PC700+
Pressure Calibrator

USER MANUAL

PC700+ Pressure Calibrators
User's Manual ver. 01-2004 MANP017
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Thank you for purchasing our pressure meter.
This product is manufactured in accordance with our strict standards for quality in design, components, and workmanship to fulfill our vision:

"To be the leading company in high quality self-contained products"

SIKA reserves the right to make improvements or alterations to their products without incurring any responsibility to make the same improvements or alterations to products previously sold.

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All efforts have been made to ensure the accuracy of this handbook. We at SIKA are always striving to improve our products and handbooks, therefore we would greatly appreciate being informed of any errors found in our product or its handbook. The above notwithstanding, SIKA can assume no responsibility for any errors in this handbook or the consequences.

Symbol used to identify an action that can cause personal injury or damage to equipment.

Always release internal pressure at connectors **before** disconnecting.

Uncontrolled release of high pressure can result in personal injury and damage to equipment.

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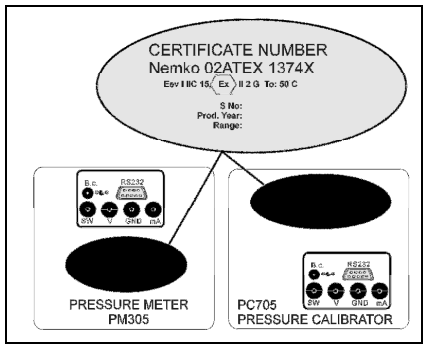
Description of the PC700+

The PC700+ Pressure Calibrator series are designed as self-contained, portable pressure meters that have been calibrated to precision pressure equipment traceable to national standards.

Each unit is marked with:

- Certificate Number
- Safety code and gas group
- Calibration certificate
- Serial number
- Production year
- Pressure range.



Calibration label

SIKA certifies that this product meets published specifications at the time of shipment from the factory. SIKA further certifies that its calibration measurements are traceable to accredited international standards. Each pressure calibrator has a calibrated label showing the last date of calibration and the date when the next calibration is due. Calibration is scheduled annually, unless you believe the unit to be defective, whereupon the unit will be calibrated after repair and receive a new label showing the date calibrated and the new calibration-due date. Check the calibrated label to ensure the Pressure Meter Calibrator has a valid calibration date before using the unit.
Calibration must be done by SIKA or a certified supplier/service center.

Certification

SIKA certifies that the PC700+ comply with its published list of specifications at the time it was manufactured. SIKA also certifies that its calibration measurements are traceable to to the calibration facilities of other *International Standards Organization* (ISO) members. SIKA confirms that the PC700+ complies with the following standards:

CE

EMC 89/336/EEC as amended by EC Directive 92/31/Eec and the European Low Voltage Directive 73/25/EEC, amended by 93/68/EEC. To ensure compliance, please use screened/shielded serial communication leads (RS232).

Warranty

This product is guaranteed free from defects in material and workmanship for one (1) year from the date of shipment. During this warranty period, SIKA will, at its option, either repair or replace the PC700+ should it prove to be defective. The product must be returned to a service facility designated by SIKA for warranty service or repair. The foregoing warranty will not apply to defects resulting from improper maintenance by the purchaser, purchaser-supplied software or interfacing, unauthorized modification or misuse, operation exceeding the environmental specifications for the PC700+, or improper site preparation. No other warranty is expressed or implied by SIKA, and SIKA shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract, tort, or any other legal theory.

Conventions used in this document

We have provided this section of the Handbook to help you identify noteworthy symbols, terms and conventions used in this handbook. Look for the following:

	Symbol used to identify an action that can cause personal injury or damage to equipment.	**Terms and definitions:** We define **calibration** as being able to compare the ability of the equipment to perform to a known standard. Pressure calibration provides a means of quantifying uncertainties in pressure measurement in order to optimize sensor and/or system accuracy.
	Conformité Européenne	

Safety precautions

Following these safety precautions should ensure safe operation of the pressure meter and your personnel safety. Be careful when working in hazardous areas as **any** electrical spark could result in an atmospheric explosion/fire.

- Do not use the instrument at ambient temperatures above 50°C.
- Do not connect to RS232 port in hazardous area.
- Do not apply voltage to the CURRENT input terminal.
- Do not remove the rear panel.
- Connect only SIKA manufactured sensors to the External Sensor connector.

