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1. **General description**

RS / RSi series electronic scales are destined for laboratory works which require high accuracy and for wide range of technical purposes as well. RSi balances have internal calibration, which corrects weighing precision during exploitation. RS series are not equipped with internal calibration system. All scales are metrologically tested by manufacturer. All balances can be prepared to comply with verification requirements but legally verification is not possible yet. According to an order balances can be calibrated.

NACE classification: 33.20.31.

2. **Set**

Standard set consists of:
1. Scale
2. Feeder
3. Draft shield with cover,
4. User manual
5. Guarantee card
3. **Safety rules**

It is necessary to follow safety rules of work with the scale shown below. Obeying those rules is the condition to avoid electrical shock or damage of the scale or connected peripheral devices.

- All repairs and necessary regulations can be made by authorised personnel only.
- To avoid fire risk use a feeder of an appropriate type (if feeder is supplied with the scale) and supply voltage has to be compatible with specified technical data.
- Do not use the scale when its cover is opened.
- Do not use the scale in explosive conditions.
- Do not use the scale in high humidity environment.
- If the scale seems not to operate properly, switch it off and do not use until checked by authorised service.

According to current acts of low about protection of natural environment, wasted scales should not be put into waste containers together with ordinary waste.

- Wasted scale after operation period can be delivered to units authorized for gathering wasted electronic devices or to the place where it was bought.
4. **Technical data**

<table>
<thead>
<tr>
<th>Type</th>
<th>RS 220</th>
<th>RS 320</th>
<th>RS 520</th>
<th>RS 1200</th>
<th>RS 2200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load (Max)</td>
<td>220g</td>
<td>320g</td>
<td>520g</td>
<td>1200g</td>
<td>2200g</td>
</tr>
<tr>
<td>Readout unit (d)</td>
<td>0,001g</td>
<td>0,001g</td>
<td>0,001g</td>
<td>0,01g</td>
<td>0,01g</td>
</tr>
<tr>
<td>Verification plot (e)</td>
<td>0,01g</td>
<td>0,01g</td>
<td>0,01g</td>
<td>0,1g</td>
<td>0,1g</td>
</tr>
<tr>
<td>Tare range</td>
<td>-220g</td>
<td>-320g</td>
<td>-520g</td>
<td>-1200g</td>
<td>-2200g</td>
</tr>
<tr>
<td>Accuracy class</td>
<td>II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working temperature</td>
<td>+10°C +40°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighing time</td>
<td>&lt; 3s</td>
<td></td>
<td>&lt; 2s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pan dimension</td>
<td>Ø115mm</td>
<td></td>
<td>Ø150mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td>185x290x90mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>In standard: RS232C and USB (ATA) Options: LAN, Wi-Fi or RS485</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply</td>
<td>~230V 50Hz 6VA / =12V 1,2A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale weight</td>
<td>ATA: 2,6kg</td>
<td>ATZ: 2,1kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended standard of mass</td>
<td>F2 200g</td>
<td>F2 200g</td>
<td>F1 500g</td>
<td>F2 1000g</td>
<td>F2 2000g</td>
</tr>
</tbody>
</table>

**Note:**
F2 and F1 are names of international calibration weight classes according to O.I.M.L. Requirements about calibration weight accuracy are connected with these classes.
5. **General scale view**

**RS-320 / RS-320i**

1 – pan  
2 – pan support  
   (under pan)  
3 – pan ring  
   (against blows)  
4 – display LCD  
5 – keys  
6 – rotating legs  
7 – water level  
8 – draft shield  
   (option)  
9 – draft shield cover  
   (option)

**RS-2200 / RS-2200i**

1 – pan  
2 – pan support  
3 – information window  
4 – display LCD  
5 – keys  
6 – rotating legs  
7 – level
Connectors view:
6. **Keys and indicators**

![Image of a digital scale interface]

**key**
- `I/Ω` - switch on / switch off (standby),
- `T` - taring (storing package mass subtracted from weighed mass),
- `→0←` - change mode of balance work,
- `→0←` - zeroing the scale when pan is empty (option),
- `MENU` - special function menu,
- `→` - result printout,
- `▼` - internal calibration / changing menu position,

**indicator**
- `→0←` - zero indicator (when scale pan is empty),
- `▼` - indicator of weighing result stabilisation,
- `NET` - net mass (after use of `→T←` key),
- `MODE` - indicator of switching special function on,
- `OFF` - switching scale with `Ω` key (standby),
- `pcs` - indication in pieces

The use of keys during entering numeric values (special functions):
- `▼` - increment current digit,
- `kiye` - insert comma,
- `→T←` - move to next position,
- `MENU` - finish entering

*Note:*
- `→0←` keys and `→0←` indicators only work in balances with d=e.
7. **Preparing working environment**

Location for the scale should be chosen with care in order to limit influence of the factors that can interrupt working scale. This location has to maintain proper temperature for working scale and necessary space for its operating. The scale should stay on stable table made of material that does not influence magnetically on the scale.

Rapid air blasts, vibrations, dust, rapid temperature changes or air humidity over 90% are not allowed in scale surrounding. The scale should be far from heat sources and devices emitting strong electromagnetic or magnetic fields.
8. **Preparing scale to work**

1. Take the scale and feeder out of the package. It is recommended to keep the original scale package in order to transport the balance safely in future.
2. Place the scale on a stable ground not affected by mechanical vibrations and airflows.
3. Level the scale using rotating legs so that the air bubble in water level at the back of the scale is in the middle.
4. Put draft shield on the scale and cover on it.

Scale should be transported in the way, that there is no risk of accidental pressing or overweighing a pan.

If the scale was taken from a lower temperature surrounding to a room with higher temperature, e.g. in winter, moisture can liquefy on the scale casing. Do not connect power supply to the scale, because this can cause damage or improper work of the scale. In this case leave the scale for at least 4 hours unplugged for acclimatization.
9. **General operation principles**

1. In order to confirm correctness of the scale during its operation, before starting and after finishing every valid measurement series it is recommended to check weighing accuracy putting calibration weight or other object of exactly known mass on the scale. In the case when allowable measurement error of the scale is exceeded, it is recommended to perform calibration with external weight or contact authorised service centre.

2. Weighed mass should be placed in the middle of the pan.

3. The scale allows taring in the whole measuring range. To tare the scale press \( \rightarrow T \leftarrow \) key. Taring does not extend measuring range, but only subtracts tare value from mass value of a sample placed on the pan. To make the control of a load on the pan easier and to avoid exceeding measurement range, the scales have load indicator calibrated 0÷100%.

4. Weighing result should be read when the indicator \( \rightarrow T \leftarrow \) lights, which signalises result stabilisation.

5. When the scale is not used but it is necessary for it to be ready to work, it can be switched off by pressing I/O key. The scale reading system is then switched off and scale goes to standby mode signalled with OFF indicator. Switching the scale on is performed by pressing I/O key.

6. In sales having \( \rightarrow 0 \leftarrow \) key (zeroing) active it should be checked if zero indicator \( \rightarrow 0 \leftarrow \) is displayed before sample is placed on the pan. If not, press \( \rightarrow 0 \leftarrow \) key and wait until the scale is zeroed and zero indicator appears. After that load can be placed on scale pan.

7. Scale mechanism is a precise device sensitive to overweight, mechanical shocks and strokes.

8. After every change of balance position, level the balance and perform internal calibration.

```
Do not overload the scale more than 20% of maximum capacity.
Do not press the pan with a hand.

For transportation time, pan support and pan ring should be packed separately.
```
10. **Internal calibration**

**RS / RSi** balances are equipped with internal calibration system, which general task is to maintain required measurement accuracy.

