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# Operating Instructions
# *AS* pro

## PRINTING ACTUALITY

Advanced technology and the high quality of our devices are ensured by continuous improvement. As a result, the specifications and information in this manual are subject to change without notice and may vary from the actual functions of your device. Errors and omissions excepted. All information, graphics and descriptions in this document without guarantee. Specifications are subject to change without further notice.

## ONE-YEAR LIMITED WARRANTY

Warranty Duration: The device described herein is warranted to the original purchaser for a period of one (1) year from the original purchase date. Warranty Coverage: This device is warranted against defective materials or workmanship which may appear within the one year warranty period. Warranty Performance: During the above one-year warranty period, a defective device will either be repaired or replaced with a reconditioned model (at our option) when the product is returned, postage prepaid, to the ibb facility. Warranty Disclaimer: The manufacturer makes no other warranty whatsoever, express or implied, including, without limitation, any implied warranties of merchantability or fitness for a particular purpose. The manufacturer shall not be liable for loss of use of the device or any other incidental or consequential costs, expenses, or damages incurred by the user. This warranty is void if the product has been opened or damaged by accident, unreasonable use, neglect, improper service, or other causes not arising out of defects in material or workmanship.

## COPYRIGHT NOTICE

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# 1  Product Description

## 1.1  Adequate Use

Please follow the instructions given in this document to prevent damage or fatal injury when using the *AS* pro:

- This device may only be used according to its proper use for which it is designed. Do not use the device for any other purposes.

- Read the operating instructions carefully before powering on and using this device.

- Also read the "Safety Information" chapter thoroughly before using this device.

The *AS* pro is exclusively designed for measuring, storing and displaying direct voltages.

An adequate use implies that you read this manual and observe all the instructions contained herein, especially the safety information. Furthermore, any adequate use implies that all maintenance work will be performed within the specified intervals.

Safe operation cannot be guaranteed if the *AS* pro is not used according to this instructions.

The producer shall not be liable for any personal injury or material damage arising from improper use of this device.

## 1.2 Design

Infrared sender/receiver

RFID
Transponder coil
(optional)

Graphics display
(LCD)

Tactile

Power on/off

Connector for battery
charger, headphone
and manual button

Safety lab jacks for
voltage
measurement
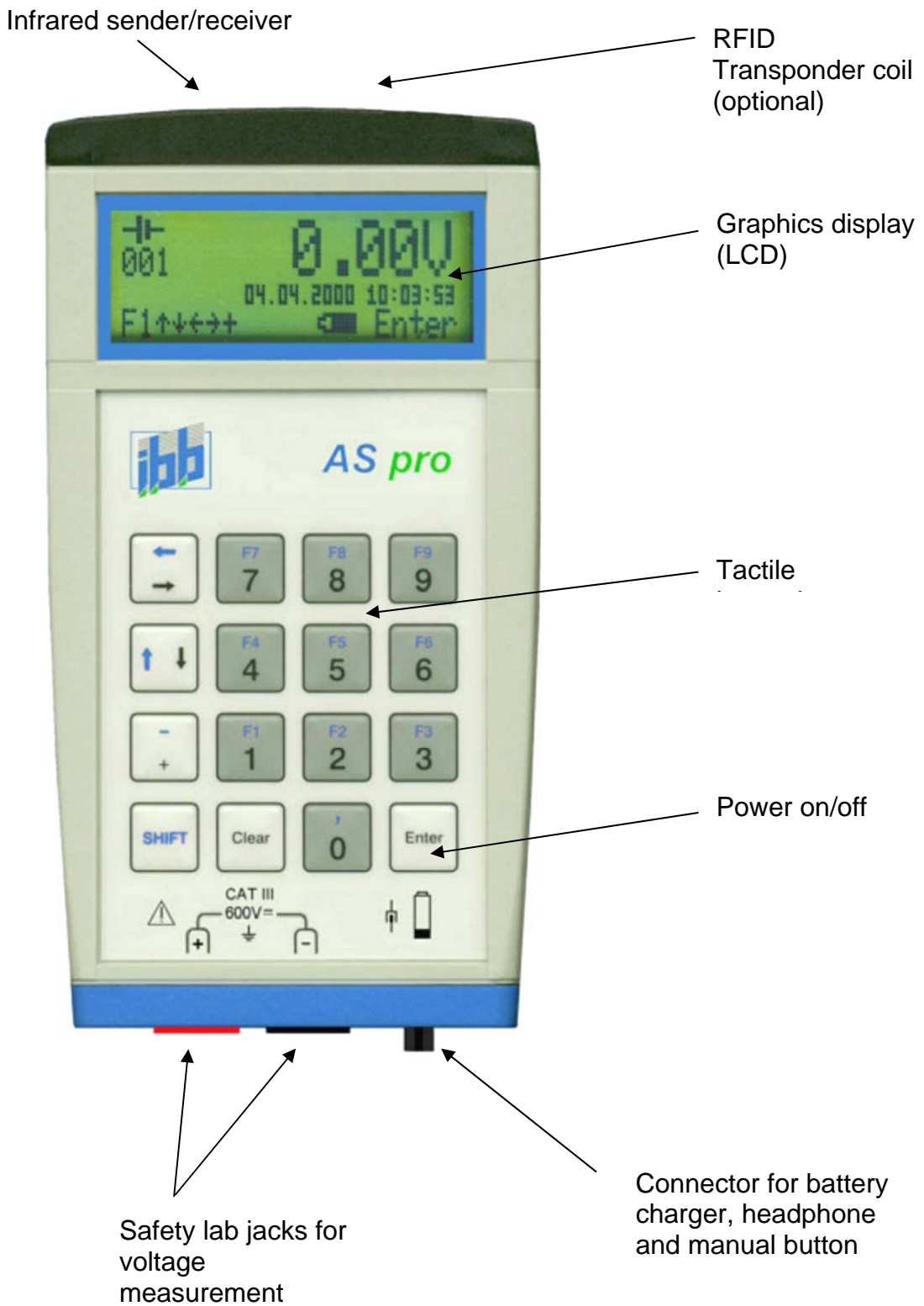
## 1.3  Functional Description

### 1.3.1  General

State-of-the-art storage battery and power supply technology is impossible without reliable, easy-to-use and highly accurate devices which monitor the battery's state of charge and operation. Professional users are looking for the following requirements:
Accurate measurements, series of measurements which can be recorded and stored, output options to external computer systems, operation which is independent of the mains, rugged design and reliable technology even in unfavorable environmental conditions. Our answer to all these requirements is just as clear - *AS* pro. The *AS* pro is a mobile measuring system especially designed for industrial applications and provides outstanding functionality and high suitability for everyday use.

