

pH-STAR CPU

DEVICE

pH-STAR CPU

Intelligent pH value-measuring device

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Introduction

The pH-Star gun is an intelligent pH-value measuring device whose multiple functions greatly facilitate the user's task.

The device can be calibrated very simply using two calibration solutions. Calibration is checked for plausibility, and improbable values are rejected.

All calibration data are saved internally and can be checked by the user.

During the measuring process, measurements can be sent to other devices (e.g. printers or PCs) continuously via the built in serial interface. The „pH-STAR CPU“ gun also has an internal memory that can hold approximately 3,000 measurement values. The memory's contents remain intact after the device has been switched off, and can be transmitted via the serial interface at any time.

When saving or transferring data, the „pH-STAR CPU“ gun assigns continuous numbers to the measurements which are saved/transferred with those values. These numbers allow a unique identification of the data during analysis. Optionally, several readings may be grouped under the same number: e.g. if they refer to the same object. The number assigned to a reading is displayed during the measuring process and can be changed by the user via the keyboard.

All settings + i.e. switching memory operations off and on, online transmission, transfer of memory contents, etc. + can be defined using simple menus.

The device also has a clock. The exact time is transmitted for each measurement during data transmission. Data and time setting are entered using a menu.

A. Installation

1. Unscrew the protective red cap from the electrode head of the stainless steel sleeve.
2. Hold the red plug-in screw head from the „pH-STAR CPU“ gun´s stainless steel box firmly between your fingers.
NOTE: Never turn or tug violently on the plug-in screw head, since this may pull the cable out of the reinforcement plate.
3. Screw the electrode head in the stainless steel sleeve onto the gun´s plug-in screw head by turning it. Then insert the stainless steel barrel into the „pH-STAR CPU“ gun´s box. Fix the barrel onto the box wall with the holding screws.
4. Always store the gun in an upright position (with the tip of the electrode pointing downwards). The hole in the glass tip should stand in the KCl/AgCl solution; the stainless steel sleeve should be kept dry. The solution regenerates and preserves the electrode after measuring.

Recommendation: Keep the device in a warm, dry room.

NOTE: Leave the „pH-STAR CPU“ in the KCl/AgCl storage solution for approximately 12 hours before using the electrode for the first time (and also after changing it).

The on /off trigger

The on/off trigger in the hold of the gun switches the power.

Please switch off the device after use, the internal data are stored at any time.

B. Keyboard

1. The „FNC“ key

This key can be pressed to switch on the device or abort its active function. It can be used at any time to return to the main menu.

The „pH-STAR CPU“ saves the graduation values calculated during calibration and all data entered by the user after the device has been switched off. The most recent settings can therefore continue to be used when the device is switched on again. If the data saved cannot be read (e.g. on initial operation), a message appears calling for the device to be calibrated. The message „CALIB“ normally indicates a functional disturbance!

2. Cursor keys (down/up arrows)

These enable the user to scroll through the menu. The value seen on screen can be modified during data entry.

„Cursor down“ (arrow pointing downwards):

This displays the next menu item down (see menu structure diagram). It is not possible to scroll through a menu cyclically; when the last option has been reached, „cursor down“ is no longer effective.

If a value (time, temperature, etc.) needs to be modified, „cursor down“ reduces the value displayed by one unit.

„Cursor up“ (up arrow):

Displays the next menu item up or increments the value displayed by one unit.

3. „ENT“ key

Executes the menu item displayed. When numerical values are entered, the value displayed at that moment is the current value.

All messages and check displays of data remain on screen until the „ENT“ key is pressed.

C. Data entry

A number of different values must be entered:

- Temperature (when calibrating and measuring)
- pH-value of the calibration solutions during calibration
- Number assigned to the measurement
- ID number (e.g. for tattooing, operating number)
- (Date and time)

The current value is displayed during data entry and can be incremented in steps using the cursor keys. One short press on a cursor key modifies the value by one unit. If the key is hold down, the value continues changing.

The idea is to modify the number assigned to a measurement and the ID number within a very large range:

Measurement number: 1 +65000

ID number: 0 + 999999

The step size becomes progressively larger in order to allow large modifications. The counter starts as usual with step size one.