Internal calibration is the process of putting internal weight on automatically by balance mechanism and correcting accuracy in balance firmware. The correction is necessary because of differences between values of gravitational acceleration in the place where the balance was manufactured and in the place where it is operated, as well as due to changes of balance level and temperature.

Internal calibration is performed in the following situations:
- when ▼ key is pressed twice,
- after defined time interval (for balances comply with verification requirements - 2 hours),
- after temperature change (for balances comply with verification requirements – more than 1°C).

For balances comply with verification requirements time interval is set to 2 hours and defined temperature change is 1°C. In other balances those values can be set as calibration options. The reason of starting internal calibration is shown as an icon near weight picture.

In order to perform internal calibration proceed with the following:

Empty the pan.

Press ▼ key twice (double pressing the key helps to avoid accidental starting calibration procedure).

During calibration internal weight is put three times on and obtained results are compared.

Discrepancy of results is signalled with a message and causes the balance being blocked.

Until calibration process is finished do not perform any operation on the balance. Any vibrations and shocks interfere calibration process and may delay it or deteriorate accuracy of its result.

When internal calibration is performed successfully the balance indicates zero on the display at empty pan.
**10. Internal calibration**

The ATA balances are equipped with internal calibration system, which general task is to maintain required measurement accuracy. Internal calibration is the process of putting internal weight on automatically by balance mechanism and correcting accuracy in balance firmware. The correction is necessary because of differences between values of gravitational acceleration in the place where the balance was manufactured and in the place where it is operated, as well as due to changes of balance level and temperature.

Internal calibration is performed in the following situations:
- when key is pressed twice,
- after defined time interval (for balances comply with verification requirements – 2 hours),
- after temperature change (for balances comply with verification requirements – more than 1°C).

For balances comply with verification requirements time interval is set to 2 hours and defined temperature change is 1°C. In other balances those values can be set as calibration options. The reason of starting internal calibration is shown as an icon near weight picture.

In order to perform internal calibration proceed with the following:
- Empty the pan.
- Press key twice (double pressing the key helps to avoid accidental starting calibration procedure).
- During calibration internal weight is put three times on and obtained results are compared.
- Discrepancy of results is signalled with a message and causes the balance being blocked.
- Until calibration process is finished do not perform any operation on the balance. Any vibrations and shocks interfere calibration process and may delay it or deteriorate accuracy of its result.
- When internal calibration is performed successfully the balance indicates zero on the display at empty pan.

**Note:**
In order to terminate internal calibration process in balances that do not comply with verification requirements press key and wait until balance mechanism is settled in initial position.

**11. Checking the balance**

In order to confirm correctness of the balance during its operation, before starting and after finishing every measurement series it is advised to check weighing accuracy. It can be done by weighing external calibration weight or other object with exactly known mass.

If exceeding of allowable measurement error is affirmed, the following things should be checked:
- if the balance stands stable and it is levelled,
- if the balance is exposed on rapid air blasts, vibrations, rapid temperature changes or air humidity,
- if the balance is not affected directly by heat source, electromagnetic radiation or magnetic field.

The cause of inaccuracy can be too low temperature of the balance as well, when it was unplugged from power supply. In this situation leave the balance switched on for several minutes in order to adjust its internal temperature.

If none of above causes of inaccuracy occurs, calibration with external weight should be performed to the balance. Recommended external calibration weight (to buy for additional charge) is given in technical data table. In order to calibrate the balance with external weight in legally verified balances verification seals should be removed and another legal verification should be performed. In this case it is recommended to contact authorized service centre.

Calibration with external weight is described in details in chapter 17.1.
12. **Connection with a computer or a printer**

The scale is equipped with RS232C, which can be used to connect external devices such as computer or a printer.

When cooperating with computer, the scale sends weighing result after initialize signal from computer or after pressing key on the scale. When cooperating with a printer data is send automatically after result stabilisation, but next transmission is possible after removing previously weighted sample.

When cooperating with label printer after pressing key, the scale sends instructions set for the label printer. Label number 0001, hour, data (if the clock is installed and on) and nett weight. During transmission communicate is displayed. The way of sending data and transmission parameters is set using special function. Set of send data is set using special function Print.

The following data can be send:

- Header (scale type, Max, d, e, serial number),
- Operator identification number,
- Successive printout number (measurement),
- Identification number or product bar code,
- Number of pcs (PCS function only),
- Single detail mass (PCS function only),
- Nett weight,
- Tare (package mass),
- Gross weight,
- Total mass (Total function only).

If the scale is equipped with two serial joints Print function is set independently for both interfaces.

Computer must have a special program for cooperation with data from a scale. Dedicated programs are also offered by AXIS.

Except RS232C joint, the scale can be equipped with USB or Wi-Fi interface. Needed controllers and instruction can be found on a CD supplied with Axis scales.
12. Connection with a computer or a printer

The scale is equipped with RS232C, which can be used to connect external devices such as computer or a printer.

When cooperating with computer, the scale sends weighing result after initialize signal from computer or after pressing \texttt{key} on the scale.

When cooperating with a printer data is send automatically after result stabilization, but next transmission is possible after removing previously weighted sample.

When cooperating with label printer after pressing \texttt{key}, the scale sends instructions set for the label printer. Label number 0001, hour, data (if the clock is installed and on) and nett weight. During transmission label is displayed.

The way of sending data and transmission parameters is set using \texttt{SE\_R\_IAL} special function.

Set of send data is set using special function \texttt{Pr\_Int}.

The following data can be send:

- Header (scale type, Max, d, e, serial number),
- Operator identification number,
- Successive printout number (measurement),
- Identification number or product bar code,
- Number of pcs (PCS function only),
- Single detail mass (PCS function only),
- Net weight,
- Tare (package mass),
- Gross weight,
- Total mass (Total function only).

If the scale is equipped with two serial joints \texttt{Print} function is set independently for both interfaces.

Computer must have a special program for cooperation with data from a scale. Dedicated programs are also offered by AXIS.

Except RS232C joint, the scale can be equipped with USB or Wi-Fi interface.

Needed controllers and instruction can be found on a CD supplied with Axis scales.

12.1 Detailed protocol description in standard mode

\textit{Long protocol}

Transmission proceeds in the following way:

1. Communication parameters: 8 bits, 1 stop bit, no parity, baud rate 4800bps,
2. Available orders send from computer and balance answers:

- Readout of scale indication (corresponds to pressing \texttt{key})

  \texttt{Computer\rightarrowScale: S I CR LF (53h 49h 0Dh 0Ah)},
  \texttt{Scale\rightarrowComputer: scale response according to description below (16 bytes)}:

<table>
<thead>
<tr>
<th>Byte</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>sign \texttt{&quot;\text{-&quot;} or space}</td>
</tr>
<tr>
<td>2</td>
<td>space</td>
</tr>
<tr>
<td>3÷4</td>
<td>digit or space</td>
</tr>
<tr>
<td>5÷9</td>
<td>digit, decimal point or space</td>
</tr>
<tr>
<td>10</td>
<td>digit</td>
</tr>
<tr>
<td>11</td>
<td>space</td>
</tr>
<tr>
<td>12</td>
<td>\texttt{k, l, c, p} or space</td>
</tr>
<tr>
<td>13</td>
<td>\texttt{g, b, t, c} or %</td>
</tr>
<tr>
<td>14</td>
<td>space</td>
</tr>
<tr>
<td>15</td>
<td>\texttt{CR}</td>
</tr>
<tr>
<td>16</td>
<td>\texttt{LF}</td>
</tr>
</tbody>
</table>

\textit{Attention:}

Network number different than zero (\texttt{SE\_R\_IAL / nr} function) changes scale working mode: communication with a computer is possible after logging the scale in with 02h scale number command. To log the scale out use 03h command.