Battery charging information

- Do not charge battery in hazardous areas.
- Use only the battery charger supplied by SIKA

From a completely discharged condition, battery-charging time is about 14 hours, at a maximum charging current of 65mA.

When the battery is charged, it will provide power for about 35 hours of continuous operation if the display back-light is defined as OFF, (and with no RS232 connection).

In safe areas, the Pressure Meter Calibrator can be operated with all Inputs and Outputs, and with the battery charger connected. The Battery Charging time will increase depending on connections and display back-light settings.

PC700+ not operating/failed

Repairs must be done by manufacturer or supplier certified for service/repair of intrinsically safe equipment. Replacement batteries and fuses must be obtained from the manufacturer.

CONTROLS AND INDICATORS

Display, controls and connections

ON/OFF button
Power on or off control

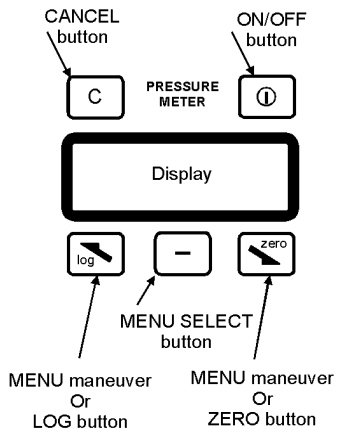
CANCEL
Used to cancel an action and to move to the previous menu level.

Display
Shows the available menu selections or values.

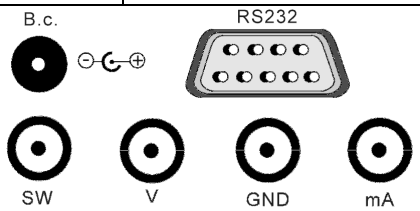
MENU SELECTION
Allows selection of menu item to read, change or define information, or to select the next level of sub-menu.

▲ move UP the menu.

▼ move DOWN the menu.



Input Terminals



SW	Switch test	V	Voltage	Gnd	Ground (common)
mA	Current	B.c.	Battery charger	RS232	serial communication

DO NOT charge battery or connect to RS232 in a hazardous area.

Battery charger

Connection for the Battery Charger provided by SIKA. In safe areas, the Pressure Meter Calibrator can be operated with all Inputs and Outputs, and with the battery charger connected. The Battery-charging time will increase depending on connections and display back-light settings.

RS232 communication

Serial RS232 connection for interfacing the PC700+ to allow menu definition, logging, etc. via PC or other computer-based device with software from SIKA.

switch test

Input connection for indicating when the switch changes state (open-to-closed or closed-to-open).

voltage

Input connection for voltage measurement.

ground

Reference ground for the pressure meter. Use in conjunction with the SWITCH-TEST, VOLTAGE, and CURRENT input connectors.

current

Do not apply voltage to the current input terminal. Applied voltage can cause the internal fuse to blow. If the fuse blows, refer to Chapter 0

Replacing fuse in the PC700+.

external sensor

Connect only reference sensors manufactured by SIKA to the External Sensor connector.

Always replace the cap/cover when not in use and power OFF the unit before connecting the external reference sensor.

Contact SIKA for available external reference sensors.

ONLY connect sensors provided by SIKA

ENTERNAL SENSOR connector

Operation menus and input setup

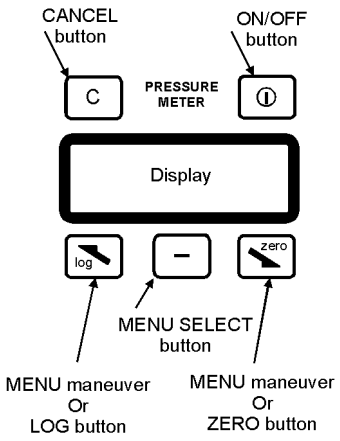
The menus are organized in levels, with each level leading to lower-levels of information or available selections. At power-up, the display will INITIALIZE and restore previously defined and saved values. To VIEW the menus, press the MENU SELECTION button. The following headings in this chapter describe the menus and sub-menus.

