

Munters at its sole discretion has the option of replacing or repairing, free of charge, products which it considers defective, and will arrange for their despatch back to the customer carriage paid. In the case of faulty parts of small commercial value which are widely available (such as bolts, etc.) for urgent despatch, where the cost of carriage would exceed the value of the parts, Munters may authorise the customer exclusively to purchase the replacement parts locally; Munters will reimburse the value of the product at its cost price.

Munters will not be liable for costs incurred in demounting the defective part, or the time required to travel to site and the associated travel costs. No agent, employee or dealer is authorised to give any further guarantees or to accept any other liability on Munters' behalf in connection with other Munters products, except in writing with the signature of one of the Company's Managers.

WARNING: In the interests of improving the quality of its products and services, Munters reserves the right at any time and without prior notice to alter the specifications in this manual.

The liability of the manufacturer Munters ceases in the event of:

- dismantling the safety devices;
- use of unauthorised materials;
- inadequate maintenance;
- use of non-original spare parts and accessories.

Barring specific contractual terms, the following are directly at the user's expense:

- preparing installation sites;
- providing an electricity supply (including the protective equipotential bonding (PE) conductor, in accordance with CEI EN 60204-1, paragraph 8.2), for correctly connecting the equipment to the mains electricity supply;
- providing ancillary services appropriate to the requirements of the plant on the basis of the information supplied with regard to installation;
- tools and consumables required for fitting and installation;
- lubricants necessary for commissioning and maintenance.

It is mandatory to purchase and use only original spare parts or those recommended by the manufacturer.

Dismantling and assembly must be performed by qualified technicians and according to the manufacturer's instructions.

The use of non-original spare parts or incorrect assembly exonerates the manufacturer from all liability.

Requests for technical assistance and spare parts can be made directly to the nearest Munters office. A full list of contact details can be found on the back page of this manual.

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