For example: Using a program to test RS232 interface (program is available on \texttt{www.axis.pl} in computer programs section) for scale number 1 please write: \$0201 to log in, then \texttt{SI}, and write: \$03 to close communication.

- Asking for scale presence in system (testing scale connection with computer):

  \texttt{Computer\rightarrowScale: S J CR LF (53h 4Ah 0Dh 0Ah)},
  \texttt{Scale\rightarrowComputer: M J CR LF (4Dh 4Ah 0Dh 0Ah)},

- Displaying a sign on scale display (text message from computer):

  \texttt{Computer\rightarrowScale: S N n n X X X X X X CR LF (53h 4Eh 0Dh 0Ah)}, \texttt{nn-displaying time in seconds; XXXXXX-signs to display}
  \texttt{Scale\rightarrowComputer: M N CR LF (4Dh 4Eh 0Dh 0Ah)},

- Scale tarring (calling \texttt{T\rightarrow key press}):

  \texttt{Computer\rightarrowScale: S T CR LF (53h 54h 0Dh 0Ah)},
  \texttt{Scale\rightarrowComputer: without response},

- Scale zeroing (calling \texttt{0\leftarrow key press}):

  \texttt{Computer\rightarrowScale: S Z CR LF (53h 5Ah 0Dh 0Ah)},
  \texttt{Scale\rightarrowComputer: without response},
- Scale turning on / off (calling I/O key press):
  Computer → Scale: S S CR LF (53h 53h 0Dh 0Ah),
  Scale → Computer: without response,

- Entering to special function menu (calling MENU key press):
  Computer → Scale: S F CR LF (53h 46h 0Dh 0Ah),
  Scale → Computer: without response,

- Setting low threshold value (option):
  Computer → Scale: S L D1...DN CR LF (53h 4Ch D1...DN 0Dh 0Ah),
  D1...DN – threshold value, maximum 8 characters ("-" – negative value, digits, dot – decimal separator), number of digits after dot should be the same as on scale display,
  Scale → Computer: without response,

  Example:
  - in order to set low threshold 1000g in scale B1.5 (d=0.5g) the following order should be sent:
    S L 1 0 0 0 . 0 CR LF (53h 4Ch 31h 30h 30h 30h 2Eh 30h 0Dh 0Ah),
  - in order to set low threshold 100kg in scale B150 (d=50g) the following order should be sent:
    S L 1 0 0 . 0 0 CR LF (53h 4Ch 31h 30h 30h 2Eh 30h 30h 0Dh 0Ah),

- Setting high threshold value (option):
  Computer → Scale: S H D1...DN CR LF (53h 48h D1...DN 0Dh 0Ah),
  D1...DN – threshold value (see )
  Scale → Computer: without response.

**Connecting cable WK-1** (scale – computer / 9-pin interface):

**Connecting cable WD-1** (connects printer with scale):

**AXIS C-001 printer internal switches setting:**

<table>
<thead>
<tr>
<th>SW-1</th>
<th>SW-2</th>
<th>SW-3</th>
<th>SW-4</th>
<th>SW-5</th>
<th>SW-6</th>
<th>SW-7</th>
<th>SW-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>on</td>
<td>off</td>
<td>on</td>
<td>off</td>
<td>off</td>
<td>on</td>
<td>off</td>
<td>off</td>
</tr>
</tbody>
</table>
12.2 Protocol ELTRON description

Transmission parameters: 8 bits, 1 stop bit, no parity, baud rate 9600bps,

- After using key in scale:
- Scale→Label printer: set of instruction in EPL-2 language that initialize label printing:

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>US FR&quot;0001&quot;</td>
<td>Steering instruction</td>
</tr>
<tr>
<td>?</td>
<td>Label number define instruction</td>
</tr>
<tr>
<td>mm:gg</td>
<td>Instruction that starts list of variable signs</td>
</tr>
<tr>
<td>rrrr.mm.dd</td>
<td>5 signs: minutes:hour</td>
</tr>
<tr>
<td>masa</td>
<td>10 signs: year:month:day</td>
</tr>
<tr>
<td>P1</td>
<td>10 signs: scale indication+ mass unit</td>
</tr>
</tbody>
</table>

Attention:

1. Except variable signs constant signs can also be inscribed e.g. factory name, product name and so on.

2. In standard only one label pattern is possible to printout (number 0001). Using bigger amount of patterns (other label numbers) is possible thanks to LABEL special function.

3. To achieve label printout, label printer must have inscribed label pattern (label pattern is created on computer and using computer it is saved to label printer memory). Label pattern is designed by ZEBRA DESIGNER program which is supplied together with label printer.

Scales parameters and transmission protocol must correspond to label printer type.
13. **Start-up**

Plug feeder into ~230V power supply socket. When the pan is empty plug feeder output connector into 12V socket at back of the scale. Autotests and internal calibration will be performed.

Autotest of balance display.
(autotests of internal electronic elements C1:8 displayed only when any test result is negative)

Showing scale program version.

Internal calibration – 45 seconds (press ▼ key if You want to terminate calibration)

Ready to work.

Attention: *UnLOAd* communicate means that the balance is loaded or the transport securing elements were not clear away.

It is recommended that before you start measuring the internal temperature has stabilized weight. For this to happen, the weight should remain enabled for at least 2 hours. To maintain the accuracy of the weight it is not recommended to turn off the power.
14. Weighing with tare

If the scale is not loaded and \( \to 0 \to \) indicator doesn't indicate, press \( \to 0 \to \) key.

Zero indication and \( \to 0 \to \) indicator mean that the scale is ready to work.

After putting container (package) tare the scale using \( \to T \to \) key. NET indicator will show up.

Put on weighted object and readout net weight (NET indicator shows that scale indicates net weight).

In order to readout gross weight press \( \leftrightarrow \) key (B/G indicator shows that scale indicates gross weight). Press again \( \leftrightarrow \) key in order to come back to net indications.
15. **Scale menu**

All scales except for basic metrological functions: weighing and taring, have many special functions and configuration options.

In order to ease using functions user can create his own (personalized) menu.

**Creating personalized menu:**

In „out of the box” scale after pressing *MENU* key only *SEtuP* option (it contains all configuration options) is available.

One of the configuration options is *Menu* that is used to create personalized menu.

To add a function to personalized menu press →*T*← key when the function is indicating.

Chosen function is indicated with „o” sign on the left side of display.

After adding all necessary functions press *out* in order to come back to weighing mode. User now after pressing *MEnu* key has access to selected earlier functions and to *SEtuP* option. *dEFAULT* option is used to set factory settings.
16. **Menu navigation rules**

*Choosing menu options:*

Scale menu shows up after pressing *Menu* key. First menu position is displayed for about 10 seconds. After 10 seconds successive menu positions are displayed automatically.

*Choosing menu position (option) is done by pressing* $\rightarrow T \leftarrow$ *key when it is displayed on the screen.*

*After choosing position (option) usually several options show up:*

- *on* – turning on selected option,
- *OFF* - turning off,
- *out* – out to menu.

*Accelerated working with menu:*

First menu position is displayed for about 10s. User can change menu positions manually by pressing $\downarrow$ key.

*Immediate out to previous menu level is done by using* *Menu* *key.*
**Key working method:**

During standard weighing, the key is used to switch between net and gross indication.

When special function e.g. PCS is turned on, using the key enables to go back to standard weighing mode.

Sign „o“ on the left side signalizes that special function is turned on and user can go back to function mode by pressing the key.
**Inscribing numerical values:**

Inscribing numerical values is needed in some special functions e.g. tArE function requires to inscribe tare values.