The *AS* pro is a portable measuring instrument designed for recording, displaying and storing a storage battery's or accumulator's voltage (cell voltage, block voltage or total voltage). A built-in signal generator beeps each time a measurement is stored. Optionally, a headphone can be connected.
The *AS* pro is operated using a tactile keypad and a graphics display. Current measurements and stored measurements as well as the average, minimum and maximum value can also be determined. By means of manual input, a battery temperature can also be assigned to a series of measurements. All of the information on a measured series can be transmitted to a PC or notebook via an infrared interface. This data can then be edited and processed further (e.g. printed, evaluated and converted into graphics in MS Excel).
The *AS* pro can be equipped with an optional bar-code reader which is used to assign battery/storage cell identification numbers (ID numbers) to the measured series in order to simplify data management.

The *AS* pro is powered by an integrated NiMH accumulator which can be recharged with the battery charger supplied. After a full charge this accumulator operates for up to 20 hours and can generally be used in the service field for about 5 days.

### 1.3.2  Measurement Procedures

The *AS* pro provides two different procedures for measuring voltages:
- Single method (only once), i.e. after applying the measuring tips to the voltage to be measured, the measured value is being stored automatically.
- Single method (only once), i.e. after applying the measuring tips to the voltage to be measured, the measured value is being stored only after a manual button has been pressed.
- Cyclic method, i.e. the value of a continuously applied voltage is being saved in a specified time interval.

After a series of measurements is complete, all saved values can be displayed on the *AS* pro, printed or transmitted to a PC.

## 1.4  Specifications

- Measuring range:        0-20V and 0-600V DC
- Resolutions:      0.01V at 20V; 0.1V at 600V measuring range
- Measuring accuracy:    0.05% of the measuring range ± 1 digit
- Power supply:    internal NiMH accumulators
- Operating time:  approx. 20 hours after full charge
- State of charge indicator resolution:  10%
- The accumulators are charged by an external battery charger via a charge jack
- Charging time:   approx. 3 hours
- Automatic switchover to float charging
- Current and stored measurements are displayed on a liquid crystal graphics display (LCD)
- Measured values can be stored together with date, time, and cell number
- Acoustic signal when a measurement is stored
- Storage and display of a measurement series identification
- Identification input via keyboard or optional RFID transponder 125 kHz
  Type of transponder: UNIQUE, HITAG1, HITAG2
- Infrared interface for transmission of stored values to a PC or notebook
- Infrared interface for stored value transmission to an external printer
- Allowable distance to infrared receiver (direct line-of-sight) $\leq$ 60cm
- Calibration interval:    biannual calibration for service use;
                         annual calibration for laboratory use
- Temperature for guaranteed accuracy: +23°C ± 5°C
- Operating temperature: +10°C to + 40°C / maximum 80% relative humidity (noncondensing)
- Storage temperature: 0°C to +50°C / maximum 80% relative humidity (noncondensing)
- IP44 protection system
- Dimensions (LxWxH): 185x92x35 mm
- Weight: 350 g

## 1.5  EC Declaration of Conformity

**EC Declaration of Conformity**
**according to EMC directive (2004/108//EG)**
**according to low voltage directive (2006/95/EG)**

The manufacturer/distributor

ibb Ing.-Büro Becker GmbH
Winkelfeld 9-11
45739 Oer-Erkenschwick, Germany

hereby confirms that the following product

Product designation:                              *AS* pro
Serial designation / type designation:      00963-0000.xx
Manufacturing year:                               as of 05.2008

meets the requirements and regulations of the above EEC directives.

The following harmonized standards have been applied:

- EN 61000-6-3:2007      Electromagnetic compatibility (EMC); Generic emission
                                      standard; Residential, commercial and light industry
- EN 61000-6-2:2005      Electromagnetic compatibility (EMC); Generic immunity
                                      standard; Industrial environment
- EN 61010-1:2001         Safety requirements for electrical equipment for
                                      measurement, control and laboratory use; Part 1: General
                                      requirements

Oer-Erkenschwick, 06.05.2008                    Bernd Scherbeck, Director

# 2  Safety Information

## 2.1  General

**Read this safety information carefully before using the device!**

The *AS* pro was designed and produced in accordance with harmonized standards and other technological specifications. This device therefore complies to state-of-the-art technology and provides maximum safety.

However, in everyday use this level of safety can only be met if all of the appropriate measures are taken. The operator/user of the *AS* pro is responsible for planning, implementing and controlling these measures.

Especially, the user must ensure that:
- the device will be used properly and adequately (see "Product Description" chapter)
- the device and its accessories (measuring leads, battery charger, etc.) will be operated only if they are failure-free and fully functional
- the complete and legible instruction manual is stored with the device at the place of operation
- the device is operated, maintained and repaired by authorized and experienced personnel only
- the staff responsible for this device is trained in all matters of occupational safety and environmental protection and also is familiar with this operating manual and the safety information contained herein
- all safety labels and warnings will be maintained in a legible state and no safety labels and warnings attached to the device will be removed

## 2.2  Charging Instructions
- Only use the supplied battery charger for charging the internal NiMH accumulators.
- Do not charge the storage batteries at temperatures above 35°C.
- The *AS* pro must be powered off during charging so that the battery charger can identify fully charged storage batteries.
- Please read the chapter "Using the Battery Charger" carefully.