Main menu	**Sub-menus**
Input setup	Measurement unit
	Sensor input
	Sensor range
	Filtering
	Number of digits
	Reference input
Settings	Main menu type
	Backlight brightness
	Backlight timeout
	LCD contrast
Information	Reference details
	Software information

Operation controls

Menu interaction controls

ON/OFF button Power on or off control
CANCEL Used to cancel an action and to move to the previous menu level.
Display Shows the available menu selections or values.
MENU SELECTION Allows selection of menu item to read, change or define information, or to select the next level of sub-menu. ▲ move UP the menu. ▼ move DOWN the menu.



Input setup

This menu group allows you to configure, select and set up all reference and external reference sensor information.

Measurement unit

You can select the desired measurement unit in this sub-menu. When you enter this sub-menu, the active unit will be shown as selected. The selected new unit will be applied to both the internal and external reference. It is possible to change from bar to any other unit. The bar value is multiplied with the respective constant. Press the CANCEL button to return to the previous menu without changing the value:

- bar
- kPa (kN/m^2) 1E5/1E3
- MPa (MN/m^2) 1E5/1E6
- atm 1E5/1.01325E5
- psi (lbf/in^2) 1E5/6.89475729317E3
- at (kgf/cm^2) 1E5/9.80665E4
- torr (mmHg) at 0°C 1E5/1.33322368421E2
- mHg at 0°C 1E5/1.33322368421E5
- inHg at 32°F 1E5/3.38638815789E3
- cmH_2O at 4°C 1E5/9.80638E1
- mH_2O at 4°C 1E5/9.80638E3
- inH_2O at 39.2°F 1E5/2.4908891E2

Sensor input

You can select the desired external reference sensor input signal-type in this sub-menu. When you enter this sub-menu, the active unit will be shown as selected. Possible sensor inputs are:

- 0-15 V
- 0-100 mV
- 0-30 mA

Sensor range

You can use this sub-screen to set up how the external reference sensor input electrical signal should be converted to pressure. To do this, you set a low and high electrical value equal to a low and high-pressure value. It is possible to edit both electrical and pressure values.

Filtering

You can select delay between each time the sensor and reference is sampled and updated in this sub-menu. When you enter this sub-menu, the active unit will be shown as selected. (The respective constant is the number of samples needed to take an average)*:* Possible filter settings are:

- Fast 2
- Medium 5
- Accurate 10

Number of digits

In this sub-menu, you can select the numbers of the digits you want to view on the sensors and references. When you enter this sub-menu, the active unit will be shown as selected. Possible selections are:

- 3 numbers
- 4 numbers
- 5 numbers

Reference input

You can select the reference input in this sub-menu. When you enter this sub-menu, the active unit will be shown as selected. Possible selections are:

- **Automatic**
  (use the external reference if it is present during power-up, otherwise use the internal reference)
- **Internal**
  (use the internal reference)
- **External**
  (use the external reference)

Settings

This menu group allows you to configure the PC700+ device settings that do not affect the sensor or the reference.

Main view type

You can select how the Main Menu will look from this sub-menu. When you enter this sub-menu, the active unit will be shown as selected. The illustration below shows the LCD with explanations and possible selections:

Normal

Error in unit		Sensor value (in mA or Volts)	III
Ref value (in unit)		Sensor value (in unit)	II
Measurement unit	MENU	Sw:OFF	I

battery

Min and max

Maximum in unit	Measurement unit	Maximum in unit	III
Ref value (in unit)		Sensor value (in unit)	II
Minimum in unit	MENU	Minimum in unit	I

battery

Switch and leak

Reading per hour/minute/day		OFF:---	III
Ref value (in unit)		Sensor value (in unit)	II
Measurement unit	MENU	ON:---	I

battery

Backlight brightness

You can adjust the brightness of the LCD back-light in this sub-menu. The hardware supports 8 different levels. High back-light brightness can severely reduce battery discharge time.

Backlight timeout

You can select back-light timeout in this sub-menu. When you enter this sub-menu, the active unit will be shown as selected. Possible selections are:

- Always off (no battery used for back-light)
- 2 seconds
- 5 seconds
- 10 seconds
- 20 seconds
- 1 minute
- Always on (battery used to provide back-light)

Selecting “Always on” as the backlight timeout will severely consume battery power.

LCD contrast

You can adjust the contrast of the LCD in this sub-menu.
High LCD contrast will slightly consume battery power.

Information

You can view the PC700+ information in this menu group.