**Keys:**

- $\text{decimal point}$,
- $\rightarrow T \leftarrow$ - next digit position,
- $\uparrow$ - increasing digit inscribed value (use also $\rightarrow 0 \leftarrow$),

$\text{MENU}$ – end of inscribing.
Menu diagram:

- personalized function menu created using SETUP / MEnu

- settings
  - creating menu ("o" added to menu)
    - choosing product
    - choosing user
    - pieces counting function
    - actual unit selection
    - percentage conversion function
    - animals weighing function
    - tare memory bank
    - maximum value function
    - summation series of measurements function
    - threshold values comparing function
    - statistics function
    - recipe weighing function
    - exit

- sensitivity calibration (only not verified scales)
  - fast calibration (without confirmation of putting weight)
  - calibration with confirmation
  - calibration report printout
  - internal calibration time interval
  - internal calibration temperature interval
  - exit

- autozeroing
  - autozeroing on
  - autozeroing off (lasts 10min)
  - exit

- unit choice
  - carat
  - miligram
  - kilogram
  - pound
  - ounce
  - aphotecary ounce
  - gram
  - jednoska jubilerska
  - exit
**Menu diagram:**

**key**
- **(PCS)**
- **(tотAL)**
- **out**

**SEтUP**
- **Prod**
- **USEr**
- **PCS**
- **Unit**
- **PErc**
- **LOC**
- **tArE**
- **UP**
- **tотAL**
- **thr**
- **StAt**
- **rECIPE**
- **(o)**
- **(o)**

**MEnu**
- **CALIb**
- **AutoZEr**
- **UnIt**
- **CAL on**
- **CAL StP**
- **CAL Prn**
- **CAL tM**
- **CAL C**
- **(out)**
- **Aut on**
- **AUt OFF**
- **(out)**

**CAрAt**
- **(ct)**
- **MGrAM**
- **(mg)**
- **HGrAm**
- **(kg)**
- **Pound**
- **(Ib)**
- **ounCE**
- **(oz)**
- **ounCE**
- **(ozt)**
- **GrAin**
- **(pennyweight)**
- **(jednostka jubilerska)**
- **GrAM**
- **(g)**

**out**
- **Unit choice**
- **carat**
- **miligram**
- **kilogram**
- **pound**
- **ounce**
- **aphotecary ounce**
- **grain**
- **(exit)**

**SERiAL**
- **Print**
- **Port-1**
- **Port-2**

**Port-1**
- **bAUd**
- **bIts**
- **PArity**
- **SEndInG**
- **Prot**
- **SCAnn**
- **(out)**

**Port-2**
- **out**

**Print**
- **Port-1**
- **Port-2**

**Port-1**
- **HEAdEr**
- **User Id**
- **dAtE**
- **tIME**
- **Prn no**
- **Prod Id**
- **Prod bA**
- **Prod nA**
- **Cont**
- **APW**
- **nEt**
- **P tArE**
- **Gross**
- **tотAL**
- **nr LCD**
- **(out)**

**Port-2**
- **(as above)**

**out**
- **(as above)**

**datE**
- **dAt oFF**
- **dAt on**
- **dAt SEt**
- **dAt PlIn**
- **dat For**
- **tM For**
- **(out)**

**out**
- **setting time and date (if the scale is equipped with clock)**
- **date and time off**
- **date and time on**
- **set date and time**
- **accoes code**
- **data format**
- **time format**
- **exit**

**- serial ports settings settings**
- **port - 1**
- **transmission speed (1200, ... ,115 200 bps)**
- **bits quantity (7 or 8)**
- **parity control**
- **transmission type (Stab, no StAb, Auto,Cont.,rEMoVE)**
- **protocol (LonG, EPL, EPL_A, EPL-d, PEn-01)**
- **barcode reader MJ4209 cooperation**
- **(exit)**

**- port-2 (as above)**

**- printout data configuration / transmission**
- **port - 1**
- **header (scale type, Max, d, e, serial nr)**
- **scale operator id number**
- **data**
- **time**
- **sucsessive printout/measurement number**
- **product identification number**
- **product barcode number**
- **product name**
- **pieces quantity (PCS function)**
- **product unit weight**
- **net weight**
- **package weight (tare)**
- **gross weight**
- **total weight (tотAL function)**
- **measurement number and value in one line printout**
- **exit**

**- port-2 (as above)**

**- exit**
(bAttEry) - turn on/off accumulator charging (if the scale is equipped with accumulator)

(AUto OFF) - automatic turning off - saving accumulator power (as above)

(ZEro) - scale start zero inscribing (factory zero)

dEFAULT - restore default settings for all options

SERVICE - options only for service

out - exit
17. Scale setup (SEtUP)

SEtUP contains all options used for setting scale work mode:

- **MEnu** – creating personalized user menu,
- **CALib** – scale sensitivity calibration,
- **AutoZEro(ing)** – self-maintaining zero indication (unloaded scale),
- **UnIt** – weight unit selection,
- **SErIAL** – setting serial ports,
- **Print** – transmission (printout) data selection,
- **dAIE** – inscribing actual date and time,
- **dEFAUlt** – reset to factory settings,
- **SErVICE** – service menu (only for service).
17.1 Scale calibration (CALib)

Calibration with external weight should be performed if balance accuracy after internal calibration is not satisfactory. Calibration weight stated in technical data table for the balance (or of better accuracy) with valid verification certificate should be used then.

Calibration of legally verified balance requires violating a mark used to protect an access to adjustment switch and results in loosing legal verification. To renew legal verification of the balance, it is necessary to contact a service or notified body.

In balances comply with verification requirements performing calibration requires changing adjustment switch position, which is placed behind protecting mark (sticker) of a notified body. An access to the switch is possible only after removing the mark.

Before proceeding with calibration for balances comply with verification requirements, adjustment switch should be set to ON position using thin screwdriver (the balance will display the message Pr ON).

When calibration process, described on next page, is finished, the balance will display the message Pr ON. Adjustment switch should be set to OFF position using thin screwdriver (the balance will move to weighing).
17.1 Scale calibration (CALib)

Calibration with external weight should be performed if balance accuracy after internal calibration is not satisfactory. Calibration weight stated in technical data table for the balance (or of better accuracy) with valid verification certificate should be used then.

Calibration of legally verified balance requires violating a mark used to protect an access to adjustment switch and results in losing legal verification. To renew legal verification of the balance, it is necessary to contact a service or notified body.

In balances comply with verification requirements performing calibration requires changing adjustment switch position, which is placed behind protecting mark (sticker) of a notified body. An access to the switch is possible only after removing the mark.

Before proceeding with calibration for balances comply with verification requirements, adjustment switch should be set to ON position using thin screwdriver (the balance will display the message Pr ON).

When calibration process, described on next page, is finished, the balance will display the message Pr ON. Adjustment switch should be set to OFF position using thin screwdriver (the balance will move to weighing).

Calibration with external weight:

Press MENU key.

Press →T← key when CALib function appears.

The following options will be displayed:

- **CAL on** – calibration with external recommended standard of mass (see technical data).
- **CAL StP** – calibration with external weight, confirmation of successive steps - MENU key, “out” – leave without changes
- **CAL Prn** – calibration report,
- **CAL tM** – set time interval for internal calibration,
- **CAL °C** – set temperature difference for internal calibration,
- **out**.

Press →T← key when CAL StP option appears (calibration in two steps).

Press →T← key when weight value used for calibration is indicating or use othEr option and inscribe proper value (keys →0←, →-←, →T←)

Press MENU and wait for writing zero to the scale.

When LOAD message appears put standard of mass on the pan. Press MENU key (CAL on doesn’t need pressing MENU key).

Wait until internal calibration is finished and zero indication is displayed.
**Internal calibration options:**

Internal calibration of the balance is performed automatically every time the balance is switched on, additionally after given time interval during work and after every temperature change of more than given value.