# 3 Operation

## 3.1 Power on/off/ Display / Features / Function Keys

### 3.1.1 Powering the Device On And Off

Press the [ENTER] key for at least one second to power the *AS* pro on.
By pressing the **F9** key ([SHIFT]+[9]), you will power the *AS* pro off. If Auto Power Off is enabled, the device will switch off after a set period of inactivity (see AS pro Settings).

### 3.1.2 Display

If you power the *AS* pro on by pressing [ENTER], the following text will be displayed:

```
  ASpro

Ver: 1.51 13.03.2008
```
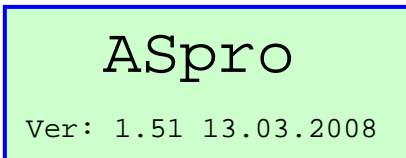
In the bottom line you will see the *AS* pro version number. Below that, the device displays:

```
        0.00V
     13.03.2008 13:49:55
 F1            ▭     Enter
```

Measured voltage

Date and time

Display line for operating information

Accumulator symbol indicating the accumulator's state of charge
Shows the function key layout (see 3.1.4)

**Display after selecting**
`Start Data Logging`

```
 Start 001 rem. 20000
 Ident No. Manual
 Store Mode Single
 ↑↓↔    Clear  Enter
```

Number of the series of measurements

Available storage capacity for measured values

Selected settings

Line for displaying operating information

### 3.1.3  Arrow Keys

The [↑] and [↓] arrow keys are used to select different features which then are confirmed by pressing [ENTER].

The [←] and [→] arrow keys are used for changing and applying the features of a selected function.

By pressing [CLEAR] you can delete input which has not yet been confirmed by pressing [ENTER]. If there is no input, the device will display the previous menu item.

### 3.1.4  Function Keys

All of the key functions on the keypad labeled in blue can be selected by simultaneously pressing
[SHIFT] + [1 ... 9] and so on (the desired function key).

F1      displays the *AS* pro function key layout
F2      battery voltage
F3      enables/disables the display of date and time
F4      decreases the display contrast
F5      enables the "Auto" measuring range (automatic range switching 600V/20V)
F6      informs about memory management and available/used series of measurements/measured values
F7      increases the display contrast
F8      sets the measuring range to 600V
F9      powers the *AS* pro off

The function keys F1 to F9 can be selected and used from any menu item.

### 3.1.5  Memory Management Information

The *AS* pro can store up to 200 series of measurements and a total of 20,000 measured values.

If you press the function key F6, the series of measurements and measured values will be displayed on the *AS* pro's LCD:

```
TEST SERIES      VALUE
IDLE / BUSY      IDLE / BUSY
 198 / 002     19960 / 00040
VER: 1.51 13.03.2008
                 ->A Enter
```

The above example illustrates that the *AS* pro has stored 2 series of measurements with a total of 40 measured values. By pressing [ENTER] you will return to the previous screen.

### 3.1.6 Selecting the desired RFID transponder type (optional)

*AS* pro is able to read 3 different types of RFID transponders. Select the required transponder type by using the Toolkit Software, the data management software, or via the information menu by pressing the F6 key. If the *AS* pro is provided with a reader for RFID transponders, the information menu will display the following:

```
TEST SERIES     VALUE
IDLE / BUSY     IDLE / BUSY
 198 / 002    19960 / 00040
VER: 1.51 13.03.2008
↑↓   RFID UNIQUE  ->A Enter
```

This means that the "UNIQUE" RFID transponder type is set in the *AS* pro. Use the [↑] and [↓] keys to select another transponder type.

RFID UNIQUE          RFID transponder, reads the UID as an identification number
RFID HITAG1          RFID transponder, reads the identification number of up to 20 digits
RFID HITAG2          RFID transponder, reads the identification number of up to 16 digits

### Explanation:

The "UNIQUE" RFID transponder type has stored a unique serial number only, which is the Unique Identification Number (UID). This invariable number was entered by the manufacturer and cannot be modified.

For "HITAG1" or "HITAG2" transponder types it is possible to enter customer-specific data into the transponder. This is done by using the *AS* pro data management software in conjunction with a reader/writer for RFID transponders (please refer to the *AS* pro data management user manual).

Various types of RFID transponders:

### 3.1.7  Selecting the required storage method

The storage method can be selected either by using the Toolkit software, the data management software, or directly at the *AS* pro. Press the F6 key to open the information menu and select the required option.

```
TEST SERIES      VALUE
IDLE / BUSY      IDLE / BUSY
 198 / 002     19960 / 00040
VER: 1.51 13.03.2008
↑↓   RFID UNIQUE  ->A Enter
```

                                                    ↑

This means that the *AS* pro is in automatic storage mode.
Use the [→] key to select another storage method:

`->A`           automatic storage
`->T`           manual storage after pressing a manual button

### Explanation:

- Cyclic storage can only be selected when starting a series of measurements. In this mode, the manual button is disabled (does not have any function).
- Switching between storage methods `[A/T]` can also be done during a series of measurements.
- Parameters for automatic storage can only be modified in the Toolkit software or in the data management software.

## 3.2 Measuring

Press the [ENTER] key to power on the *AS* pro. You can immediately start measuring as with any usual voltmeter.