Reference details

This tells you information about the reference you have selected (refer to "Input setup" and "reference input" chapters). The following information is shown:

- Serial number
- Sensor pressure range
- Calibration date

Software information

There are two software items with related information. The first one (to the left on each line) refers to the main micro-controller in the PC700+, which controls the external RS-232 port, the LCD and user input. The second (to the right on each line) refers to the internal sensor reference ADC micro-controller. The following Information is shown:

- Baud rate (communication speed)
- Communication protocol addresses
- Software versions

History log

This menu group allows you to store, view and delete log information in the PC700+. The stored log-information is sensor name, related input setup, switch-state and pressure values for reference and sensor. It is possible to store up to 30 groups of information ("connected" to a “sensor name”), and up to 10 pressure points (reference, sensor and switch-state).

Enter sensor name

You must enter a sensor name before you can log information. Both alphabetical and numeric characters are available, and up to 8 characters can be used in a sensor name. When you have configured
the input setup and entered the sensor name, pressing the Log Button when in Main view will store information to the history log. A specific input setup is connected to each sensor name, and if this input setup is modified after the information is logged, a new sensor name is required.

View stored sensors
Select this menu-item to view logged sensor names, connected input setup, switch-state and pressure values.

Delete one sensor
This menu item allows you to select one sensor name for removal from the history log. All information connected to this sensor-name will be removed.

Delete all
All history-log information will be removed if this menu item is selected. You will be prompted to ensure that this is not done accidentally.

Getting started
This section contains a description of the PC700+ operator control and connection points to help you to get started quickly.

Operation controls and connections
Very little operator interaction is required to begin a calibration. The main operator interaction is via the unit's buttons and display, or via a (local) PC or other remote computer. Communication with the PC is via the unit's RS232 serial port connector. To begin a calibration, you must:

1. Connect the external reference sensor (if it is to be used)
2. Connect the meter or sensor to be tested. Refer to Chapters **Fehler! Verweisquelle konnte nicht gefunden werden.** for information about the type of pump being used.
3. Power the unit ON.
4. Configure the sensor to be tested.
5. Connect the sensor leads to the appropriate input connector. Refer to Chapters **Fehler! Verweisquelle konnte nicht gefunden werden.** for information.
6. Set the pressure using the pressure pump

End of procedure.

SPECIFICATIONS of PC700+

Accuracy	± 0.03% FS (10–40℃), temperature effects: 0.001% of reading/℃
mA input	0–30mA (± 0.03% FS.)**
V input	0–15VDC (± 0.05% FS.)**
	** Ambient temperature 25℃, temperature effects: ± 0.008%/℃.
History log	30 sensors, 10 points each
Operating temperature (ambient)	0 to +50℃
Process temperature	–20 to +80℃
Pressure overload	FS x 1.5
Wetted parts	Hastelloy C-22
Housing	Anodized aluminum
Operating time on batteries	Approximately 35 hours
Functions	Programmable: Input mA/mV/V/Switch Test, Range, Conversion, Engineering Units, Filter. Min/Max/Tare, History Log, Internal/External Sensor, Battery Indicator, Leak Test, Selectable Language (optional), Remote Operation (optional).
Engineering unit	Bar, kPa, Mpa, atm, psi (lb/in²), at (kgf/cm²), torr, mHg at 0℃, inHg at 32℉, cmH_2O at 4℃, inH_2O at 39.2℃
EEx / IS certification	Exe ia IIC T4 Ⓔx, NEMKO 02ATEX 1374X
ATEXproduction notification	NEMKO 02ATEX445Q ATEX according to directive 94/9/EC
Pressure range	0 to 700 Bar
Pressure media	Oil
Overall dimensions	345 x 160 x 180 mm (w-h-d)
Weight	8.1 kg

Maximum input rating

Input	Range	Absolute maximum	Unit
Pressure	0 - 20	30	Bar
Pressure	0 - 40	60	Bar
Pressure	0 - 80	120	Bar
Pressure	0 -150	225	Bar
Pressure	0 - 300	450	Bar
Pressure	0 - 600	900	Bar
Pressure	0 - 1200	1800	Bar
Voltage	0 - 15	19	VDC
Current *	0 - 30	40	mADC

* Input is protected by 50 mA fuse

When returning a product, please provide the following information,

1. Product name
2. Serial number
3. Details of defect/work to be undertaken
4. Operating conditions
5. Tell us if the product has been in contact with anything hazardous or toxic and the relevant COSHH references and precautions to be taken when handling.