In order to perform internal calibration in any moment, empty the pan and press ▼ key twice (one more pressing terminates calibration).

Press MENU key to display function menu and choose CALib function by pressing →T← key when it is displayed. The following options will appear:

- **CAL on** – perform calibration with external weight
- **CAL Prn** – printout of calibration report
- **CAL tM** – set time interval for internal calibration (1h – 6h)
- **CAL °C** – set temperature difference for internal calibration (1°C - 4°C)
- **out** – switch internal calibration off for internal calibration

Press →T← key when **CAL tM** option is displayed. Predefined time intervals for internal calibration will be displayed. Select required value pressing →T← key.

Accordingly choose **CAL °C** option pressing →T← key and selecting values of temperature difference.

Select **out** option to finish.
**The form of RSi balance calibration report printout** (option CAL Prn):

```
-------- CALIBRATION REPORT --------
ATA2200 MAX=2200g e=0.1g d=0.01g
S/N : 1234
PROD.DATE: 2013-12-16
FIRM.VER.: ATA102 2015-01-12 AD7710 NTC

FACTORY EXT.LOAD : 2000.00 g
FACTORY INT.LOAD : 196.131 g
CALIBRATION NO. : 1
CALIBRATION DATE : 2015-01-22
CALIBRATION TEMP1: 30.346 °C
CURRENT EXT.LOAD : 2000.00 g
CURRENT INT.LOAD : 196.131 g
WEIGHT DIFFERENCE: 0.00 g
```

**The form of RS balance calibration report printout** (option CAL Prn):

```
-------- CALIBRATION REPORT --------
ATZ2200 MAX=2200g e=0.1g d=0.01g
S/N : 1234
PROD.DATE: 2013-12-16
FIRM.VER.: ATA102 2015-01-12 AD7710 NTC

FACTORY EXT.LOAD : 2000.00 g
CALIBRATION NO. : 1
CALIBRATION DATE : 2015-01-22
CURRENT EXT.LOAD : 2000.00 g
```
17.2 Autozeroing function (AutotAr)

When the function is activated, the scale automatically ensures stable zero indication if the pan is empty or if zero indication was acquired by pressing $T\leftarrow$ key.

To turn on the function use MENU key and using $T\leftarrow$ key choose AutotAr and then Aut on.

To leave the function press MENU key, then choose AutotAr and Aut OFF.

Note:
1. AUt sign occurs only in scales with LCD display.
2. In scales with active $T\leftarrow$ key function changes name into AutoZE (autozeroing) and works only when the scales is unbiased.
### 17.3 Weight unit selection (UnIt)

The function allows selecting weighing unit:
- CarAt (1 ct= 0,2 g) - carat,
- MGrAM (1mg=0,001g) milligram,
- KGrAM (1kg=1000g) kilogram,
- Pound (1 lb=453,592374g) English pound,
- OunCE (1oz=28.349523g) - ounce,
- OunCEt(1ozt=31,1034763g) pharmaceutical ounce,
- GrAln (1gr=0,06479891g) - grain
- PennYW (1dwt=1,55517384g) jewellery mass unit,
- GrAM (1g) - gram.

The way of choosing carats as weighing unit is shown on the example.
17.4 Serial port parameters setting (SERIAL)

The function allows setting independently communication parameters of both of serial ports Port-1 and Port-2 (executed in RS232C, RS485, USB or LAN standard):

- transfer protocol (Prot):
  - LonG – cooperation with printer or computer,
  - EPL – cooperation with label printer in normal mode (activates LABEL function),
  - EPL_A – cooperation with label printer in automatic mode (activates LABEL function),
  - EPL_d – cooperation with special label printers,
  - Pen-01 – cooperation with PEN-01,

- baud rate (bAud): (4800, 9600, ….115 200bps),

- number of bits in single char. (bitS): 7, 8,

- parity control (PARity):
  - nonE – no control
  - Odd – nonparity
  - Even – parity control,

- scale number in network (nr):
  (if the scale doesn’t work in network the number must be 0),

- transmission through serial interface (Sending):
  - STAb – transmission after key is used and result is stable,
  - noSTAb – transmission after key is pressed without need of stabilisation,
  - Auto - automatic transmission after load is put on and result is stable (Auto),
  - Cont - continuous transmission, about 10 results per second (Cont.),
  - Remove – transmission after putting off the weight.

Default parameter values:
- LonG, 9600 bps, 8 bits, none, STAb,
- SCAnn – cooperation with MJ-4209 barcode readers.

In order to set needed parameters choose SERIAL function, select appropriate parameter and press →T← key when required option or parameter value is displayed.

In scales with an additional serial port appear Port-1 and Port-2, for the independent setting of both ports.
17.5 Printout configuration (Print)

Function is used for printing additional information stored in scale memory, weighed product identification data and scale operator id. That information is inscribed using scale keys or scanner.

The function allows to switch on/off following positions on the printout:
- **HEAdEr** – header: name, model and scale number,
- **USEr Id** – scale user identification number,
- **USEr nA** – user name,
- **Prn no** – successive printout number (choose this option to zero counter),
- **Prod Id** – product number,
- **Prod bA** – product barcode (inscribed or scanned),
- **Prod nA** – product name,
- **Count** – counting result (PCS function),
- **APW** – unitary mass (PCS function),
- **nEt** – net mass
- **tArE** – current tare value,
- **GroSS** – gross mass,
- **totAL** – total mass (totAL function)

**Attention:**
If **Prod Id** or **USEr Id** is chosen, it is possible to inscribe quickly their new values (with omission of main menu).

In order to do that hold (about 3 seconds) **MENU** key and release it when **Prod Id** or **USEr Id** indicates. Inscribe new value using keys:
- **→0←** increasing digit,
- **□** - decimal point,
- **→T←** next digit,
- **MENU** - end.

While inscribing **Prod id** user can use barcode reader connected to RS232C interface.

If the scale is equipped with two serial joints **Print** function is set independently for both interfaces.
Sample printout during normal weighing (all printout positions deactivated):

| 20.07 kg |
| 20.04 kg |
| 20.04 kg |

Sample printout during normal weighing with clock option (all printout positions deactivated):

| 20.07 kg 2012-11-08 10:01 |
| 20.04 kg 2012-11-08 10:01 |
| 20.04 kg 2012-11-08 10:01 |

Sample printout during normal weighing (some printout positions activated):

```
ATA220
MAX: 30kg e=d=0.01kg
S/N :

ID OPER. : 000001
DATE : 2012-11-08
TIME : 12:26
NO : 3
ID PROD. : 01
COUNT : 0 PCS
APW : 0.000 g
NET : 3.08 kg
TARE : 0.00 kg
GROSS : 3.08 kg
TOTAL : 0.00 kg
```
17.6 Weighing speed selection (SPEED)

Option enables to change weighing speed, that enables better performance thanks to adaptation to environment conditions.

To turn on the function use MENU key and choose SPEED option by using → ← key, then select one of these options:

- SLOW – slow measurement,
- MEd – medium,
- FAST – fast,
- DEFAULT – back to factory setting.

**Attention:**
When setting fast speed check if weighing results are stable. Otherwise use slower option.
17.7 Entering reference zero value (ZErO)

Note: This function is enabled in non-legalized scales only.

ZErO function allows entering new value of reference zero (value referred to empty pan) without need of contacting with authorised service centre.

Press MENU key.
When ZErO is displayed press \( \rightarrow T \leftarrow \) key.
On the display a sign ZEr Cod will show up momentary and the a dash on last digit position.