If you power the *AS* pro on by pressing [ENTER], the following text will be displayed:

```
     113.8V
   13.03.2008 13:49:55
F1          ■   Enter
```
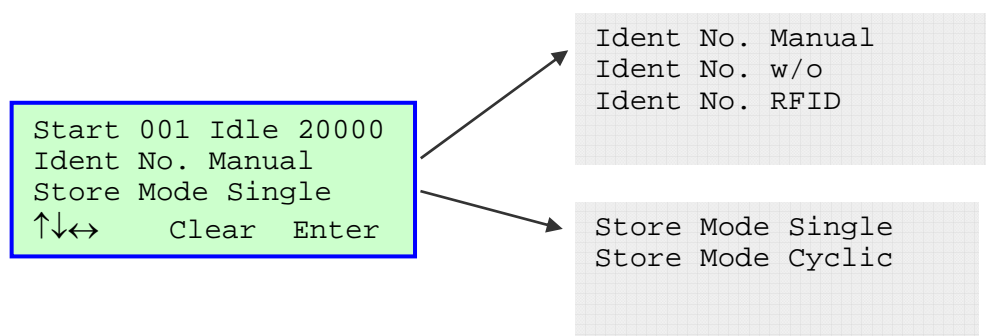
### 3.2.1 Starting Measurements

A series of measurements is a collection of related measurements (measured values) belonging to a battery array, to a system or to a measurement task. Press the [ENTER] key once again to select the main menu and start a series of measurements.

```
Start Data Logging
View Test Series
Delete Test Series
↑↓      Clear  Enter
```

The [↑] and [↓] arrow keys are used to select different features which then are confirmed by pressing [ENTER]. By pressing [CLEAR] you will return to the previous menu item.

You have selected `Start measurements`. Press [ENTER] to confirm your selection. The menu for starting a series of measurements is displayed.

```
Start 001 Idle 20000
Ident No. Manual
Store Mode Single
↑↓↔     Clear  Enter
```

```
Ident No. Manual
Ident No. w/o
Ident No. RFID
```

```
Store Mode Single
Store Mode Cyclic
```

The [↑] and [↓] arrow keys are used to select different features which then are confirmed by pressing [ENTER].
The [←] and [→] arrow keys are used for changing and applying the selected function.
By pressing [CLEAR] you can return to the previous menu item.

An identification number (ID number) is a unique designation for a series of measurements. The identification number is used for identifying measurements so that this measurement can be assigned to a storage battery, power supply system or to a measurement task at a later time.

There a three different types of identification numbers:

| | |
|---|---|
| `Ident No. Manual` | for entering the identification number via the device's keypad |
| `Ident No. RFID` | Reading the identification number via an RFID transponder reader (available only if the device is equipped with an RFID transponder reader): |
| `Ident No. w/o` | no identification number is being entered or read in |

Storage Options:

| | |
|---|---|
| `Store Mode Single` | manual voltage measurement<br>The voltage to be measured is measured individually and manually and then stored by the *AS* pro (see page 16). |
| `Store Mode Cyclic` | automatic voltage measurement in a range of between 1 second to 60 minutes and 59 seconds<br>(This setting can only be applied by using the PC program.)<br>The voltage source to be measured is continuously connected to the *AS* pro. The *AS* pro will save the measurements cyclically in the set time interval. This measurement procedure is used for recording voltage curves. |

Entering the identification number via keypad:

```
Start 001 rem. 20000
Enter Ident No.
XXXXXXXXXXXXXXXXXXXX
↑↓↔    Clear  Enter
```

Enter the identification number manually on the device's keypad.
Press the [↑] and [↓] arrow keys to gradually delete a number in the forward [↓] or backward direction [↑].
Press the [←] or [→] arrow keys to gradually move the cursor back [←] and forth [→] within an input number and to make changes.
Confirm your input by pressing [ENTER].
Press [CLEAR] to return to the previous menu item.

Reading the identification number via an RFID transponder reader (available only if the device is equipped with an RFID transponder reader):

```
Start 001 rem. 20000
Read Ident No.
Read RFID HITAG2
->      <- Clear
```

Press [CLEAR] to move back to the previous menu item.

If the RFID transponder has been identified correctly, the *AS* pro will display:

```
Start 001 rem. 20000
Read Ident No.
Read RFID HITAG2
->RFID<- Clear
```

Reading the RFID transponder data will start immediately (please monitor the status indicator in the display's bottom right corner). After data transfer is complete, the device beeps and the *AS* pro stores the data as an identification number. Next (and also after you have entered the data via a keyboard), you can verify if the identification number is correct and read it in once again, if necessary.

```
Start 001 rem. 20000
Ident No. ok?
battery room 12
        Clear   Enter
```

Press [CLEAR] to move back to the previous menu item.
Press [ENTER] to confirm the input and to start measuring.

**Please note:**

**To achieve optimum results when reading the RFID transponder data, the *AS* pro must be held in a distance of 1-3 cm in front of the RFID transponder for approximately 2 seconds, so that data transfer can start. The transponder coil is located beneath the black side of the casing's cover (see 1.2, *AS* pro design).**

**The RFID transponder must not be attached to a surface made of aluminum!**

This example illustrates what is displayed when you start a series of measurements:

```
Start 001 rem. 20000
Ident No. Manual
Store Mode Single
↑↓    Clear   Enter
```

Pressing [ENTER] will start a series of measurements having the sequential number 001. The identification number will be entered manually, and the selected storage procedure is „single". A remaining total of 20,000 measurements can be stored in the memory.

Pressing [CLEAR] will return you to the previous menu item without starting a measurement.

Press [ENTER] to start a series of measurements consisting of single measurements. First of all, the LCD will display:

```
 ⊣⊢
Bat       0.00V

F1↑↓↔+   001  ▬■ Enter
```

Now you can measure the total voltage of the storage battery („Bat" instead of the cell number). Next, you can measure individual cell voltages. You can also skip the total voltage measurement by pressing the [ENTER] key.

```
 ⊣⊢
001       2.35V
2.33V
F1↑↓↔+   001  ▬■ Enter
```

Symbol for „single" storage and display of the number of the next value that can be saved.