A range check is performed for all data entry, i.e. a value can only be modified within a specific interval.

D. Menu items

A number of checks are performed every time the main menu is accessed using „FNC“. Firstly, calibration values are checked to see that they are valid. If this is not the case, the message „CALIB“ appears (the system’s values can still be used for measuring).

1. „MEASURE“ (measuring)

This item in the main menu appears every time the system is switched on and can be executed immediately using „ENT“. The „FNC“ key can be used at any time to return to this point in the main menu. The temperature must be entered when measurement starts. It can be specified anywhere within a range of 0 – 50 degrees Celsius.

First of all, the ID number of the measurement must be entered. The ID number last used is suggested automatically. You can accept it by pressing the enter key. The next thing to be determined is how many measurements should be performed for one measurement number (known as the „GR“ number). Numbers between 1 and 100 can be entered here.

a) Data transmission

When serial data transmission (in the menu item „CONFIG“) is activated, the „pH-STAR CPU“ first tries to address a device via the serial interface. If no device responds, the transmission remains activated. The data are being sent into a vacuum. First of all, a header is transmitted including date and time. If the „ENT“ key is released during measurement (i.e. if the hold function is terminated), the measurement and time (in hours, minutes and seconds) displayed on screen are transmitted. Values transmitted are numbered continuously. In each case, the next number in the sequence is displayed on the top display line. The continuous measurement number can be modified using the cursor keys. A message appears briefly for each transmission.

If a group is defined, the measurement number does not change every time the „ENT“ key is pressed, but only after the group measurement has been completed. The measurement number can be modified at any time using the cursor keys.

b) Storing measurements

If measurement storage is activated (in the menu item „CONFIG“), the „pH-STAR CPU“ stores the current measurement in the built-in memory when the „ENT“ key is released (i.e. when the hold function is terminated). Date, time and measurement number are stored with the measurement itself (the measurement number is displayed as during send mode and can be modified). As soon as there is no space left in the memory, the message „M FULL“ is displayed. Storage mode is then separated automatically and measuring can continue.

The memory can hold up to 3,000 records!

ID number, date and current temperature are also saved. However, this occurs only if the value of one of them changes. Stored values can be transmitted using the menu item „TRANSMIT“ via the serial interface.

2. „CALIB“ (calibration)

Before measurement takes place, it may be necessary to check the calibration of the electrode using the technical calibration solutions pH 4.6 and pH 7.

The probe is calibrated using an on-off measuring method. First of all, the temperature of the calibration solutions should be specified. Any temperature between 0 and 50 degrees Celsius can be chosen.

The pH values of the calibration solutions must be entered.

Any pH values between 0 and 9.9 pH can be chosen. When two identical values are specified, a message appears to this effect. Calibration is then rejected and must be repeated.

The solution must be measured as soon as the data have been entered.

Put the electrode in the first buffer, leave it for three seconds, then press „ENT“ while the electrode remains the buffer. The display counts down to zero. If it is near to zero (+1/-1) then the buffer is recognized from the system.

Press „ENT“. Repeat the procedure with the second buffer. After this, the system

ch0762(on)10.6383()-15-4.h0762
Patent (+d b(f)-7.42551()-7.42551(e)-2.80762(r)13.8
P.1(1)28.04342.06-T180762Patent 015(ib)10.63832(h)F

No message is displayed here. Measurement is carried out as soon as the pH value is entered using the „ENT“ key. Graduation constants are calculated from the two measurements.

These graduation constants are calculated from the two measurements. These graduation constants are checked for plausibility. If they do not fit within the given range, a message appears to this effect.

Offset: - 20mV 20mV
Nernst: - 50pH/mV - 65pH/mV

The user is responsible for any future calibration. The menu item „MEASURE“ can also be invoked with false graduation values. If necessary, check calibration before every slaughter.

3. „CONFIG“

Here, the user can specify whether data are to be transmitted via the serial interface during measuring. The cursor keys can be used to switch between „SEND-ON“ and „SEND-OFF“. The user must then specify whether measurements taken should be saved for subsequent transmission. The cursor keys can be used to switch between „SAVE ON“ and „SAVE OFF“. „SEND“ and „SAVE“ can be activated at the same time!