To enter code (in new scale: 1234) use keys:
\( \rightarrow 0 \leftarrow \) - increasing digit,
\( \rightarrow T \leftarrow \) - next digit,
MENU – end of inscribing.
The following options appear successively on display:
ZEr Cod – enter new secure code value,
ZEr SET – enter new zero value

Using \( \rightarrow T \leftarrow \) key, choose ZEr SET. Direct result from A/C converter will appear on scale display.
When the pan is empty press \( \rightarrow 0 \leftarrow \) key.
Wait for finishing zeroing process.

In order to change access code use
ZEr Cod option (as mentioned earlier).
18. **Special functions description**

All scales besides basic metrological functions: weighing and taring, have a set of special functions. Depending on meter type functions set differs. Below a list of functions available in standard ME-01 type meters:

- Add id number to product (Prod),
- Add id number to user (USER),
- pieces counting function (PCS),
- change of mass unit (Unit),
- percentage weighing function (PERC),
- selecting label number function (LABEL),
- weighing large animals function (LOC),
- entering tare function (TARE),
- maximum value indication function (UP)
- statistical calculations (STAT)
- paperweight calculation function (PAPER) – on demand

and functions that require additional equipment to be completely functional:

- options with the clock:
  - setting current date and time function (dAtE)
  - total weight function (tOtAL)
- options with the transoptors connectors (WY""):  
  - checkweighing function (thr)

LabEL function is available in scales with EPL or EPL-A transmission protocol activates (go to SetUp/SErIAL).
18.1 **Product and user identification (Prod and USEr)**

The balance enables to inscribe product barcode and user identification number:
- **Prod bA** – product barcode,
- **USEr Id** – user identification number.

Balance product barcode and user readout together with external devices (e.g. printer, label printer and computer) enables to build simple identification and archivisation systems.
Inscribing multi-digit data without using e.g. computer keyboard is inconvenient and using barcode reader is beneficial.
Inscribing data to base

*Prod* and *USEr* options enable inscribing single product and user data.

To inscribe data use keys:
- ▼ - increasing digit,
- →T← - next digit,
- MENU - end of inscribing.

Barcode reader (connected to RS232C interface) can also be used to inscribe data and this way it is faster and more effective.
18.2 Pieces counting function (PCS)

This function enables to count identical pieces, e.g. turnbuckles or buttons.

A measurement is performed in two phases:
- first phase - single piece weight calculation on the basis of defined pieces amount (5, 10, 20, 50, 100, 200 or 500 pieces),
- second phase – pieces counting.

First phase options:
- PCS.. – recalling of a value inserted earlier (this quantity must be inscribed earlier),
- PCS SET – set any amount of pieces in a sample,
- PCS APW – set unitary mass directly,
- PCS rS – inserting number of details in a sample and receiving of their mass from other scale connected by RS-232C.

It is advised that single piece weight is not less than one reading unit and sample weight used in first phase is bigger than 100 reading units.

To leave function press MENU key and then using →↓← key chose PCS and PCS oFF.

Note:
1. APW too LOW communicate signalises that a sample was not put on the pan or if single piece weight is less than one-tenth readout plot (counting is not possible).
2. APW LOW communicate signalizes that single piece weight is more than one-tenth but less than one readout plot. (counting possible but with bigger errors, result blinks).
3. In scales equipped with LED display pcs sign is replaced with “■”.
18.2 Pieces counting function (PCS)

This function enables to count identical pieces, e.g. turnbuckles or buttons. A measurement is performed in two phases:
- first phase – single piece weight calculation on the basis of defined pieces amount (5, 10, 20, 50, 100, 200 or 500 pieces),
- second phase – pieces counting.

First phase options:
- PCS – recalling of a value inserted earlier (this quantity must be inscribed earlier),
- PCS SEt – set any amount of pieces in a sample,
- PCS APW – set unitary mass directly,
- PCS rS – inserting number of details in a sample and receiving of their mass from other scale connected by RS-232C.

It is advised that single piece weight is not less than one reading unit and sample weight used in first phase is bigger than 100 reading units. To leave function press MENU key and then using  key chose PCS and PCS oFF.

Note:
1. APW too LOW communicates that a sample was not put on the pan or if single piece weight is less than one-tenth readout plot (counting is not possible).
2. APW LOW communicates that single piece weight is more than one-tenth but less than one readout plot. (counting possible but with bigger errors, result blinks).
3. In scales equipped with LED display pcs sign is replaced with “■”.

18.3 Percentage weighing function (PErC)

This function allows displaying weighing result in percents. A measurement is performed in two phases:
- first phase – weighing a reference sample (100%),
- second phase – measuring specific sample as a percentage of the reference sample.

Weighing result is displayed in different format, depending on the weight value of reference sample.

The function has the following options:
- PEr oFF – disable the function,
- PEr on – set current scale indication as 100% and activate percentage weighing,
- -out- exit without changing settings.

Note:
1. PEr Err message informs that reference 100% mass is less than 0,5*Min or was not defined.
2. In scales with LCD display sign “■” is replaced with %.
18.4 Label choosing function (LAbEL)

This function is used in scale with ELTRON (SERIAL function) data protocol. This protocol enables label printout with actual scale indication and chosen data from Print special function (variable data), for example date and time. Other data, for example company address, product name, barcode can appear on label as a constant text. Label patterns with number (4 digit) used by user should be saved in scale memory according to printer manual. Label pattern choice is made by inscribing label number using LAbEL function.

Press MENU button.
When LAbEL is displayed press →T← key.
Actual label number will show.
To enter new label number press →T← key, to exit function without number change press MENU.

To inscribe label number use keys:
▼ - digit increase,
→T← - next digit,
MENU - end.

After entering label number, putting load and pressing key will cause sending data to label printer.

Data format sent to label printer (label nr 1, language EPL-2):

<table>
<thead>
<tr>
<th>US</th>
<th>(55 53 0D 0A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FR*0001</td>
<td>(46 52 22 30 30 30 31 22 0D 0A)</td>
</tr>
<tr>
<td>?</td>
<td>(3F 0D 0A)</td>
</tr>
<tr>
<td>00:00</td>
<td>(30 30 3A 30 30 0D 0A)</td>
</tr>
<tr>
<td>2000.00.00</td>
<td>(32 30 30 30 2E 30 30 2E 30 30 0D 0A)</td>
</tr>
<tr>
<td>10 g</td>
<td>(20 20 20 20 20 31 30 20 20 67 0D 0A)</td>
</tr>
<tr>
<td>P1</td>
<td>(50 31 0D 0A)</td>
</tr>
</tbody>
</table>
18.5 **Weighing animals function (LOC)**

The function allows weighing animal moving on the scale.

Press *MENU* key.

When LOC function is displayed press \( \rightarrow T \leftarrow \) key.

The following options appear on display successively:
- LOC oFF – leave the function,
- LOC on – automatic weighing after loading the scale,
- LOC Prn – the measurement initiated manually by pressing \( \rightarrow T \leftarrow \) key.

When LOC on is displayed press \( \rightarrow T \leftarrow \) key.

Tare the scale using \( \rightarrow T \leftarrow \) key if necessary and place the animal on the pan.

Wait until the weighing result is averaged – scale display blinks. Then scale will show stable (averaged) result and will send it through serial port.

The result remains on display for about 30 second.

**Important notes:**

1. The loads lower than Min value are not averaged.
2. In case when putting animal on scale takes more than 5s it is suggested to choose LOC PRN option (measurement started manually by pressing \( \rightarrow T \leftarrow \) key).
18.6 Constant tare memory function (tArE)

This function enables to measure gross weight of a sample placed in a container of a known weight value (stored in the memory) and to display calculated net weight of the sample. Tare value is recalled from the memory with \( \rightarrow 0 \) or \( \rightarrow T \) key when the pan is empty. Tare value may be entered using keypad or by putting container on the pan.