Display of the saved voltage (only if the value has already been saved). This measured value can be overwritten by a new measurement.

Number of the current series of measurements

The measurement is carried out by applying the measuring probes to the voltage to be measured. A short beep tone is emitted to confirm that the value has been saved. If the surrounding area is too noisy to hear the beep, you can connect the headphone.

Measurements will be saved according to the settings selected in the *AS* pro setup. If the option "manual button off" is selected, the measurement will be stored automatically. If the option "manual button on" is selected, the manual button on the measurement tip must be pressed in order to store the measured value. Depending on the *AS* pro settings, the device will emit different acoustic alarms if a limit value is exceeded or underrun.

If the limit value is exceeded, a short three-beep acoustic signal will sound; if the limit value is underrun, you hear a short two-beep signal. If the measured value is within the limit values, it beeps only once.

When you press [+], the current measurement will be saved immediately. This feature is independent of the selected storage procedure and can be helpful if there are negative voltages, high voltage fluctuations or ripple.

Press [ENTER] to complete the series of measurements.

If there was an error during measurement (e.g. the wrong cell of a storage battery was measured), you can repeat the measurement as often as you like by selecting the corresponding value and simply overwriting it. Press [←] or [→] to move to the beginning or end of the measurement, and press [↑] or [↓] to gradually move back and forth and then overwrite the wrong measurement by a new measurement.

**Please note:**

**If you are at the end of a series of measurements and return to the start of the measurement by pressing the [←] or [↑] key (e.g. for checking the total voltage once again), you have to keep in mind that:**

**If the total voltage is not measured again, but confirmed by pressing [ENTER], the display of the cell number will change to the cell that will be measured next at the end of the series of measurements.**

**If the total voltage is measured again, the display of the cell number changes to cell 001. If you want to save the total series of measurements nonetheless, you have to jump to the end of the series of measurements by pressing the [→] or [↓] arrow keys in order to prevent that the series of measurements only consists of the total voltage measurement. The series of measurements will always be closed at the point where you selected the „Complete series of measurements" menu.**

**If you want to measure the total voltage after a series of measurements is complete, you can also press the [F2] key. In this case, the *AS* pro will go back to the start of the series of measurements (and displays "BAT" in the upper left corner of the display). Now the total voltage can be measured, and immediately after this measurement has been taken, the *AS* pro jumps to the end of the series of measurements, which now can be continued or completed.**

Here is another example of starting a series of measurements:

```
Start 001 Idle 20000
Ident No. Manual
Cyclic storage
↑↓↔    Clear  Enter
```

[ENTER] will start a series of measurements having the sequential number 001. The identification number will be entered manually, and the selected storage procedure is „cyclic". A remaining total of 20,000 measurements can be stored in the memory.
Pressing [CLEAR] will return you to the previous menu item without starting a measurement.

Press [ENTER] to start a series of measurement consisting of cyclic measurements.

Symbol for cyclic measurement and (total) number of saved values.

```
ЛЛ
001      2.35V

F1+     003 ▢■ Enter
```

Number of the current series of measurements

The measured value will be saved immediately after starting the series of measurements. Therefore the *AS* pro should already be connected to the voltage to be measured.
If you press [+], the current measurement will be saved immediately and independently of the time delta (delta-t).
Press [ENTER] to complete the series of measurements.

### 3.2.2  Special Feature for Recording Series of Measurements

During an single or cyclic series of measurements you can interrupt the recording process and power the *AS* pro off. When you power the *AS* pro on again, it resumes recording measurements at exactly the same point where it was interrupted.

### 3.2.3 Completing a Series of Measurements

```
Store with Temperat.          Store with or
Store with Acid Dens          without temperature
Save Test Series
↑↓↔   Clear   Enter           Store with or
                              without density of
                              acid

                              Save
                              Cancel/Abort
```
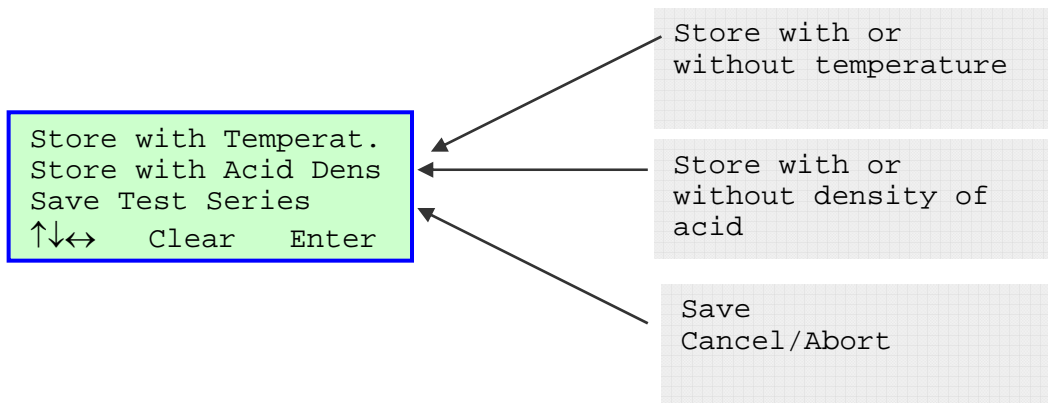
By pressing [CLEAR] you return to the previous menu item.

Press [← ] or [→ ] to toggle between the "with/without temperature input" default. Or press [↑] or [↓] to toggle between the "with/without density of acid" default.

If you have selected input without temperature and without density of acid, the series of measurements will be saved right away by pressing the [ENTER] key.

After pressing [↑] or [↓] to move to the third line, you can toggle between the „Save" and „Cancel/Abort" options. You can now completely cancel/abort the last series of measurements, when you press [ENTER] and confirm the displayed confirmation dialog.