4. „TRANSMIT“

When this menu item is selected, the records stored in the memory are transmitted via the serial interface. First of all, the message „START OK“ appears. The „FNC“ key can be used here to return to the main menu. If „START OK“ is confirmed with the „ENT“ key, data transmission from the memory begins.

The display format corresponds to that of „SEND“.

When a change of date is identified, „pH-STAR CPU“ transmits a new header.

During transmission, the number of the measurement just proceeded is displayed in the lower display line. Transmission is interrupted when the receiving device draws down the DSR line to low level. It is continued as soon as the device is ready to receive again. Once transmission is completed, it is possible to release the memory (sequence as described for „CONFIG“).

When the memory is full, the last line to be transferred is „MEMORY OVERFLOW“ or „END OF LIST“. It is possible to see whether or not measurement data are missing by whether this second message appears.

If „TRANSMIT“ is invoked when the memory contains no data, the message „EMPTY“ appears.

5. „SYSTEM“

This menu item allows certain system data to be checked. The „ENT“ key leads on to the next screen (see menu structure diagram).

Operating voltage:

The cursor keys can be used to choose between two screen modes. The battery charge default is given in words, i.e. „BATT LOW“ or „BATT OK“. However, the exact voltage value can also be displayed.

Graduation values:

The current values of voltage offset („AS+“) and Nernst factor („NE+“) are displayed.