**Inscribing tare value to memory:**

After pressing *MENU* key and choosing tArE function using \( \rightarrow T \) key, the following options are available:
- tAr off – leave the function,
- tAr on – activate the function with the previous tare value,
- tAr .. – sample tare value from the pan,
- tAr SET – enter tare value with keys: \( \rightarrow 0 \), \( \rightarrow T \), and *MENU*
- out – printout a setting value of tare.

Press \( \rightarrow T \) key when tAr SET is displayed. By pressing \( \rightarrow T \) key choose proper memory cell where tare will be stored: tAr 01, 02, ..., 10.

Choose inscribing method:
- MANuAL – inscribing using keys: \( \rightarrow 0 \), \( \rightarrow T \), and *MENU*,
- Pan – inscribing mass value that is on the pan.

After storing tare, the scale starts working with inscribed tare value.

*Note:*
Tare value is stored in memory also after unplugging the scale from the mains.
Weighing with constant tare:

In order to use tare value that is located in memory, choose from menu tArE function and then tAr on option. A list of memory cells will show up: tAr 01, 02, ..., 10. Cells with inscribed value are marked with "o" sign on the left side, active value marked with "●".

**ATTENTION**: In scales with LED display, cells with inscribed value are marked with "■".

Choose proper memory cell using →T← key.

tArE function is activated with chosen tare value. Moreover the scale will indicate nett weight (weight on the pan minus tare values). Using →T← key (or →0←, while empty pan) causes scale zeroing and then subtraction of recalled tare. Minus indication will show up.
18.7 Maximum value indication function (UP)

This function allows holding maximum (or minimum) value that is indicating at the moment.

Before measurement scale should be tared. Function has following options:
- UP oFF – function off,
- HIGH – holding maximum value,
- LOW – holding minimum value.
Pressing →T← key will cause result zeroing.

Note:
Autozeroing function and the stabilisation indicator are deactivated when UP function is running.
18.8 Total weight function (totAL)

The function allows calculating total weight for series of measurements, which can be greater than scale capacity. It allows calculating total weight as well as average value.

Press MENU key.
When totAL is displayed press →T← key.

The following options will appear successively:
- tot Prn - report printout without clearing total register,
- tot oFF - clearing total register, report printout and leaving the function,
- tot - working with receipt printout after each measurement,
- tot oFF - working without receipt printout,

Press →T← key when tot is displayed.
Perform measurement series by pressing key for storing results into total register.

In order to print and display results enter the function by choosing totAL and tot Prn option from menu.

The results are displayed in the following sequence:
- total weight (SUM ≺),
- number of registered measurements (n),
- average value (=),
regarding that moving to display successive result is performed after pressing key.
Attention: In scales with LED display SUM sign is replaced by “≈”.

In order to go back to total weighing without zeroing total register press key several times.
To leave the function with clearing total register, select **total** function from menu and choose **tot off** option. Scale prints the communicate informing about clearing registers.

The form of receipt after each measurement:

<table>
<thead>
<tr>
<th>Date:</th>
<th>...</th>
<th>Time: ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>measurement no</td>
<td>weight</td>
<td></td>
</tr>
<tr>
<td>measurement no</td>
<td>weight</td>
<td></td>
</tr>
</tbody>
</table>

Report form:

<table>
<thead>
<tr>
<th>Date: ...</th>
<th>Time: ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL WEIGHT =</td>
<td></td>
</tr>
<tr>
<td>NUMBER OF SAMPLES =</td>
<td></td>
</tr>
<tr>
<td>AVERAGE VALUE =</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

*When the scale doesn’t have an internal clock, Date and Time do not appear on printout.*

*Maximum number of measurements is 99 999.*

*Maximum total load 99 999 000d.*

*The weighing unit of the total value from the register (Total) is the same as the weighing unit stated on the keypad or is 1000 times greater, what is signalled by “o” indicator at the left of the display.*

*If the registered value is too big to be displayed, “E” communicate appears on the display. If the number of series is too high and cannot be displayed, “Err1” communicate appears on the display.*
18.9 **Checkweighing function (thr)**

This function allows comparing weighing result with two programmed reference values: lower and upper threshold. Comparison result is signalled with indicators (MIN, OK, MAX) and sound signal generated when threshold values are exceeded.

If comparison result is:
- smaller than zero threshold – no signal,
- smaller than lower threshold – the scale signals MIN (yellow colour),
- between threshold values - the scale signals OK (green colour, with the short sound signal),
- greater than upper threshold - the scale signals MAX (red colour, long sound signal).

The checkweighing results can be use to control:
- optical indicator (*Indication* mode),
- batching devices (*Batching* mode).

Standard scale is set for cooperation with optical indicator.

On outputs P1-P3 (*Relays* socket) short-circuit states appear as result of comparison scale indication with threshold values.

On the chart below output states are shown during increasing load on the scale for both working modes:

In *Batching* mode on P1 (thr I) and P2 (thr II) outputs short-circuit impulses appears for time of 0.5s. On P3 (zero) output short-circuit state appears when indication does not exceed threshold value signalling zero load.
Operation sequence:

Press **MENU** key and choose **thr** pressing →T← key.
The following options are displayed successively:

- **thr** off – deactivate the function,
- **thr** on – activate the function,
- **thr** Prn – check last threshold values (press ⬅️ key several times),
- **thr** CFG – choose Relays socket mode:
  - IMPULS - Batching mode
  - SIGNAL – Indication mode.

Choose **thr**-on option using →T← key. The following options for entering thresholds are displayed:

- **Set-LO** - set lower threshold value,
- **Set-HI** - set upper threshold value,
- **Set-ZEr** - set zero signalisation threshold.

Using →T← key select **Set-LO** option.
Set lower threshold value using the following keys:

- ▼ - digit increase,
- ⬅️ - decimal point,
- →T← - move to next digit,
**MENU** - finish.

Then select **Set-HI** option and enter upper threshold value.

Choosing **out** option will cause starting work with signalisation of exceeding thresholds and zero.

To change Relays socket mode use **thr** CFG option. Default option is **Indication**.

To leave the function, press **MENU** key and then choose **thr** and **thr** off options.
Relays connection diagram:

Relays output is the open collector transoptor output with load capacity 25mA / 24V. Transmitter inputs must be protected with diodes, e.g. 1N4148. It is advised to use MS3K/P electronic board (sold separately), consisting of RM96P transmitters, with DC24V input voltage and AC250V, 3A output.

Important notes:
1. After switching the scale on, both thresholds are set to maximum values.
2. When setting upper threshold value, pay attention that its value is not below lower threshold value.
3. Setting lower and upper threshold value is possible after sending appropriate orders from computer, what is described in scale user manual.
18.10 Setting date and time function (dAtE)

The function allows setting current date and time of scale internal clock and mode of its use. The function has the following options:
- dAt off – deactivate date and time during printout of current weighing result,
- dAt on – activate date and time during printout of current indication (key),
- dAt Set - change current date and time,
- dAt Pin – data and time secure password (to prevent from changing date and time by unauthorized personnel),
- dAt For – data printout in USA or EU format
- tM For – time printout in 24h or 12h format.

The example at the left presents how to set current date and time using dAt Set option.

After setting proper date and time activate it with dAt on option.
UE: rrrr-mm-dd gg:mm
USA: mm-dd-rrrr gg:mm AM/PM
(gg – hours, mm – minutes, AM – before noon, PM – after noon, mm - month, dd - day, rrrr - year).

Attention: Inscribing non-zero PIN value causes showing PIN sign during next date and time changing and inscribing 4 digit code is necessary. (using keys →0←, →T← and MENU).
18.11 Statistical calculations function (StAt)

This function evaluates from series of measurements (max 1000) statistical parameters of weighting process. Adding successively measurements to register is automatic and it occur after the scale is loaded and its indications stabilize. After each loading printout is made with: number of measurements, result, date and time (if clock is installed and the function is activated).