If you have selected "with temperature" and "with acid" as defaults, you can now enter the temperature and the density of acid or an acid density range, (e.g. +27°C and 1.12-1.28 kg/l)

```
Save Test Series
Enter Temperature
[+27]
↑↓↔    Clear   Enter
```

Confirm your input by pressing [ENTER]. Press [CLEAR] to return to the previous menu item.

```
Save Test Series
Enter Acid Density
[1.12-1.28]
↑↓↔    Clear   Enter
```

Confirm your input by pressing [ENTER]. Press [CLEAR] to return to the previous menu item.

If you select `Cancel/Abort`, you will be prompted to confirm this option in order to prevent inadvertent deletion of a series of measurements.

```
Delete Test Series
Are you sure?
        Yes   No
         +    Enter
```

If you press the [+] key, the series of measurements will be **deleted and cannot be recovered**.
By pressing the [ENTER] key, you return to the current series of measurements.

## 3.3  Displaying and Printing Stored Series of Measurements

In the „Display and print measurement" dialog, choose `View Test Series` from the menu which displays after confirming the *AS* pro voltmeter function by pressing [ENTER].

```
Start Data Logging
View Test Series
Delete Test Series
↑↓     Clear   Enter
```

The [↑] and [↓] arrow keys are used to select different features which subsequently are applied by pressing [ENTER]. Press [CLEAR] to return to the voltmeter function.

You have selected `View Test Series`. Press [ENTER] to confirm your selection and go to the menu for selecting a series of measurements. First of all, select the desired series of measurements which you want to display or print.

```
001  00060 Value
470011
13.03.08 11:35:51
↑↓↔    Clear   Enter
```

Series of measurements and number of measured values

Identification number of the storage battery or measurement

Date and (starting) time of

Press the [↑] or [↓] keys if you want to view an overview of the stored series of measurements. Press [↓] to move to next measurement, or press [↑] to return to the previous measurement.
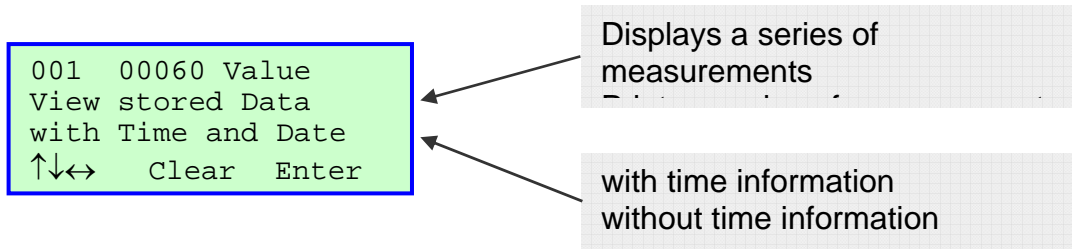Press the [←] arrow key to return to the start (i.e. the first series of measurements), or press the [→] key to move to the end (i.e. the last series of measurements).
Press [ENTER] to confirm the selected series of measurements.
Press [CLEAR] if you want to return to the previous menu item.

### 3.3.1  Displaying Series of Measurements

After you have selected a measurement by pressing [ENTER] you can choose the next menu item. Here you can decide how the measurement should be displayed or printed. A series of measurements can be displayed or printed with or without time information.

```
001   00060 Value
View stored Data
with Time and Date
↑↓↔    Clear   Enter
```

Displays a series of measurements

with time information
without time information

The [↑] and [↓] arrow keys are used to select different features which subsequently are confirmed by pressing [ENTER].
The [←] and [→] arrow keys are used for changing and applying the features of a selected function.
Press [CLEAR] to return to the previous menu item.
Press [ENTER] to confirm the selected series of measurements.

By pressing [↓] or [ENTER] you can move to the next page.

```
00001    12.34V  14:05:09
00002    12.33V  14:05:13
00003    12.32V  14:05:18
00004    12.35V  14:05:23
↑↓↔    Clear   Enter
```

Use the [↑], [↓] or [ENTER] keys to view the stored measurements page by page. Press [↓] or [ENTER] to move to the next page, or press [↑] to return to the previous page.
If you press [←], you will see the first measurements. If you press [→], you can view the last measurements.

A series of measurements will be displayed in the following order:

„Number, voltage, time"

provided that this series of measurements was recorded by using the single storage method.
If you have selected the cyclic procedure when starting a series of measurement, the following order is used:

„Number, time, voltage"

If you have entered values for temperature and density of acid, you will find them at the end of the series of measurements.

```
001   00060 Value
Temperature:+27
Acid density: 1.12-1.23
↑↓↔    Clear   Enter
```

If you want to return to the measurements menu containing the stored measurements, you have to press [CLEAR]. If you press [ENTER], the last values of the series of measurements will be displayed again.

If you measured the total voltage of a series of measurements, the total voltage will be displayed in the top line at the end of the series of measurements.

```
Battery voltage:247.8V
Temperature:+27
Acid density:1.12-1.23
↑↓↔    Clear   Enter
```

### 3.3.2  Printing Series of Measurements

If you want to print a series of , select the `Print measurements` option already described above. Again, you can print this measurement with or without time.

```
001  00060 Value
Print stored Data
with Time and Date
↑↓↔    Clear   Enter
```

The [↑] and [↓] arrow keys are used to select different features which subsequently are applied by pressing [ENTER]. If you press [CLEAR] you will return to the measurements menu containing the stored measurements.

Press [ENTER] to start transmitting the series of measurements to the infrared interface of the powered-on printer.

```
      printing ...

         Clear
```

**Please ensure that there is a direct line-of-sight connection between the *AS* pro and the printer's infrared receiver in order to guarantee error-free data transmission. Make sure that the distance between the *AS* pro and the infrared receiver is not greater than 60 cm.**
You can cancel the data transmission to the printer by pressing [CLEAR]. If the data transmission is complete, you will be returned to selection menu of the stored series of measurements.
By pressing [CLEAR] you return to the previous menu item.