Time /date

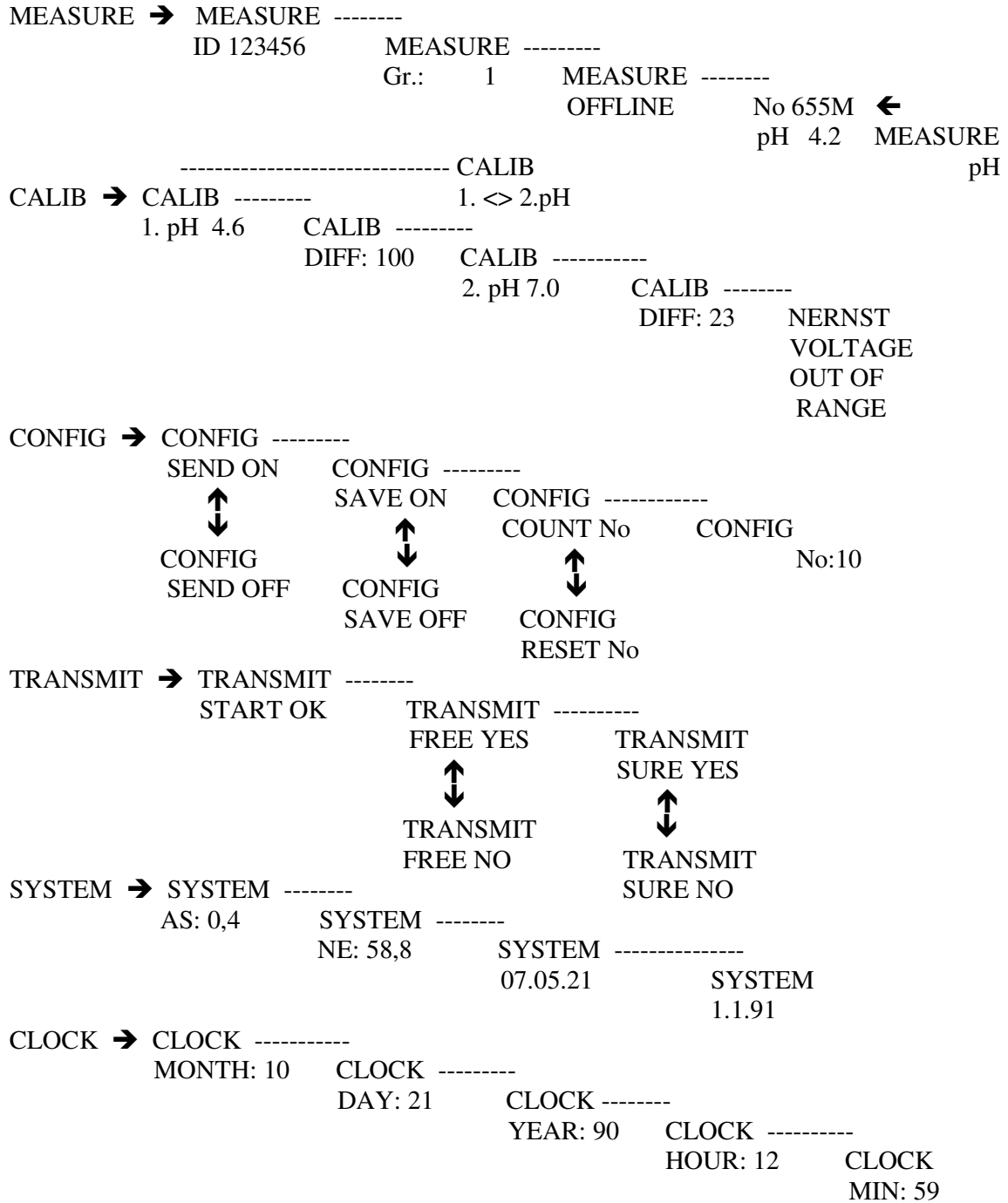
6. „CLOCK“

Date and time are specified here. The settings for the day/month/year and hour/minute fields are defined separately.

Date and time can be checked in the menu item „SYSTEM“.

E. Menu Structure

POWER OFF



F. Measuring with the „pH-STAR CPU“

Insert the tip of the electrode at an angle horizontal to the carcass, between the ribs or in the ham. Confirm the value by pressing „ENT“.

Measuring points for determining the pH value of the pig.

G. Loading the „pH-STAR CPU“

Always charge the battery of the pH-STAR CPU (inlet in the socket) after measuring has been completed. Use the power unit with charge control that was delivered with the device.

The battery will be fully recharged in 8 + 14 hours depending how low the charge was before. However, overcharging is impossible thanks to the controlled power unit.

Note: If the battery has not been recharged for any reason, the charging set can also be used as a power unit while measuring is going on.

H. Important points to note

Clean the tip of the electrode before and after use by rinsing it under hot water!

The rod measurement chain should be handled with care!

No guarantee can be given for broken glass.

The electrode with sleeve should be changed as described when it has worn out or if the glass breaks.

If the „pH-STAR CPU“ gun has to be transported, the electrode should be packed separately from the gun.

THE RINSE CAP OF THE ELECTRODE MUST BE EMPTIED!

(it must be transported „dry“)

I. Messages

All messages remain on screen until confirmed by the user with the „ENT“ key.

- „CALIB“ appears when the device is switched on if the stored data cannot be read correctly. This message may indicate some defect. It also appears when the device is operated for the first time: since all data were initialized with their default values, the device must be recalibrated. Date and time must also be set.
- „1 <> 2PH“ The same pH values have been entered for both solutions during calibration. Calibration is rejected and must be repeated.
- „FAIL“ The graduation values calculated during calibration lie outside the reliable range of values, which means that calibration must be repeated.
- „OFFLINE“ Serial data transmission is activated but no answer is received from any device on the serial bus. It is also displayed if „TRANSMIT“ receives no answer from a peripheral device.
- „SEND“ A measurement is transmitted via the serial interface.
- „M_FULL“ Automatic measurement storage is activated, but the memory no longer has room for the current reading.
- „M_EMPTY“ „TRANSMIT“ is invoked although the memory contains no data.
- „START OK“ is displayed before data transmission using „TRANSMIT“. In conjunction with „FNC“, it allows the user to return to the main menu.

Specifications

- pH probe: adaption module for measurement electronics
- 12-bit A/D transformer
- 6301 CPU
- 32KB EPROM for operating system
- 2x16-character, alphanumeric LCD for dialog and measurement screen
- Keypad with 4 keys for menu control
- Power supply: 9V NiCd battery rechargeable for a measuring operation of at least 8 hours
- RS 232 interface for data transmission to host computer or printer
- Storage capacity in the gun is 3,000 records

The device is built with state-of-the-art, space-saving SMD technology