For the obtained measurements series the scale evaluates:

- **n** - number of samples
- **sum x** - sum of all samples  \( \text{sum } x = \sum x_n \)
- **\( \bar{x} \)** - average value \( (\text{sum } x)/n \)
- **min** - minimal value from n samples
- **max** - maximal value from n samples
- **max-min** - maximal value minus minima value
- **S** - standard deviation  
  \[ S = \sqrt{\frac{1}{(n-1)} \sum (x_n - \bar{x})^2} \]
- **srel** - variance factor  
  \[ srel = \frac{S}{\bar{x}} \]

Statistical calculations results can be printed.
Order of operations:

Press MENU key.
When STAT is displayed press →T← key.
The following options are displayed:

- **STA Prm** – monitoring and printout of statistical data,
- **STA oFF** – deactivate function,
- **STA □** – activate function, work with printout of chosen weighting results,
- **STA -** – activate function, work without printout,
- **STA n** – maximal samples value,
- **STA nM** – inscribing nominal value for statistics,
- **STA toL** – inscribing tolerance in %,
- **STA tAr** – automatic tare on/off
- **STA CFG** – function configuration:
  - **Auto** – Automatic work (samples are confirmed after loading the scale and indication stabilization.),
  - **ManuAL** – manual work (confirmation is made by pressing key).
- **out** – exit from function.

Remember first to inscribe nominal weight value and tolerance (mentioned above).

After that, push →T← key when STA o is displayed.

Put on successive objects on the pan (remove after indication stabilization) in order to add them to measurements register.

In order to obtain printed statistical results from measurements series press MENU key and →T← key when STAT is displayed and later STA Prm.

After printout two options are enabled:

- **rESET** – erasing results,
- **Contin** – continuation.
Pressing \( \text{MENU} \) key printouts estimated values and histogram:

Nominal - nominal value,
Tolerance - accepted value in percentage.

N - number of sample
IN TOL. – number of samples in toleranc
-TOL – amount of measurements
under allowable lower value
+TOL – amount of measurements above
allowable upper value
TOTAL - sum of weights of all n samples
AVERAGE – average weight as (Total)/n
MIN – minimum weight in n samples
MAX– maximum weight in n samples

ST. DEV. – standard deviation

ST. DEV.% – standard deviation percentage

To finish work with this function and
zeroing result register press MENU
key and then when StAt. and Sta oFF is
displayed press \( \rightarrow T \leftarrow \) button.

Statistics function cooperation with computer and
Printer. Scale can be equipped with two serial ports
marked as RS232C-I (computer) and RS232C-II
(printer). After each data printout by printer identical
set of data is sent to computer. After sending by
computer initialization signal S A CR LF
(53h 49h 0Dh 0Ah) the scale sends to computer
statistic data enclosed in histogram.

<table>
<thead>
<tr>
<th>NO.</th>
<th>SAMPLE</th>
<th>TOL-</th>
<th>NOM</th>
<th>TOL+</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10.007 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>2</td>
<td>28.125 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>3</td>
<td>28.126 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>4</td>
<td>30.205 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>5</td>
<td>30.204 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>6</td>
<td>30.201 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>7</td>
<td>48.557 g</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

\( \text{TOTAL} : 1264.664 \text{ g} \)
\( \text{AVERAGE} : 50.587 \text{ g} \)
\( \text{MAX} : 91.131 \text{ g} \)
\( \text{MIN} : 10.007 \text{ g} \)
\( \text{MAX-MIN} : 81.124 \text{ g} \)
\( \text{ST.DEV.} : 20.6480 \) g
\( \text{ST.DEV.} : 48.82 \% \)

\(--HISTOGRAM--

| (TOL- : | 0 |
| 0 | | |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |

\( \text{TOTAL} + \) 0 | 1 |
18.12 Function for summing recipe ingredients (rECIPE)

The function allows for separate weighing of several ingredients in one container with the possibility of reading current sum of all weighed ingredients.

The function includes the following options:
- rEC oFF – leave the function with the possibility of read sum mass,
- rEC on – start recipe weighing,
- rEC Con – continue previous recipe,
- -out – exit without changes.

When proceeding with recipe, successive ingredients (A, B, C, etc.) are weighed each time starting from zero indication, which is obtained after scale taring.

If several ingredients are weighed, their sum mass can be read (despite several taring). For this purpose use \( \Downarrow \) or rEC oFF option.

Using \( \Downarrow \) once again enables fast return to recipe.

In order to turn off rECIPE function press MENU key and then using \( \rightarrow T \leftarrow \) key choose rECIPE and rEC oFF.

Comments:
- o indicator on the left side of scale display shows rECIPE function is active.
- SUM indicator shown when rEC oFF option is used, disappears after using \( \rightarrow T \leftarrow \) key.
19. **Troubleshooting and maintenance**

1. The scale should be kept clean.
2. Take care that no dirt is between pan and casing of the scale. If dirt is noticed take the pan off (lift it up). Clean dirt and then put the pan on.
3. In case of improper operation caused by a short-lasting lack of power supply, switch the scale off by unplugging it from the mains, and then after several seconds switch it on.
4. Every repairs performed by unauthorized persons are forbidden
5. To repair the scale, please contact nearest service centre. The list of authorised service centres is given in guarantee card and on [www.axis.pl](http://www.axis.pl) website.
6. Scales can be sent for repair as messenger delivery only in original package. For transportation scale pan have to be protected against accidental pressing. If not, there is a risk of damaging the scale and loosing guarantee.

**Failure messages:**

<table>
<thead>
<tr>
<th>Message</th>
<th>Possible cause</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>C-1 ... 6</strong></td>
<td>negative result in one of autotests</td>
<td>contact service centre if the message remains</td>
</tr>
<tr>
<td>(more than 1min.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>scale is not</td>
<td>protecting screw remains in the scale</td>
<td>remove protecting screw</td>
</tr>
<tr>
<td>weighing</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>no pan on the scale</td>
<td>put the pan on</td>
</tr>
<tr>
<td></td>
<td>mechanical damage of scale sensor</td>
<td>contact service centre</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td>overweight of the scale</td>
<td>take a load off the pan</td>
</tr>
<tr>
<td></td>
<td>mechanical damage of the scale</td>
<td>contact service centre</td>
</tr>
<tr>
<td><strong>Err-b</strong></td>
<td>load left on the pan during start-up</td>
<td>take a load off the pan</td>
</tr>
<tr>
<td>Indicator does not work</td>
<td>unstable scale position, ground vibration, air flows</td>
<td>locate the scale in place where stable results are maintained</td>
</tr>
<tr>
<td></td>
<td>damage of the scale</td>
<td>contact service centre</td>
</tr>
<tr>
<td><strong>- - - - -</strong></td>
<td>taring not finished</td>
<td>contact service centre</td>
</tr>
</tbody>
</table>
Declaration of Conformity

We:

AXIS Spółka z o.o. 80-125 Gdańsk, ul.Kartuska 375B

confirm with all responsibility that scales

ATA220, ATA320, ATA520, ATA1200, ATA2200
ATA220, ATZ320, ATZ520, ATZ1200, ATZ2200

marked with CE mark comply the following:


Moreover scales with the following markings on the name plate:

- the number of the Notified Body responsible for EC verification
- two-digit number of the year of EC verification
- a green metrology sticker with "M" mark
- a protective seal affixed by the Notified Body

Additional information
- Conformity evaluation for the Council Directive 89/336/EEC were carried out by Laboratorium Badawcze Oddziału Instytutu Elektrotechniki in Gdańsk, accredited by PCA.

Gdańsk, 30.10.2015 r.

Per pro Director of AXIS Ltd:

Production Manager Jan Kończak

Signature