**Please note:**

**Please also read the printer's operating manual thoroughly.**

### 3.3.3  Special Printing Features

When you print out series of measurements, you can also create a description text for the *AS* **pro** printer. This text will precede the series of measurements. The text can contain company information such as the company name, address, tester, customer, etc. that can be assigned to a measurement.

**Please note that this text has to be created by a PC program and subsequently must be transmitted to the *AS* pro.**

### 3.3.4  Printing Example

```
Customer:_____

Battery type:_____

No. of cells:_____

Operating since:_____

Checked during:

Charge........       []
Continuous charge    []
Discharge.....       []
No-load voltage      []

Measurement:001
ID number: 1234
Battery voltage: 18.51V
Start 10.03.00 10:29:51


Cell.... voltage...time
00001     2.31V  10:30:00
00002     2.32V  10:30:04
00003     2.30V  10:30:09
00004     2.33V  10:30:16
00005     2.32V  10:30:22
00006     2.30V  10:30:28
00007     2.31V  10:30:33
00008     2.32V  10:30:39
```

This example illustrates a header that helps the tester to manually add certain information in the field. The actual series of measurements starts with the sequential number, the identification number (ID number) and the starting time of the measurement. Subsequently all of the measured voltage values will be printed. If you do not want to print certain time information of individual measurements, disable that function in the corresponding menu.

## 3.4  Deleting Measurements

From the main menu choose `Delete measurements`. Select this menu from the menu which appears after pressing the [ENTER] key in the *AS* pro voltmeter function.

```
Start Data Logging
View Test Series
Delete Test Series
↑↓     Clear    Enter
```

The [↑] and [↓] arrow keys are used for selecting different features which subsequently are applied by pressing [ENTER]. Press [CLEAR] to return to the previous menu.

When you have pressed [ENTER] to select `Delete Test Series,` you will be prompted to confirm this option in order to prevent inadvertent deletion of all series of measurements.

```
Delete all !!!
Are you sure?
          Yes  No
           +    Enter
```

**If you press the [+] key, <u>all</u> series of measurements will be irretrievably deleted and cannot be recovered.**
By pressing [ENTER] you can return to the main menu **without** deleting the series of measurements.

## 3.5  Using the Battery Charger

### 3.5.1  State of Charge Display

A battery symbol on the *AS* pro's LCD illustrates the state of charge. It has a resolution of about 10%. Thus you can determine the *AS* pro's remaining operating time at any time (see specifications).

Full accumulator

Half-full accumulator
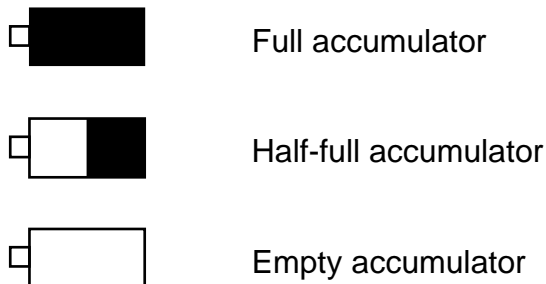
Empty accumulator

### 3.5.2  Charging Procedure

When the battery symbol signals an insufficient remaining operating time, you should recharge the accumulator of the device. Use the supplied battery charger for this purpose. At first connect the battery charger to the *AS* pro and then plug it into the mains socket.

**Please note:**

The *AS* pro must be powered off during charging so that the battery charger can recognize fully charged storage batteries.

Please let the battery charger load until the float charge mode is achieved. This is indicated by a **continuously flashing green LED**. Only then the "full" charge state will be taken over when powering the *AS* pro on.

These are the different states of charge:

- yellow LED:         flashes          - initializing (test phase)
- orange LED:         flashes          - quick charge
- green/yellow LED:   blinks       - recharge (storage batteries are not fully charged yet)
- green LED:          flashes          - float charge (storage battery is fully charged)

# 4  Troubleshooting

## 4.1  Voltage Measurement Problems

| Error description | Possible cause | Measures to be taken |
|---|---|---|
| No measurement | No contact to the voltage to be measured | Use new measuring probes |
| No measurement | Defective measurement leads | Use new measurement leads |
| No measurement storage | Measurements have not been started | Select "Start Data Logging" in the *AS* pro menu |
| No measurement storage | Wrong storage method selected | Preselect *single* storage in the *AS* pro menu |
| No measurement storage | Wrong *AS* pro parameter settings for min. value, hysteresis, ripple | Transmit new settings to the *AS* pro |
| No measurement storage | Wrong *AS* pro parameter settings for manual button | Transmit new settings to the *AS* pro |
| No measurement storage | Ripple of the voltage to be measured is too high | Press the „+" key for manual storage or change ripple setting |
| No cyclic storage of the measurement | Wrong storage method selected | Preselect *cyclic* storage in the *AS* pro menu |
| Wrong cycle time when storing voltages | Wrong AS pro parameter settings for delta-t time | Transmit new settings to the *AS* pro |

## 4.2 Problems with the operating time/powering-on

| Error description | Possible cause | Measures to be taken |
|---|---|---|
| Device cannot be powered on | Empty accumulators | Connect *AS* pro to the battery charger and charge until the full charge symbol appears |
| Device cannot be powered on | „Enter" key was not pressed long enough | Press „Enter" key for at least 1 second |
| No display on the LCD | Wrong contrast setting | Increase *AS* pro LCD contrast by pressing F4/F7 function keys |
| Operating time is too short | Defective accumulators | Have the *AS* pro repaired |