PC700+, Hydraulic hand-held pressure test system

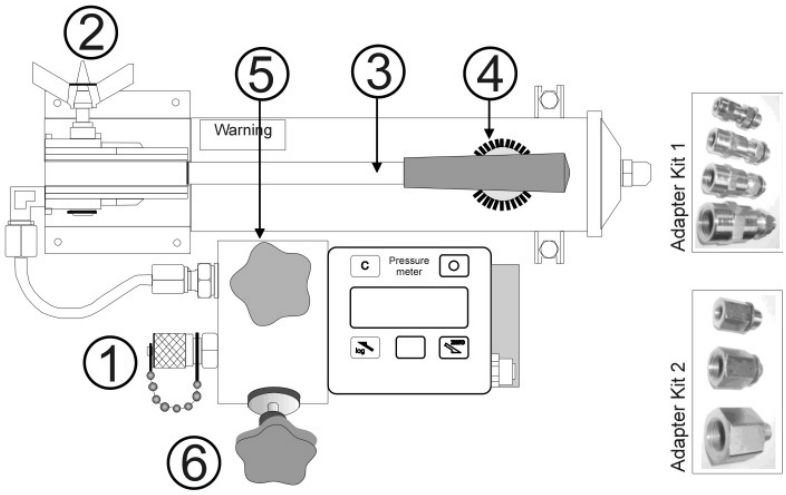
Provides hydraulic pressure of 0 to 700 bar

Always release the internal pressure at connectors before disconnecting. Uncontrolled release of high pressure can result in personal injury and damage to the equipment.

Reservoir-fluid level: If the fluid level in the reservoir falls considerably during use, a partial vacuum may be created in the reservoir that can affect the pump performance. To avoid this, simply allow air to enter the reservoir by partly unscrewing the filling plug.

Seal replacement: Depending on frequency of use, the main piston seal (and others) may need replacing. Replacement seals and instructions for fitting are contained in the seal kit

PC700+ Controls and orientation



Drawing key:

1 Pressure port: M16 x 1.5 mm quick connector for flexible hose to adapters and item under test.
2 Pressure release valve
3 Pump handle.
4 Filling cap
5 Main pressure valve
6 Fine-adjustment valve (volume control).

Operation of the PC700+

Refer to the orientation drawing to locate the controls.

1. Lift the pump handle. Remove the filling plug and fill the reservoir to 6mm level with the recommended fluid. Replace the filling plug.
2. Connect the instrument under test to the flexible hose/gauge adapter and attach it to the pump via the quick-fit connection.
3. Adjust the main-pressure valve and fine-adjustment valve to mid-travel.
4. Ensure that the pressure-release valve is open (turn fully clockwise, then one turn counter-clockwise).
5. Operate the pump handle several times to expel air from the pump.
6. Close the pressure-release valve fully clockwise.
7. Prime the system by pumping the handle to allow the oil to enter the pump cylinder. Repeat as necessary until the system is fully primed and low pressure is indicated on either the master or the test instrument.
8. Close the main-pressure valve.

Adjust the pressure to the required value using the fine-adjustment valve.

Note: The pressure will fall slightly, immediately after pressure generation due to the thermodynamic effect but will stabilize after a short time.

DO NOT EXCEED the maximum operating pressure indicated on the pump label!

9. To totally release pressure from the system, turn the pressure-release valve and the main-pressure valve one turn counterclockwise (the pump handle can be operated without pressure resistance).

Note: Careful use of the release valve, main-pressure valve ⑤ and fine-adjustment valve ⑥ enables a controlled release of pressure, essential for calibration purposes.