## 4.3 Printing Problems

| Error description | Possible cause | Measures to be taken |
|---|---|---|
| Measurements do not print | Printer is powered of (Power LED does not flash) | Power on the printer |
| Measurements do not print | Printer is offline (online LED does not flash) | Press online button |
| Measurements do not print | Printer ran out of paper | Insert new paper roll |
| Measurements do not print | Defective patch cord for infrared adapter and printer | Connect a new cable |
| Measurements do not print | Defective infrared adapter | Use PC to check infrared adapter and replace if defective |
| Measurements do not print | Defective printer power supply | Use new plug-in power supply (take care of polarity and voltage) |
| Measurements do not print | Empty printer accumulator | Connect printer to plug-in power supply and recharge (see printer manual for more details) |
| Faulty measurement printout | Optical distance between *AS* pro and printer is too high | Reduce distance between infrared adapter and *AS* pro |

## 4.4 Problems with the infrared connection to the PC

| Error description | Possible cause | Measures to be taken |
|---|---|---|
| No communication between *AS* pro and PC | No direct line-of-sight connection between *AS* pro and the PC's infrared adapter | Reduce distance between infrared adapter and *AS* pro (refer to specifications) |
| No communication between *AS* pro and PC | No direct line-of-sight connection between *AS* pro and the PC's infrared adapter | Align infrared adapter and *AS* pro |
| No communication between *AS* pro and PC | Wrong COM port preselected in the software | Select the correct COM port to which the infrared adapter connects |
| Communication errors between *AS* pro and PC | Optical distance between *AS* pro and PC is too high | Reduce distance between infrared adapter and *AS* pro |
| Communication errors between *AS* pro and PC | Defective infrared adapter | Use PC to check infrared adapter and replace if defective |
| Communication errors between *AS* pro and PC | A series of measurements is active in the *AS* pro | Complete and close the series of measurements |
| No measurement storage | A series of measurements is active in the *AS* pro | Complete and close the series of measurements |

## 4.5 Troubleshooting problems when reading RFID transponder data

| Error description | Possible cause | Measures to be taken |
|---|---|---|
| No communication between *AS* pro and RFID transponder | Distance between *AS* pro and RFID transponder is too long | Reduce the distance between RFID transponder and *AS* pro (see specifications) |
| No communication between *AS* pro and RFID transponder | Wrong RFID transponder type selected | Use the F6 key or PC software to select the correct type |
| No communication between *AS* pro and RFID transponder | RFID transponder is defect | Try a new or another RFID transponder |
| No communication between *AS* pro and RFID transponder | RFID transponder is attached to aluminum (or another inadequate material) | Attach the RFID transponder to another material |

# 5  Maintenance

## 5.1  Cleaning

For cleaning the *AS* pro, moisten a soft cloth with lukewarm water, carefully wipe the *AS* pro and rub it dry with a clean cloth. Do not use any solvents or aggressive detergents, since they may damage the surface of the casing. Wipe the LCD with a soft cloth to prevent the display from getting scratched.

A soft and dry anti-static cloth is sufficient for cleaning slight soiling.

## 5.2  Maintenance

The *AS* pro operates almost maintenance free. To maintain the accumulators' durability, do not store the *AS* pro in a discharged state for a longer period of time.

Periodically submit the device for calibration to ensure that the specifications will be maintained (see specifications for calibration intervals).

Ensure that the *AS* pro and all of its accessories are in a perfect condition before commissioning and using them. Do not use the device if you notice signs of damage on casing, connectors and cables.

Also read the "Safety Information" chapter thoroughly before using this device.

# 6 Accessories and replacement parts

## 6.1 Accessories

| Article number | Designation |
|---|---|
| 00963-0600.00 | Thermal printer for the *AS* pro, including power supply/battery charger, battery pack, paper roll, patch cord for infrared transmitter, infrared transmitter |
| 00963-0406.00 | Headphone with patch cord for the *AS* pro |
| 00963-0408.00 | Beep Transmitter 85db(A)-1m for *AS* pro |
| 00963-0410.00 | RFID Transponder 50mm Unique round |
| 00963-0410.01 | RFID Transponder ISO Smart Card Hitag1 |
| 00963-0410.02 | RFID Transponder ISO Smart Card Hitag2 |
| 00963-0500.02 | Windows Toolkit Software CD V2.x for *AS* pro |
| 00963-0500.05 | Windows Toolkit Software CD Update for *AS* pro |
| 00963-0501.00 | Infrared transmitter for *AS* pro / thermal printer |
| 00963-0502.00 | Adapter 9/25pol. *AS* pro Infrared transmitter |
| 00963-0700.00 | Windows Data processing Software CD V2.x for *AS* pro |
| 00963-0700.05 | Windows Data processing Software CD Update for *AS* pro |
| 00963-0800.00 | Handheld Density Meter DMA 35n |
| 00963-0800.01 | Handheld Density Meter DMA 35n Ex |
| 00963-0801.00 | RS232/IR-patch cord for DMA 35n |
| 00963-0802.00 | Transport case for DMA 35n |
| 00963-0805.00 | RFID Transponder Reader and Programmer USB |

## 6.2  Replacement parts

| Article number | Designation |
|---|---|
| 00963-0401.00 | Foam-padded *AS* pro case |
| 00963-0402.01 | *AS* pro battery charger |
| 00963-0403.00 | Set of red and black measurement leads (1.5 m long) |
| 00963-0403.01 | Set of red and black measurement leads (2.0 m long) |
| 00963-0403.02 | Set of red and black measurement leads (1.5 m long) with button |
| 00963-0404.00 | Patch cord with 3.5 mm jack for *AS* pro headphone |
| 00963-0405.03A | English *AS* pro Operating Instructions |
| 00963-0601.00 | *AS* pro thermal printer |
| 00963-0602.00 | Power supply/battery charger for the *AS* pro thermal printer |
| 00963-0603.00 | Patch cord for infrared transmitter of *AS* pro thermal printer |
| 00963-0604.00 | Battery pack for the *AS* pro thermal printer |
| 00963-0605.00 | Paper roll for the *AS* pro thermal printer |