10. End of operation procedure.

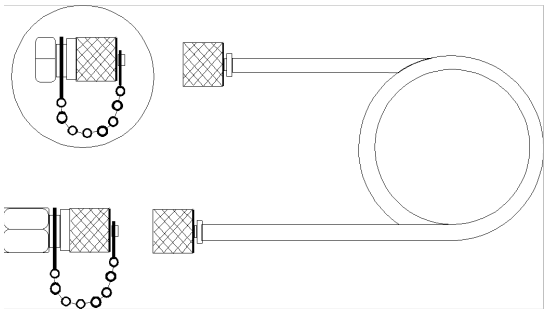
PC700+ Accessories

Adapters for the item under test

Adapter kit 1, ¼-inch BSP to NPT Female, Carbon Steel	
Description	drawing
1/4" BSP male – 1/8" NPT female 1/4" BSP male – 1/4" NPT female 1/4" BSP male – 3/8" NPT female 1/4" BSP male – 1/2" NPT female	

Adapter kit 2, ¼-inch BSP to BSP Female, Carbon Steel	
Description	drawing
1/4" BSP male –- 1/8" BSP female 1/4" BSP male – 3/8" BSP female 1/4" BSP male – 1/2" BSP female	

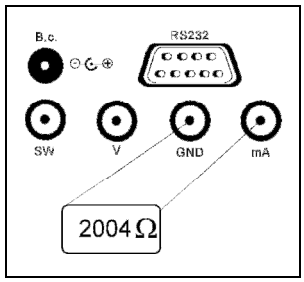
Adapter kit 4C BSP-BSP Swivel, Carbon Steel
1/4" BSP male – 1/4" BSP male for 5PV-411
For PC700+; connects to M16 x1.5mm quick connect at pump and to item with M16 x 1.5mm with ¼" BSP.



Replacing fuse in the PC700+

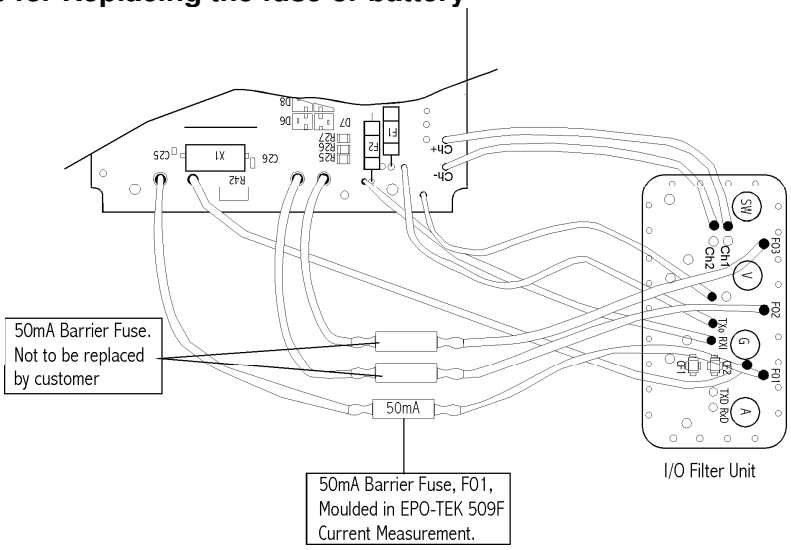
Fault finding to determine if the fuse has blown

To determine if the fuse has blown, use a multimeter and measure the resistance between GND and A input. The resistance must be less than (≥) 25 Ohms. Use a multimeter with a test voltage less than 2.5VDC (otherwise, the internal 2.7V protecting diodes may cause a faulty Ohm/resistance measurement).



When ordering spare parts, always include the serial number of the faulty instrument. Battery and fuses must be obtained from SIKA or a certified supplier/service center.

PC700+, instructions for Replacing the fuse or battery



If needed, request original drawing no. SA00325; Title Assembly drawing, Fuse and Battery replacement.

Replacing Fuse F01.

Remove Fuse,

1. Unscrew 4 screws in the side-panel and remove panel carefully. 2 wires from battery are connected.
2. The fuse is now accessible. The fuse is marked with 50mA and plugged between 2 black wires.
3. Locate the fuse. Then, pull out the fuse-legs from the wires (the 2 wires are supplied with a small connector).

New Fuse

4. Connect the new fuse to the 2 wires and put the wires back into the housing. When everything is OK, the side-panel can be remounted and secured with the 4 screws.

Replacing the Battery

1. Unscrew 4 screws in the side-panel and remove panel carefully. 2 wires, red and black, from battery are connected.
2. Disconnect wires. Mini connector.

Remove the 4 screws holding the battery pack to the side-panel. Lift off the old battery and replace it with a new. Secure the new battery with the 4 screws.

3. Connect the battery.
4. Remount the back panel and secure with 4 screws.

If needed, follow instructions for charging.